

February 12, 2021

Mr. Craig Rankine, Site Manager
Department of Ecology
12121 NE 99th Street, Suite 2100
Vancouver, Washington 98682

**Subject: Submittal of Second Semi-Annual 2020 Groundwater Monitoring Report
 NuStar Vancouver Facility
 Vancouver, Washington
 0060-002-008**

Dear Mr. Rankine:

Enclosed please find the *Semi-Annual Groundwater Monitoring Report: July through December 2020*. The report was prepared on behalf of NuStar Terminals Services, Inc. (NuStar) by Cascadia Associates, LLC (Cascadia) and presents data collected from July through December 2020.

If you have any questions or would like to discuss this further, please contact me at 503-906-6577 ext. 110.

Sincerely,



Stephanie Bosze Salisbury, L.G.
Senior Associate Geologist

ENCLOSURE

Semi-Annual Groundwater Monitoring Report July through December 2020 (2 hard copies)

cc: Mr. Joe Aldridge, NuStar Energy, L.P. (electronic deliverable)
 Ms. Patty Boyden, Port of Vancouver (electronic deliverable)
 Mr. Richard Roché, Parametrix (electronic deliverable)
 Mr. R.J. Sherman, P.G., Kinder Morgan (electronic deliverable)



**Semi-Annual Groundwater Monitoring Report
July through December 2020
NuStar Vancouver Facility
2565 NW Harborside Drive, Port of Vancouver
Vancouver, Washington**

Prepared for:

NuStar Terminals Services, Inc.

Prepared by:

**Cascadia Associates, LLC
5820 S Kelly Avenue, Suite B
Portland, Oregon 97239**

Project No. 0060-002-008

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July through December 2020
NuStar Vancouver Facility
2565 NW Harborside Drive, Port of Vancouver
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Prepared for:

**NuStar Terminals Services, Inc.
Project No. 0060-002-008
February 2021**

Prepared by:

**Lindsay Wallis
Senior Staff Environmental Scientist, Cascadia Associates**



**Stephanie Bosze Salisbury, L.G.
Senior Associate Geologist, Cascadia Associates**

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1.0 INTRODUCTION

This semi-annual groundwater monitoring report was prepared by Cascadia Associates, LLC (Cascadia) on behalf of NuStar Terminals Services, Inc. (NuStar) for the NuStar Vancouver Facility (Facility) in Vancouver, Washington (Figure 1). This report presents the results of the groundwater monitoring activities completed at the Facility during the third and fourth quarters of 2020. Additionally, the report includes a summary and evaluation of interim action monitoring data for the reporting period.

The Facility is located at the Port of Vancouver (POV) Terminal No. 2 in Vancouver, Washington (Figure 1). The Facility Site Plan is shown on Figure 2. The property address is 2565 NW Harborside Drive, Port of Vancouver, Vancouver, Washington 98660 (Latitude: N45° 38.26', Longitude: W122° 42.20'). The property is owned by the POV and leased by NuStar; the current extent of the leasehold is shown on Figure 2. The Facility is on the north shore of the Columbia River. Land adjacent to the Facility is industrial property also owned by the POV. The Facility is approximately 19 acres in size located on Clark County Tax Lot Nos.: 151979-000, 502010-002, 502010-000, and a portion of 502020-000, as well as a portion of the Washington Department of Natural Resources tideland area managed by the POV.

2.0 GROUNDWATER MONITORING FIELD ACTIVITIES

The groundwater monitoring was performed in general accordance with the *Groundwater Monitoring Plan* (GWMP; Ash Creek, 2008), which was approved by the Washington State Department of Ecology (Ecology) in a letter to NuStar dated July 30, 2009. The monitoring program for the third and fourth quarters of 2020 is summarized in Table 1. Deviations from the Table 1 program include the exclusion of sampling monitoring well EX-1, which was decommissioned during the third quarter 2019 and awaiting replacement, as described in further detail in Section 7.0.

Two monitoring events were conducted during this period: the “third quarter” 2020 groundwater monitoring event was conducted from October 5 through 9, 2020, and the fourth quarter 2020 event was conducted from December 7 through 10, 2020. The third quarter monitoring event was initially scheduled for mid-September but could not be conducted as scheduled due to hazardous air quality in the region associated with forest fires. On September 17, 2020, a request was made to Ecology to postpone the monitoring event until early October when air conditions would likely be improved. Ecology approved the extension request on the same day. While the October 2020 event was technically conducted during the fourth quarter 2020, the event is referred to in this document as the “third quarter” monitoring event to prevent confusion with the December 2020 monitoring event.

2.1 WATER LEVEL MEASUREMENTS

Third quarter 2020 groundwater levels were measured on October 5, 2020, and fourth quarter 2020 groundwater levels were measured on December 7, 2020. The depth to groundwater was

measured at Facility monitoring wells, multi-level groundwater monitoring (MGMS) wells, and selected off-site wells (MW-14, MW-17, MW-23i, MW-25i, MW-26, MW-E, MW-F, MW-G, S-1, and S-2). Monitoring well locations are shown on Figure 2.

Depth to groundwater and groundwater elevation data are summarized in Table 2. The wells are screened in three different groundwater zones: Shallow, Intermediate, and Deep as defined in the Remedial Investigation report for the Facility (Apex, 2013).

2.2 MONITORING WELL SAMPLING AND ANALYSIS

The sampling and analysis program for third and fourth quarter 2020 is summarized in Table 1. Groundwater monitoring data sheets for the sampling events are included in Appendix A. For quality assurance/quality control (QA/QC), field blanks and equipment blanks were prepared, and sample duplicates were collected from wells MW-7, MW-12, MW-19, and MGMS3-40 during the third and fourth quarter 2020 sampling events.

For both sampling events, the samples were uniquely labeled, stored in insulated coolers with ice, and transported under chain-of-custody protocol to Apex Laboratories of Tigard, Oregon, for laboratory analysis. Samples were analyzed for halogenated volatile organic compounds (HVOCs) by U.S. Environmental Protection Agency (EPA) Method 8260B. Select samples were analyzed for total organic carbon (TOC) by SIM 5010C. Groundwater analytical results for both events are shown in Table 3. Historical data are tabulated in Appendix B.

The terminal handled and distributed bulk fertilizer products, primarily urea but also mono-ammonium phosphate, continuously from 2013 up until September 2020. The former contract with the fertilizer supplier has been terminated and it is uncertain whether fertilizer will be handled at the terminal in the future under a new contract. Urea cannot be directly measured in water but can be estimated by analysis of the primary urea constituents: ammonia, nitrate, and nitrite. To evaluate for urea in groundwater during the third and fourth quarter 2020 monitoring events, Facility monitoring wells were sampled for nitrate as nitrogen and nitrite as nitrogen by EPA Method 300.0 and ammonia as nitrogen by EPA Method 350.1.

Samples from select wells were also analyzed for ethene, ethane, and methane to assist in evaluating remedial parameters. Apex Laboratories subcontracted to Air Technology Laboratories of City of Industry, California, using chain-of-custody protocols, for laboratory analysis of ethene, ethane, and methane by Method RSK-175.

3.0 GROUNDWATER ELEVATIONS

Groundwater elevations and estimated elevation contours for the Shallow and Intermediate Zone wells for the third quarter 2020 are shown on Figures 3 and 4, respectively. Groundwater elevations and estimated elevation contours for the Shallow and Intermediate Zone wells for the fourth quarter 2020 are shown on Figures 5 and 6, respectively.

3.1 THIRD QUARTER 2020

Shallow Zone. On October 5, 2020, depth-to-groundwater measurements were made at Shallow Zone monitoring wells in accordance with the groundwater monitoring plan provided in Table 1. The observed depths to groundwater in these wells ranged from 26.88 to 33.81 feet below the top of casing (BTOC), and the corresponding groundwater elevations in these wells ranged from 3.50 to 6.58 feet above mean sea level (MSL; Table 2).

During the third quarter 2020 monitoring event, gauging of the Shallow Zone wells was completed between 9:36 AM and 2:41 PM. During that time interval, the water level in the adjacent Columbia River decreased by 1.96 feet. River stage data were obtained from the nearest National Oceanographic and Atmospheric Administration (NOAA) tide station (Columbia River—Vancouver), which is located approximately 0.5 mile upstream of the Facility.

As shown in Table 2, groundwater elevations on average were 5.9 feet lower in October 2020 than during the previous monitoring event in June 2020. During the third quarter 2020 gauging event, and consistent with previous gauging data, there was a northwest to eastern groundwater divide between wells MW-10 located in the northwest and well MW-15 located in the east. To the south/southwest of the divide, groundwater flow was to the river; and to the north/northeast of the divide, groundwater flow was away from the river to the east/northeast (Figure 3).

Intermediate Zone. On October 5, 2020, depth-to-groundwater measurements were made at Intermediate Zone monitoring wells in accordance with the groundwater monitoring plan provided in Table 1. Groundwater levels in Intermediate Zone wells were measured during a predicted tidal inflection to minimize the magnitude of tidal influence on water levels during the gauging event. Water levels were measured from Intermediate Zone wells between 11:20 AM and 2:46 PM on October 5, 2020. During the time interval in which Intermediate Zone wells were gauged, water levels in the adjacent Columbia River decreased by 1.20 feet.

During the October 5, 2020 water level measurements, the observed depths to groundwater in the Intermediate Zone wells ranged from 28.38 to 30.13 feet BTOC, and groundwater elevations in these wells ranged from 3.13 to 4.32 feet above MSL (Table 2). As shown in Table 2, groundwater elevations in the Intermediate Zone were approximately 5 feet lower in October 2020 than during the previous monitoring event in June 2020. During the October 2020 gauging event, the Intermediate Zone groundwater gradient beneath the Facility was toward the river to the south/southwest (Figure 4).

Deep Zone. Depth to groundwater was measured in well MW-24d, which is screened from 210 to 230 feet below ground surface (bgs), within the Troutdale Formation. Depth to water in well MW-24d was 28.26 feet BTOC, corresponding to an elevation of 5.65 feet above MSL. A groundwater potentiometric map was not prepared for Deep Zone groundwater.

3.2 FOURTH QUARTER 2020

Shallow Zone. On December 7, 2020, depth-to-groundwater measurements were made at Shallow Zone monitoring wells in accordance with the groundwater monitoring plan provided in Table 1. The observed depths to groundwater in these wells ranged from 26.18 to 33.38 feet BTOC, with groundwater elevations ranging from 4.69 to 6.57 feet above MSL (Table 2).

During the fourth quarter 2020 monitoring event, gauging of the Shallow Zone wells was completed between 9:34 AM and 11:49 AM. During the gauging activities, the water level in the adjacent Columbia River increased by 0.75 foot with a maximum river stage difference of 0.77 foot. As shown in Table 2, groundwater elevations on average were around 1 foot higher in December 2020 than the previous gauging event in October 2020.

A northwest to southeast trending groundwater divide was observed in the western and central portion of the property between wells MW-10 and MW-3. To the south/southwest of the divide, groundwater flow was to the river; and to the north/northeast of the divide, groundwater flow was away from the river to the east/northeast (as shown on Figure 5).

Intermediate Zone. During the December 7, 2020 gauging event, depth to groundwater was measured in Intermediate Zone wells between 10:30 AM and 12:31 PM. During this time period, water levels in the adjacent Columbia River decreased by a net 0.03 foot with a maximum river stage difference of 0.25 foot. The observed depths to groundwater in Intermediate Zone wells ranged from 26.68 to 29.34 feet BTOC, and groundwater elevations in these wells ranged from 4.59 to 5.69 feet above MSL (Table 2). As shown in Table 2, groundwater elevations on average were around 1 foot higher in December 2020 than the previous monitoring event in October 2020. During December 7, 2020 gauging event, groundwater flow was relatively flat, with an isolated groundwater high around well S-1, but a slight riverward gradient to the southeast of well S-1 (Figure 6).

Deep Zone. Depth to water in Deep Zone well MW-24d was 28.80 feet BTOC, corresponding to an elevation of 5.11 feet above MSL (Table 2).

4.0 GROUNDWATER SAMPLE ANALYTICAL RESULTS

Complete copies of the laboratory reports for the third and fourth quarter 2020 groundwater monitoring events, including the quality assurance evaluation report and chain-of-custody documentation, are included in Appendix C.

4.1 THIRD QUARTER 2020

The October 2020 monitoring program included the collection of groundwater samples from the wells identified in Table 1. Groundwater samples from these wells were analyzed for HVOCs, nitrate as nitrogen, nitrite as nitrogen, and ammonia as nitrogen. The HVOC and nitrate/nitrite/ammonia

results for third quarter 2020 are summarized in Tables 3 and 4, respectively; VOC data are shown on Figure 7, and nitrate and ammonia results are shown on Figure 8.

4.2 FOURTH QUARTER 2020

The December 2020 monitoring program included the collection of groundwater samples from the wells as shown in Table 1 with the exception of the sample from monitoring well MW-24d. Field staff were unable to collect a sample from well MW-24d as they could not insert the bladder pump ensemble to the target depth as in previous events. After several troubleshooting attempts, the field staff still could not insert the ensemble into the casing without encountering what felt like an obstruction at depth. It is possible that the tubing was bent or coiled, thus limiting access at depth. During the next monitoring event, new tubing will be dedicated to see if this allows sufficient access without obstruction.

The monitoring well samples were analyzed for HVOCs, nitrate as nitrogen, nitrite as nitrogen, and ammonia as nitrogen. The sample results for fourth quarter 2020 are summarized in Tables 3 and 4; VOC data are shown on Figure 9, and nitrate and ammonia results are shown on Figure 10.

4.3 EVALUATION OF RESULTS

VOC concentration trend plots for each monitoring well are provided in Appendix D. Monitoring results demonstrate decreasing VOC concentration trends in Shallow and Intermediate Zone groundwater in 30 of 33 monitoring wells. VOC concentration trends were slightly increasing for trichloroethene (TCE) in wells MW-17, MW-19, and MGMS3-132 and tetrachloroethene (PCE) in wells MW-17 and MGMS3-132. The concentrations of PCE and TCE in wells MW-17 and MGMS3-132 have consistently been variable and relatively low (i.e., PCE ranging from less than 1 microgram per liter [$\mu\text{g/L}$] to 16.3 $\mu\text{g/L}$ for MGMS3-132 and TCE ranging from less than 0.5 $\mu\text{g/L}$ to 28.2 $\mu\text{g/L}$ for MW-17); therefore, it is difficult to identify a discernable concentration trend for the wells. While concentrations of PCE have declined in well MW-19, concentration trends for TCE have been predominately stable to slightly increasing. The increase in TCE may be the result of the conversion of chlorinated hydrocarbon mass from PCE to TCE during reductive dechlorination. A discussion of reductive dechlorination and total molar ethene mass is presented in Section 5.3.

Ammonia, nitrate, and nitrite results are provided in Table 4 and on Figures 8 and 10. The highest concentrations of ammonia and nitrate were found in the western area of the property in Shallow Zone groundwater. Concentrations of ammonia and nitrate in the Intermediate Zone groundwater were more similar throughout the Facility, with slightly higher concentrations being found in localized areas in the center of the Facility. Fertilizer products have historically been stored at the Facility, although the specific products and storage areas have changed over time. Historical fertilizer handling operations ceased in late August 2008. The Facility obtained a new contract in 2014, and, at that time, resumed fertilizer handling and distribution processes. This fertilizer contract continued until it was terminated and the last shipment was received in September 2020. There is currently no active receiving, handling or distribution of fertilizer products at the NuStar facility. Historical nitrate results are also provided in Table 4. For wells in which historical data are

available, the concentrations of nitrate and ammonia in October and December 2020 are generally similar to or less than historical results. A Supplemental Remedial Investigation (SRI) will be initiated in the first semi-annual 2021 reporting period, upon Ecology approval, to further assess the nature and extent of ammonia, nitrates, and nitrites in groundwater at the Facility.

5.0 INTERIM ACTION MEASURE ACTIVITIES

Several interim actions have been implemented at the Facility, as listed below.

- Between 2000 and 2005, a remediation system operated at the Facility that included: (1) a re-circulating system to treat groundwater, and (2) vapor extraction to treat soil. The interim action system pumped groundwater from extraction wells installed near the river, treated the pumped water with potassium permanganate, and then filtered and pumped the water into a series of injection wells along the railroad tracks. For soil, a soil vapor extraction (SVE) system withdrew soil vapors from wells IW-1, IN-2, IN-3, IN-4, EX-1, EX-3, EX-4, and EX-5. This SVE system was inactivated in 2005 because it no longer was removing significant VOC mass.
- Bioremediation injections for remediation of Facility groundwater and the installation of an SVE system for the remediation of HVOCs in vadose-zone soils was completed in the spring/summer of 2008. These activities are herein referred to as the 2008 interim action. This SVE system has been operating since 2008.
- The SVE system was expanded and additional bioremediation injections were completed during the summer of 2011, which is referred to herein as the 2011 interim action. Details of the 2008 and 2011 interim actions are provided in the Interim Action Installation Report (Ash Creek, 2009b) and the 2011 Interim Action Evaluation Report (Ash Creek, 2012), respectively.
- Additional bioremediation injections were completed in 2016 adjacent to the seawall at the Facility in accordance with the 2015 Interim Action Work Plan (Apex, 2016). This work is referred to as the 2016 interim action. The Interim Action Summary Report (Apex, 2017) describes the scope and preliminary results of the 2016 interim action.

The 2008, 2011, and 2016 interim actions and results to date are described in the following subsections.

5.1 SUMMARY OF 2008 AND 2011 INTERIM ACTIONS

The 2008 interim action consisted of SVE in the vadose zone and enhanced anaerobic bioremediation of the Shallow Zone groundwater. The 2008 enhanced bioremediation locations and the SVE system layout are shown in Appendix E. The 2008 SVE system removed approximately 3,150 pounds of HVOCs between startup in September 2008 and the expansion in 2011. The mass removal rate at startup in 2008 was 58.8 pounds per day (lbs/day). The removal rate decreased to

an average of 1.7 lbs/day by the third quarter of 2011. A mass removal chart for the 2008 SVE system is provided in Appendix E.

A soil and groundwater investigation in 2010 indicated that the 2008 interim action had reduced HVOCs in vadose-zone soils by 90 percent for PCE and 98 percent for TCE and had reduced total molar ethene concentrations in source area groundwater by 77 percent (Ash Creek, 2011). The investigation results were summarized in an appendix to the *2011 Interim Action Work Plan* (Work Plan; Ash Creek, 2011) that was submitted to Ecology on March 25, 2011. The Work Plan included a proposal for the expansion of the SVE system to include 17 additional SVE well locations, additional bioremediation injections in the 2008 interim action area, and bioremediation injections in an expanded interim action area. On May 23, 2011, Ecology approved the Work Plan. The bioinjection activities were conducted from July 21 through August 31, 2011, and the SVE installation activities were conducted from August 2 through 5, 2011, and August 29 through October 3, 2011. The 2008 and 2011 bioremediation injection locations are shown on Figure 11.

The initial Facility SVE system installed in 2008, herein referred to as the 2008 SVE system, was comprised of 17 wells, divided among five branches, which were connected by a network of underground piping as shown on drawings provided in Appendix E. As part of the 2011 SVE system expansion, Branches 4 and 5 were disconnected from the other system branches and were connected to a new blower unit located approximately 150 feet to the northeast of the railroad tracks (Figure 13). The wells and piping associated with Branches 4 and 5 and the associated blower unit are herein referred to as the North System.

In August 2011, 17 additional SVE well pairs (for a total of 34 additional SVE wells) were installed within and to the south of Warehouse No. 13 (a.k.a. the Butler Building), in general accordance with the Work Plan (Ash Creek, 2011; Figure 13). For each well pair, one well is screened in vadose-zone soils from 10 to 15 feet bgs and the second well is screened in vadose-zone soils from 15 to 25 feet bgs. These 17 well pairs, along with the Branch 1 through 3 wells from the 2008 SVE system, are piped underground to a blower unit located outside of the southeast corner of Warehouse No. 13. These SVE wells, associated underground piping, and the blower unit are herein referred to as the South System.

5.2 SUMMARY OF 2016 INTERIM ACTION

NuStar and the POV submitted a joint Feasibility Study (FS) to Ecology in March 2014 (Apex and Parametrix, 2014). To avoid potential delays in groundwater treatment while working through the FS and the associated regulatory approval process, NuStar proposed to implement a portion of the recommended remedial action for the NuStar source area as an interim action. The details of the proposed interim action were submitted to Ecology in an *Interim Action Work Plan* on September 15, 2015. After a 30-day public comment period from May 12 to June 10, 2016, the Work Plan was approved on June 14, 2016. The interim action consisted of bioremediation injections along the southern portion of the NuStar terminal near the seawall. Per Ecology's request, the interim action also included baseline sediment and surface water sampling in the

Columbia River. Additionally, enhanced bioremediation injections were implemented in an isolated area to the northwest of the NuStar terminal (the Northwest [NW] Area), which has been less responsive to monitored natural attenuation than at the NuStar terminal. The NW Area bioremediation injections were completed as a joint project between NuStar and the POV.

The NW Area injections were completed in July 2016 and included the injection of 52,000 gallons of bioremediation oil substrate (EosPro, diluted with water) into the Shallow Zone groundwater through 30 boreholes in the vicinity of and between (NuStar) monitoring wells MW-14 and MW-26. Figure 12 illustrates the approximate boring locations in the NW Area. The same substrate material was injected at the NuStar terminal in August and September 2016 and included the injection of 100,000 gallons of EosPro (diluted with water) into 72 borings along the southern portion of the Facility, adjacent to the seawall. Figure 12 identifies the approximate locations of the injection borings near the NuStar seawall. In accordance with the approved *Interim Action Work Plan*, a summary of the groundwater injection and surface/water sampling activities was provided to Ecology in an *Interim Action Summary Report* on June 29, 2017 (Apex, 2017). The report included the results of the baseline surface water and sediment sampling as well as the results of two quarters of post interim action groundwater monitoring. A brief evaluation of the groundwater monitoring results from the interim action area is summarized in Section 5.3 below.

5.3 INTERIM ACTION MONITORING AND EVALUATION

This section summarizes the scope and results of groundwater monitoring that has been performed to evaluate the effectiveness of interim actions. Effectiveness is evaluated by reviewing HVOC and ethene concentration trends and TOC concentrations in groundwater. Effectiveness of the SVE system is evaluated based on the mass removal rate.

5.3.1 Enhanced Bioremediation Injections

Groundwater samples collected from wells MP-1, MW-7, MW-12, MW-13, MW-19, MW-24i, MW-26, MGMS1-43, MGMS2-40, and MGMS3-43 during the third and fourth quarter 2020 events were analyzed for TOC by EPA Method 5310 D and ethene by Method RSK-175, to evaluate the performance of the bioremediation injections.

In addition to the laboratory analysis of groundwater samples, field measurements of oxidation-reduction potential (ORP) and dissolved oxygen (DO) were collected from the monitoring wells during the third and fourth quarter 2020 monitoring events. Table 5 shows the results of interim action groundwater monitoring from the February 2007 baseline event through the fourth quarter 2020 monitoring event. Wells MW-24i and MGMS2-40 are not located within the 2008 interim action injection area but are located within the footprint of the 2011 and 2016 interim action areas; therefore, interim action monitoring data for these wells are presented from the second quarter 2011 baseline event through the fourth quarter 2020. Wells MW-13, MW-14, MW-19, MW-26, MGMS-1, and MGMS-3 are not located within the 2008 or 2011 interim action areas but are within the 2016 interim action area; therefore, monitoring data for those wells are presented from September 2016 through December 2020.

A discussion of reductive dechlorination of HVOCs in groundwater from prior to the 2008 interim action through the fourth quarter 2020 is provided below.

5.3.1.1 VOC Concentrations Evaluation

Bioremediation injections in the primary source area at the Facility were initiated in 2008 and expanded in 2011¹; bioremediation injections along the riverbank and in the NW Area were completed in 2016. Additionally, seven injection boreholes were advanced in 2016 in the area of wells MP-1 and EX-1, located on the western side of the (former) primary source area. The following paragraphs evaluate the results to date in each of these areas.

Primary Source Area. Concentration trend plots for PCE, TCE, total dichloroethene (DCE), and vinyl chloride (VC) in 2008/2011 interim action area wells MW-7, EX-1, MP-1, and MGMS2-40 are provided in Appendix F. VOC data are included from the baseline monitoring event that was completed prior to the 2008 interim action (first quarter 2007; second quarter 2007 for well MGMS2-40) through December 2020. As described in Section 2.0, monitoring well EX-1 has not been sampled since the fourth quarter of 2018, but results through the fourth quarter 2018 monitoring event are included for completeness. The concentrations of PCE and TCE have decreased in each well. The concentrations of PCE and TCE in wells MW-7, EX-1, and MGMS2-40 have been reduced by more than 98 percent since the interim measures were initiated. The concentrations of PCE and TCE in well MP-1 have decreased by approximately 78 percent and 90 percent, respectively, between the February 2007 baseline event and the December 2020 monitoring event.

Another indicator of effective treatment of chlorinated ethenes is a decrease in the total molar chloroethene concentration (the molar concentration of PCE, TCE, DCE, and VC combined). The use of total molar concentrations allows an assessment of changes in the total number of related contaminant molecules as the reductive dechlorination process transitions from the relatively heavy PCE to the progressively lighter TCE, DCE, and VC. Molar concentration trend plots for wells MW-7, EX-1, MP-1, and MGMS2-40 are provided in Appendix F. Between the February 2007 baseline event and the December 2020 monitoring event, total molar concentrations in wells MP-1, MW-7 and MGMS2-40 decreased between 83 percent (well MP-1) to over 99 percent (well MW-7). Between the February 2007 baseline event and the December 2018 monitoring event, total molar concentrations in well EX-1 decreased over 99 percent.

Riverbank Area. Wells MW-12, MW-13, MW-19, MGMS1-43, and MGMS3-40 are located within the 2016 riverbank interim action area and, therefore, are useful for evaluating the effectiveness of the 2016 interim action. Concentration trend plots for PCE, TCE, DCE, and VC in these wells are provided in Appendix F. As shown on the trend plots, monitoring results from the 2016 interim action area indicate reductions in concentrations of PCE and TCE of over 95 percent in groundwater from wells

¹ The description of the primary source area or “source area” is detailed in the Remedial Investigation Report (Ash Creek, 2009a); the location is identified on Figure 2 of this report.

MW-12, MW-13, and MGMS3-40 after the 2016 enhanced bioremediation injections. For example, concentrations of PCE and TCE in well MW-13 in June 2016, prior to the injection event, were 2,470 and 1,820 µg/L, respectively. By December 2020, PCE and TCE were not detected at concentrations above the detection limit (0.400 µg/L). DCE concentrations have also decreased. The DCE concentrations in wells MW-12, MW-13, and MGMS3-40 have all been reduced by greater than 78 percent since the 2016 enhanced bioremediation injections; concentrations of DCE in well MGMS1-43 have decreased by approximately 81 percent since 2007 and 16 percent since 2016. Unlike wells MW-12 and MW-13, VOC concentrations in well MW-19 have not shown a response to the 2016 oil injections. Well MW-19 is in an area of consistently flat groundwater gradient, and it appears based on the TOC readings from this well (see Table 5) that the oil substrate did not reach the area of this well. However, the presence of VC in the groundwater samples from the well support that reductive dechlorination is occurring near the well.

The third and fourth quarter 2020 results showed a continued decrease of ethenes in most of the riverbank wells suggesting that the oil substrate is becoming depleted, and enhanced reductive dechlorination has slowed significantly in response. Additional discussion of ethene production is provided in the sections below. Future quarterly monitoring will be utilized to further evaluate these concentration trends, both in the Shallow Zone source area as well as outside of the source area treatment zone and in Intermediate Zone groundwater.

Northwest Area. Wells MW-14 and MW-26 are located within the 2016 NW Area interim action area and, therefore, are useful for evaluating the effectiveness of the interim action in this area. Concentration trend plots for PCE, TCE, DCE, and VC in these wells are provided in Appendix F. Response to the 2016 interim action injections was delayed and reduced in these wells, likely due to the typically flat or north/northwest groundwater gradient slowing the spread of the oil substrate. However, average concentrations of PCE and TCE pre-2016 injections remain higher than average concentrations post-2016 injections for MW-14 and MW-26, indicating that although injections were not as effective in the NW Area, there still has been moderate success at decreasing concentrations. These wells are located on the periphery of the injection area, limiting their utility in monitoring the effectiveness of the injections. Continued quarterly groundwater monitoring will be conducted to further evaluate concentration trends.

5.3.1.2 Ethene Evaluation

Ethene is an end product of the reductive dechlorination process. The detection of ethene confirms the completion of the reductive dechlorination pathway and the destruction of the target HVOCs at the Facility. Ethene degrades quickly in most natural environments; therefore, observing increases in ethene concentration can be difficult. During the second semi-annual 2020 monitoring period, ethene was detected in four of the eleven 2016 interim action area monitoring wells sampled (MW-12, MW-13, MGMS2-40, and MGMS3-40). Further discussion of ethene results is provided below.

Primary Source Area. While the focus of the 2016 interim actions was not located in the area historically identified as the “primary source area,” there was some overlap between the 2008/2011

interim action injection areas and the 2016 interim action injection area, namely in the vicinity of wells MP-1 and EX-1. Concentrations of ethene in well MP-1 reached a maximum of 328 µg/L in March 2017, decreased to 83.2 µg/L in June 2017, and then decreased to below reporting limits (1.0 to 13 µg/L) in all samples collected since then (September 2017 through December 2020). These data suggest that the 2016 bioremediation substrate injected near well MP-1 was effective for stimulating reductive dechlorination; however, the mass of substrate may be diminished.

Ethene has been detected in well EX-1, with the highest concentration measured in June 2018 (99.2 µg/L). In the September 2018 monitoring event, ethene was detected an order of magnitude lower (2.9 µg/L) and not detected in well EX-1 during the December 2018 monitoring event. As described in Section 2.0, well EX-1 has not been sampled since the December 2018 sampling event due to damage to the well and was abandoned in September 2019.

Monitoring well MGMS2-40 is located near, but outside of, the 2016 interim action injection area, and within the footprint of the 2011 interim action injection area. Ethene concentrations in well MGMS2-40 increased in response to the 2011 injections and remained elevated, although with variability through March 2018. Ethene was not detected in well MGMS2-40 in the July 2018 sample but has been detected during subsequent monitoring event samples, at concentrations ranging from 1.4 to 78 µg/L. The presence of ethene in several interim action area wells, along with decreasing PCE and TCE concentrations, indicate that reductive dechlorination has been ongoing near this well since the 2011 injections.

Riverbank Area. Prior to the 2016 interim action injections, ethene was not present in groundwater in wells located in the 2016 interim action area, including wells MW-12, MW-13, and MGMS3-40, as shown in Table 5. Since the completion of the 2016 interim action injections, ethene has been detected in all four 2016 interim action area wells. The presence of ethene suggests that the 2016 injections have successfully resulted in the complete reductive dechlorination of the PCE and TCE. A summary of the presence and persistence of ethene in each riverbank area interim action well is provided below; ethene concentrations are tabulated in Table 5:

- Ethene concentrations in well MW-12 increased from non-detect prior to the 2016 interim action, to 75.2 µg/L in March 2017, and remained elevated between March 2017 and September 2017. Concentrations of ethene in well MW-12 have been non-detect since November 2017 (reporting limit of 1.0 to 13.0 µg/L), except for detections in September 2019 (1.1 µg/L), October 2020 (56 µg/L) and December 2020 (3.6 µg/L).
- PCE and TCE concentrations in MW-13 have decreased significantly between September 2016 and December 2020 (from 5,090 µg/L and 951 µg/L, respectively, to <0.400 µg/L and <0.400 µg/L, respectively), but it was not until November 2017 that ethene was detected in the well. Since then, concentrations of ethene continued to rise to 500 µg/L by July 2018 and then decreased to 7.1 µg/L in December 2018. Ethene concentrations have been below the reporting limit (1.0 µg/L) since then, except for a detection in March 2020 (18.0 µg/L) and October 2020 (120 µg/L).

- Ethene was first detected in well MW-19 during the September 2017 monitoring event and was detected in every sampling event since (except for in December 2019, October 2020, and December 2020) with the highest concentration (271 µg/L) detected during the June 2018 sampling event. Concentrations have since decreased and were below the detection limit (1.0 µg/L) in the December 2019 sampling period and were detected at 7.5 and 5.0 µg/L in the first and second quarter 2020 sampling events, respectively, and then back to below the detection limit (1.0 µg/L) in the October 2020 and December 2020 sampling events. As previously stated, VC concentrations in groundwater samples collected from well MW-19 in the June 2018 monitoring event were the highest since the well was first sampled in 2002. Since then, concentrations of VC have continued to decrease. Collectively, these data confirm reductive dechlorination around well MW-19 and that chlorinated VOC mass is being degraded.
- Ethene was detected in well MGMS3-40 during the first monitoring event after the 2016 injections (December 2016) and has been detected during each subsequent monitoring event through December 2020, at concentrations ranging from 4.1 µg/L to 242 µg/L. The only exception being the December 2019 sampling event, when concentrations of ethene were below the detection limit (1.0 µg/L).

NW Area. Ethene concentrations in wells MW-14 and MW-26 have not been detected above the reporting limit (1.0 to 13 µg/L) since ethene monitoring was initiated in September 2016. As stated above, these wells are located on the periphery of the injection area, limiting their utility in monitoring the effectiveness of the injections.

5.3.1.3 *Total Organic Carbon Evaluation*

The presence of elevated TOC indicates that the bioremediation injections have increased the electron donor carbon source needed to reductively dechlorinate the HVOCs present in groundwater at the Facility. While a baseline monitoring event was not conducted prior to the 2016 injection event, TOC data are available for wells MP-1 and MW-12 (riverbank area) for the event prior to the injections (June 2016) and the two events concurrent with and following the injections (September and December 2016). TOC was further analyzed between March 2017 and December 2020 at select wells. TOC results are tabulated in Table 5. A discussion of the TOC results is provided below.

Primary Source Area. Seven bioremediation injection points were located near well MP-1 during the 2016 interim action. In well MP-1, TOC values increased by over three orders of magnitude between June and September 2016, with concentrations remaining elevated during the December 2016 event. During the March 2017 event, the TOC values remained stable from the previous event; however, TOC values decreased in June 2017 by an order of magnitude and further decreased in September 2017 by another order of magnitude before remaining stable through December 2020. At well EX-1, the TOC concentration increased by two orders of magnitude following the 2016 interim action injections, then decreased an order of magnitude during the

June 2017 event, and has remained relatively consistent since that time at concentrations ranging between 11 and 44 mg/L. As described in Section 2.0, well EX-1 has not been sampled since the December 2018 sampling event due to damage to the well and was abandoned in September 2019. These results indicate utilization of the oil substrate in the dechlorination of HVOCs, supporting the significant decreases in VOC concentrations observed following the 2016 bioremediation injections in this area.

Riverbank Area. The following describes TOC results in the riverbank portion of the 2016 interim action area (wells MW-12, MW-13, MW-19, MGMS3-40, and MGMS1-43).

- In groundwater collected from well MW-12, TOC concentrations increased by over three orders of magnitude between June and September 2016, with concentrations remaining elevated during the December 2016 monitoring event. Between December 2016 and March 2017, TOC concentrations in well MW-12 decreased by an order of magnitude and then gradually decreased another order of magnitude between June 2017 and June 2018. TOC concentrations have remained stable to slightly decreasing from July 2018 to December 2020.
- At well MW-13, TOC concentrations were elevated during the September 2016 sampling event, and then decreased by three orders of magnitude by the November 2017 event. TOC concentrations have remained relatively stable in well MW-13 through the December 2020 sampling event.
- At well MW-19, TOC values were low (one to two orders of magnitude below concentrations observed in wells MP-1 and MW-12) from September 2016 through November 2017, then increased by an order of magnitude in the March 2018 through June 2018 results. TOC concentrations decreased from June to September 2018, where they remained relatively stable (between 5.38 and 19.1 µg/L) through March 2020. Concentrations of TOC increased slightly in the June 2020 sampling event to 40.1 µg/L and then decreased to 19.7 µg/L and 17.3 µg/L in the October 2020 and December 2020 sampling events, respectively.
- At well MGMS3-40, TOC concentrations increased during the September and December 2016 groundwater monitoring events, then decreased by an order of magnitude during the March 2017 event and have remained stable through December 2020.
- At well MGMS1-43, the TOC concentration in groundwater has remained relatively low and steady from September 2016 through December 2020 and does not appear to be significantly influenced from the oil injections in 2016.

With the exception of well MGMS1-43, TOC concentrations in riverbank area wells indicate utilization of the oil substrate in the dechlorination of HVOCs, which is supported by decreasing VOC concentrations in most riverbank area wells.

NW Area. In wells MW-14 and MW-26, TOC concentrations did not increase after the September 2016 injections. TOC levels in these wells have historically been low and stable.

Concentrations of TOC in well MW-14 increased an order of magnitude, from 5.06 mg/L in September 2018 to 50.0 mg/L in December 2019 before decreasing to 4.22 mg/L in June 2020 and remained low and stable in the October and December 2020 sampling events (2.79 mg/L and 3.05 mg/L, respectively). TOC concentrations in this well will continue to be monitored to better assess the accuracy of the increased TOC measurement.

Summary of Enhanced Bioremediation Results Following the 2016 Interim Action. The 2016 groundwater interim action was implemented in July through September 2016 and included over 72 bioremediation injections at the NuStar Facility and 30 bioremediation injections at the off-facility Northwest Area. Since implementation, groundwater in the 2016 interim action area has been monitored for 18 quarters for indicators of reductive dechlorination. The results from the third and fourth quarter 2020 sampling events are consistent with previous events and indicate that reductive dechlorination is occurring. Specifically:

- Up to three orders of magnitude reduction of PCE and TCE concentrations have been observed between the September 2016 and December 2020 monitoring events in some of the 2016 interim action area wells.
- Observed trends in breakdown product concentrations are consistent with reductive dechlorination of chlorinated ethene compounds.
- After the 2016 injections, ethene was first detected in four riverbank interim action monitoring wells in March 2017. Detections of ethene in Facility wells have continued through December 2020, although concentrations are starting to taper off in many of the wells. TOC concentrations are also decreasing and are below 10 mg/L in the majority of wells, indicating that an additional injection event may be needed in the area to further reduce VOC concentrations and achieve site goals.

As identified above, wells MW-14 and MW-26 are located on the periphery of the injection area in the Northwest Area and provide limited utility in evaluating the effectiveness of the 2016 interim action in this area. However, VOC and ethene concentrations in these wells have continued to decrease supporting that reductive dechlorination is occurring in this area.

5.3.2 SVE Systems – Monitoring and Mass Removal Evaluation

The following paragraphs summarize the monitoring and analytical results as well as the total VOC mass removal for the North and South SVE Systems at the Facility. Field vapor measurements were collected with a photoionization detector (PID). Effluent vapor samples from the SVE systems were collected into Summa™ canisters and submitted to Eurofins Air Toxics Inc. in Folsom, California, for analysis of HVOCs by EPA Method TO-15.

The North SVE System has been non-operational since May 2017 due to the blower motor failing. The rotor is locked and blown fuses were noted on two of the three legs. A replacement blower is required to return the North SVE system to operation. The terminal is planning modifications to the rail alignment at the Facility to accommodate modifications to one of its storage areas; part of the

planned work will require the abandonment and potential relocation of several of the SVE wells in the North SVE system. As of December 2020, the modifications to the terminal infrastructure have not been initiated and the North SVE system remains non-operational.

Starting in May 2018, SVE monitoring events have occurred on a bi-monthly, rather than monthly, basis after it was deemed frequent enough to sufficiently maintain the system and quantify mass removal. During the January 2020 SVE monitoring event, corrosion was identified in the outlet from the knockout drum and the South SVE system was turned off to prevent the potential for leakage of effluent water. System repairs were planned for the spring/summer 2020 but were postponed due to health and safety concerns associated with the Covid-19 pandemic. A series of SVE blower, knockout drum, and piping valve repairs were conducted in November and December 2020. The South SVE system was returned online on December 7, 2020 and an SVE monitoring event was conducted on December 14, 2020.

North SVE System operating and analytical data are provided in Tables 6 and 7, respectively. As discussed above, the North SVE system was not operational during this reporting period; therefore, data are from the period prior to May 2017. South SVE System operating and analytical data are provided in Tables 8 and 9, respectively.

SVE System Mass Removal. The approximate VOC mass removed by the North and South SVE Systems is presented in Tables 10 and 11 and on Figures 14 and 15, respectively. The North and South Systems have removed approximately 232 and 4,435 pounds of HVOCs, respectively, since startup in October 2011. Including the mass removed from the 2008 SVE System, the total mass removal by SVE at the Facility to date is approximately 7,887 pounds.

6.0 INFRASTRUCTURE MAINTENANCE

The following sections describe maintenance on the SVE system infrastructure conducted up to and during the reporting period.

6.1 SVE SYSTEM

In November 2017, blue water was observed in the knockout drum for the south SVE system and has been observed intermittently since that time. Troubleshooting to find the source of the blue water has been ongoing. As detailed in previous groundwater monitoring reports prepared for the Facility since 2017, the condition of the SVE wells and piping, and the SVE system, has been continuously assessed to identify the source of the blue water.

During the January 10, 2020 SVE monitoring event, the outlet spout from the knockout drum was observed to be corroded through. When the system was on, no leaking was observed; however, when the system was turned off, effluent water was observed to leak from the corroded hole in the knockout drum outlet. To prevent potential leaks, the system was turned off until repairs could be completed. Because of this, additional SVE sampling was ceased until the system was repaired and put back online. The repair of the SVE system knockout valve was planned for the second quarter

2020 but was postponed due to health and safety concerns associated with the Covid-19 pandemic. On November 6, 2020, a representative of Telluric Enterprises, LLC (Telluric) replaced the outlet spout from the knockout drum. When attempting to turn the SVE system back on after this repair, it was discovered that the blower was seized, preventing the SVE system from being operational. Representatives of Telluric were able to perform repairs to the blower on December 7, 2020, after which the system was turned on.

During investigation to determine the source of the blue water in the knockout drum, many of the pipe valves located in the manifold vaults inside the Butler building were observed to be corroded through, thus allowing ambient air into the pipes, which were under vacuum. On December 8, 2020, representatives from Telluric replaced the corroded valves to the SVE system piping in the vaults located within the Butler building.

7.0 FUTURE ACTIVITIES

Groundwater monitoring on a quarterly basis and reporting on a semi-annual basis will continue in accordance with the Groundwater Monitoring Plan approved by Ecology in 2008 (Ash Creek, 2008).

As initially presented to Ecology in the *Well Decommissioning, Well Installation, and Well Monument Replacement Work Plan* that was submitted to Ecology on May 17, 2019 (Cascadia, 2019) and detailed further in the *Response to Ecology Letter Regarding the May 17, 2019 Well Decommissioning, Well Installation, and Well Monument Replacement Work Plan* (Cascadia, 2020a), NuStar plans to install the replacement monitoring well EX-1 adjacent to its former location and upgrade 16 flush monuments to utility vault style monuments. These upgraded monuments are designed to withstand heavy and high-volume truck traffic. At the request of Ecology, NuStar presented the utility vault specifications and installation procedures to Ecology in an email on June 23, 2020. After NuStar provided additional supporting information, Ecology approved the vault specifications and installation procedures in an email on July 14, 2020. NuStar is still waiting for approval on the proposed vault specifications from the POV engineering group. Once the POV approval is received, the vaults will be special ordered and installed.

In 2019, Ecology issued Agreed Order DE 15806 for a supplemental remedial investigation for the presence of metals in site media due to operations at the adjacent Kinder Morgan Bulk Terminal and ammonia, nitrates, and nitrites due to fertilizer operations at NuStar. NuStar will continue to analyze groundwater samples collected during the VOC monitoring program to support the assessments for Order DE 15806.

As a requirement of the Agreed Order, NuStar, the POV, and Kinder Morgan (the Parties) submitted a *Draft Supplemental Remedial Investigation Work Plan (SRIWP)* to Ecology in February 2020 (Cascadia, 2020b), proposing a soil, groundwater and sediment investigation to evaluate the nature and extent of metals and fertilizer constituents in site media. The Parties responded to Ecology's comments and provided a revised Draft SRIWP to Ecology in June 2020. The Parties received additional comments from Ecology in July 2020. On December 18, 2020, a final Supplemental

Remedial Investigation Work Plan was submitted to Ecology and was approved by the agency on December 21, 2020. In accordance with the Order, implementation of the SRIWP will commence by February 20, 2021, which is 60 days after Ecology approval of the Work Plan.

SVE operations and maintenance will resume bi-monthly in accordance with the schedule proposed in the 2011 Interim Action Evaluation Report (Ash Creek, 2012).

8.0 REFERENCES

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- Cascadia, 2020b. *Draft Supplemental Remedial Investigation Work Plan NuStar Terminals Services, Inc. Vancouver Main Terminal, Vancouver, Washington.* February 14, 2020.

TABLES

Table 1
Groundwater Monitoring Plan: Third and Fourth Quarters 2020
NuStar Vancouver Facility
Vancouver, Washington

Monitoring Program	Well ID	Included Monitoring Wells		Notes
		Third Quarter	Fourth Quarter	
Groundwater monitoring includes depth-to-water measurement.	MW-1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-14	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-15	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-16	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-17	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-18i	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-19	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-19i	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-20i	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-21i-40	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-21i-105	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-22i	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-23i	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-24i	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-24d	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-25i	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-26	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-30i	<input type="checkbox"/>	<input type="checkbox"/>	
	MW-31i	<input type="checkbox"/>	<input type="checkbox"/>	
	MW-32s	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
MW-32i	<input checked="" type="checkbox"/>	<input type="checkbox"/>		

Please refer to notes at end of table.

Table 1
Groundwater Monitoring Plan: Third and Fourth Quarters 2020
NuStar Vancouver Facility
Vancouver, Washington

Monitoring Program	Well ID	Included Monitoring Wells		Notes
		Third Quarter	Fourth Quarter	
Groundwater monitoring includes depth-to-water measurement.	MGMS1-3(43)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MGMS1-2 (60)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MGMS1-1(110)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	MGMS2-4(40)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MGMS2-3 (60)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MGMS2-2(110)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	MGMS2-1(132)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	MGMS3-4(40)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MGMS3-3(60)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MGMS3-2(101)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	MGMS3-1(132)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	MW-E	<input type="checkbox"/>	<input type="checkbox"/>	
	MW-F	<input type="checkbox"/>	<input type="checkbox"/>	
	MW-G	<input type="checkbox"/>	<input type="checkbox"/>	
	EW-1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	EX-1	<input type="checkbox"/>	<input type="checkbox"/>	
	MP-1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	MP-2	<input type="checkbox"/>	<input type="checkbox"/>	
	MP-3	<input type="checkbox"/>	<input type="checkbox"/>	
	MP-4	<input type="checkbox"/>	<input type="checkbox"/>	
S-1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
S-2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		

Notes:

- = Included in sampling program represented in this report.
- = Not included in sampling program represented in this report: water level measurement only.
- Wells MW-E, MW-G, MW-30i, MW-31i, and MW-32i are sampled by the Port of Vancouver.

Table 2
Groundwater Elevation Data: 2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number/ (TOC Elevation)	Date of Measurement	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
<i>Groundwater Monitoring Wells</i>			
MW-1 (32.60)	3/9/2020	26.34	6.26
	6/15/2020	23.22	9.38
	10/5/2020	28.05	4.55
	12/7/2020	27.76	4.84
MW-2 (34.04)	3/9/2020	28.26	5.78
	6/15/2020	24.61	9.43
	10/5/2020	29.65	4.39
	12/7/2020	29.16	4.88
MW-3 (34.41)	3/9/2020	27.65	6.76
	6/15/2020	24.11	10.30
	10/5/2020	29.78	4.63
	12/7/2020	27.84	6.57
MW-5 (33.86)	3/9/2020	27.15	6.71
	6/15/2020	23.40	10.46
	10/5/2020	29.14	4.72
	12/7/2020	27.97	5.89
MW-6 (32.83)	3/9/2020	27.26	5.57
	6/15/2020	22.89	9.94
	10/5/2020	27.94	4.89
	12/7/2020	27.24	5.59
MW-7 (33.74)	3/9/2020	26.94	6.80
	6/15/2020	23.18	10.56
	10/5/2020	28.92	4.82
	12/7/2020	28.01	5.73
MW-8 (33.97)	3/9/2020	26.71	7.26
	6/15/2020	23.92	10.05
	10/5/2020	28.29	5.68
	12/7/2020	28.02	5.95
MW-9 (33.86)	3/9/2020	26.99	6.87
	6/15/2020	23.36	10.50
	10/5/2020	28.99	4.87
	12/7/2020	28.12	5.74
MW-10 (34.83)	3/9/2020	26.65	8.18
	6/15/2020	24.19	10.64
	10/5/2020	28.25	6.58
	12/7/2020	28.30	6.53

Please refer to notes at end of table.

Table 2
Groundwater Elevation Data: 2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number/ (TOC Elevation)	Date of Measurement	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
MW-12 (31.43)	3/9/2020	25.16	6.27
	6/15/2020	21.36	10.07
	10/5/2020	26.88	4.55
	12/7/2020	26.72	4.71
MW-13 (33.15)	3/9/2020	26.66	6.49
	6/15/2020	23.45	9.70
	10/5/2020	28.41	4.74
	12/7/2020	27.35	5.80
MW-14 (33.81)	3/9/2020	27.03	6.78
	6/15/2020	22.98	10.83
	10/5/2020	29.02	4.79
	12/7/2020	28.22	5.59
MW-15 (39.13)	3/9/2020	32.23	6.90
	6/15/2020	29.17	9.96
	10/5/2020	33.81	5.32
	12/7/2020	33.38	5.75
MW-16 (33.05)	3/9/2020	27.13	5.92
	6/15/2020	23.76	9.29
	10/5/2020	28.61	4.44
	12/7/2020	28.11	4.94
MW-17 (32.65)	3/9/2020	27.20	5.45
	6/15/2020	22.71	9.94
	10/5/2020	27.98	4.67
	12/7/2020	27.49	5.16
MW-18i (33.40)	3/9/2020	27.60	5.80
	6/15/2020	24.18	9.22
	10/5/2020	29.17	4.23
	12/7/2020	28.28	5.12
MW-19 (33.59)	3/9/2020	27.03	6.56
	6/15/2020	23.43	10.16
	10/5/2020	28.85	4.74
	12/7/2020	28.09	5.50
MW-19i (33.62)	3/9/2020	27.98	5.64
	6/15/2020	24.24	9.38
	10/5/2020	29.48	4.14
	12/7/2020	28.61	5.01

Please refer to notes at end of table.

Table 2
Groundwater Elevation Data: 2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number/ (TOC Elevation)	Date of Measurement	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
MW-20i (33.14)	3/9/2020	27.75	5.39
	6/15/2020	29.98	3.16
	10/5/2020	28.96	4.18
	12/7/2020	28.09	5.05
MW21i-40 (34.10)	3/9/2020	28.30	5.80
	6/15/2020	24.93	9.17
	10/5/2020	29.85	4.25
	12/7/2020	28.99	5.11
MW-21i-105 (33.99)	3/9/2020	28.16	5.83
	6/15/2020	24.82	9.17
	10/5/2020	29.74	4.25
	12/7/2020	28.92	5.07
MW-22i (34.39)	3/9/2020	28.58	5.81
	6/15/2020	25.21	9.18
	10/5/2020	30.13	4.26
	12/7/2020	29.25	5.14
MW-23i (33.80)	3/9/2020	27.99	5.81
	6/15/2020	24.61	9.19
	10/5/2020	29.76	4.04
	12/7/2020	28.53	5.27
MW-24i (33.47)	3/9/2020	27.92	5.55
	6/15/2020	24.31	9.16
	10/5/2020	29.42	4.05
	12/7/2020	28.16	5.31
MW-25i (33.58)	3/9/2020	27.74	5.84
	6/15/2020	24.46	9.12
	10/5/2020	29.32	4.26
	12/7/2020	28.42	5.16
MW-26 (33.73)	3/9/2020	26.81	6.92
	6/15/2020	23.20	10.53
	10/5/2020	28.91	4.82
	12/7/2020	28.04	5.69
MW-24d (33.91)	3/9/2020	28.26	5.65
	6/15/2020	24.79	9.12
	10/5/2020	29.63	4.28
	12/7/2020	28.80	5.11

Please refer to notes at end of table.

Table 2
Groundwater Elevation Data: 2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number/ (TOC Elevation)	Date of Measurement	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
EW-1 (31.40)	3/9/2020	25.09	6.31
	6/15/2020	22.08	9.32
	10/5/2020	26.90	4.50
	12/7/2020	26.18	5.22
<i>Secor Interim Action Pilot Study Wells</i>			
S-1 (33.24)	3/9/2020	26.95	6.29
	6/15/2020	23.62	9.62
	10/5/2020	28.95	4.29
	12/7/2020	27.55	5.69
S-2 (33.15)	3/9/2020	27.34	5.81
	6/15/2020	23.69	9.46
	10/5/2020	29.53	3.62
	12/7/2020	28.46	4.69
<i>Multi-Level Monitoring Wells</i>			
MGMS1-3 (43)* (32.86)	3/9/2020	NM	NM
	6/15/2020	23.30	9.56
	10/5/2020	28.47	4.39
	12/7/2020	28.02	4.84
MGMS1-2(60)* (32.86)	3/9/2020	NM	NM
	6/15/2020	23.85	8.74
	10/5/2020	29.32	3.27
	12/7/2020	27.75	4.84
MGMS1-1(110)* (32.86)	3/9/2020	NM	NM
	6/15/2020	23.91	8.68
	10/5/2020	29.25	3.34
	12/7/2020	27.81	4.78
MGMS2-4(40)* (32.59)	3/9/2020	NM	NM
	6/15/2020	22.71	9.88
	10/5/2020	27.70	4.89
	12/7/2020	27.62	4.97
MGMS2-3(60)* (32.59)	3/9/2020	NM	NM
	6/15/2020	23.79	8.80
	10/5/2020	29.46	3.13
	12/7/2020	27.94	4.65
MGMS2-2(110)* (32.59)	3/9/2020	NM	NM
	6/15/2020	23.90	8.69
	10/5/2020	29.43	3.16
	12/7/2020	27.86	4.73

Please refer to notes at end of table.

Table 2
Groundwater Elevation Data: 2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number/ (TOC Elevation)	Date of Measurement	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
MGMS2-1(132)* (32.59)	3/9/2020	NM	NM
	6/15/2020	23.84	8.75
	10/5/2020	29.18	3.41
	12/7/2020	28.00	4.59
MGMS3-4(40)* (31.65)	3/9/2020	NM	NM
	6/15/2020	22.56	9.09
	10/5/2020	28.09	3.56
	12/7/2020	26.69	4.96
MGMS3-3(60)* (31.65)	3/9/2020	NM	NM
	6/15/2020	22.71	8.94
	10/5/2020	28.38	3.27
	12/7/2020	26.94	4.71
MGMS3-2(101)* (31.65)	3/9/2020	NM	NM
	6/15/2020	22.89	8.76
	10/5/2020	28.46	3.19
	12/7/2020	26.68	4.97
MGMS3-1(132)* (31.65)	3/9/2020	NM	NM
	6/15/2020	22.81	8.84
	10/5/2020	28.41	3.24
	12/7/2020	26.95	4.70
<i>Port of Vancouver Wells</i>			
MW-30i (29.77)	03/27/17	11.42	18.35
	06/12/17	15.55	14.22
	09/25/17	26.36	3.41
	11/06/17	Well Abandoned	
MW-31i** (31.33)	3/9/2020	NM	NM
	6/15/2020	NM	NM
	10/5/2020	NM	NM
	12/7/2020	NM	NM
MW-32s (34.34)	3/9/2020	28.14	6.20
	6/15/2020	24.45	9.89
	10/5/2020	29.68	4.66
	12/7/2020	29.01	5.33
MW-32i (34.41)	3/9/2020	28.63	5.78
	6/15/2020	25.21	9.20
	10/5/2020	30.09	4.32
	12/7/2020	29.34	5.07

Please refer to notes at end of table.

Table 2
Groundwater Elevation Data: 2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number/ (TOC Elevation)	Date of Measurement	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
MW-E ** (30.64)	3/9/2020	NM	NM
	6/15/2020	NM	NM
	10/5/2020	NM	NM
	12/7/2020	NM	NM
MW-F (33.48)	3/9/2020	28.57	4.91
	6/15/2020	25.16	8.32
	10/5/2020	29.98	3.50
	12/7/2020	NM*	NM*
MW-G (31.50)	3/9/2020	NM	NM
	6/15/2020	NM	NM
	10/5/2020	NM	NM
	12/7/2020	NM	NM

Notes:

1. TOC = Top of casing; BTOC = Below top of casing.
2. Utilizes new survey information from June 2010. NGVD29 datum (feet mean sea level).
3. * Water levels measurement points are located at the top of the plastic fittings mounted on the well covers.
4. NM = Not measured.
5. ** The casing has been modified at Port of Vancouver wells MW-E and MW-31i. The TOC elevation has not yet been re-surveyed, so groundwater elevation data for these wells is likely inaccurate.
6. The casing for well MW-10 was lowered during a recent monument replacement event. Top of casing information will be updated once the well is resurveyed.
7. NM* = Well dry or dedicated bladder obstructing ability to measure water levels.

Table 3
Groundwater Analytical Results: 2019-2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride
		Concentrations in µg/L (ppb)										
MW-1	3/10/2020	4.45	<0.400	<0.400	13.4	<0.400	<0.500	5.96	<0.400	<0.500	5.22	<0.400
	6/17/2020	2.95	<0.400	0.420	23.5	0.520	<0.500	12.1	<0.400	<0.500	7.75	0.460
	10/7/2020	6.45	<0.400	<0.400	104	1.41	<0.500	26.4	<0.400	<0.500	22.2	1.80
	12/8/2020	5.47	<0.400	0.512	62.6	0.968	<0.500	19.0	<0.400	<0.500	12.3	1.42
MW-2	3/12/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/17/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	10/8/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/9/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
MW-3	3/10/2020	1.77	<0.400	<0.400	48.9	1.97	1.03	192	2.74	<0.500	50.9	<0.400
	6/17/2020	<0.800	<0.400	<0.400	18.6	1.16	<1.00	115	1.38	<1.00	22.8	<0.800
	10/7/2020	5.30	<0.400	<0.400	62.9	1.02	1.10	169	1.57	<0.500	32.6	<0.400
	12/8/2020	<2.00	<2.00	<2.00	29.7	<2.00	<2.50	145	<2.00	<2.50	36.1	<2.00
MW-5	3/12/2020	<0.400	<0.400	<0.400	14.3	<0.400	<0.500	18.7	<0.400	<0.500	7.11	2.58
	6/18/2020	<0.400	<0.400	<0.400	10.4	<0.400	<0.500	17.3	<0.400	<0.500	18.3	0.410
	10/6/2020	<0.400	<0.400	<0.400	5.74	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	1.10
	12/10/2020	0.499	<0.400	<0.400	38.4	<0.400	<0.500	<0.400	<0.400	<0.500	3.67	4.77
MW-6	3/12/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/17/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	10/8/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/9/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
MW-7	3/11/2020	0.936	<0.400	<0.400	26.5	<0.400	<0.500	45.8	<0.400	<0.500	14.1	0.476
	3/11/2020 DUP	0.912	<0.400	<0.400	25.7	<0.400	<0.500	47.4	<0.400	<0.500	14.3	0.440
	6/18/2020	0.780	<0.400	<0.400	10.2	<0.400	<0.500	43.0	<0.400	<0.500	10.0	<0.400
	6/18/2020 DUP	0.850	<0.400	<0.400	11.1	<0.400	<0.500	40.8	<0.400	<0.500	10.1	<0.400
	10/8/2020	1.97	<0.400	0.481	23.1	<0.400	<0.500	49.5	<0.400	<0.500	19.7	<0.400
	10/8/2020 DUP	1.96	<0.400	0.431	23.6	<0.400	<0.500	50.2	<0.400	<0.500	19.6	<0.400
	12/9/2020	7.05	<0.400	1.41	56.3	0.552	<0.500	108	<0.400	<0.500	45.4	<0.400
	12/9/2020 DUP	6.83	<0.400	1.38	55.6	0.519	<0.500	106	<0.400	<0.500	44.5	<0.400

Please refer to notes at end of table.

Table 3
Groundwater Analytical Results: 2019-2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride
		Concentrations in µg/L (ppb)										
MW-8	3/11/2020	<0.400	<0.400	<0.400	3.44	<0.400	<0.500	0.929	<0.400	<0.500	<0.400	<0.400
	6/17/2020	0.770	<0.400	<0.400	12.1	0.450	<0.500	3.51	<0.400	<0.500	0.430	<0.400
	10/6/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	4.56	<0.400	<0.500	<0.400	<0.400
	12/10/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	3.97	<0.400	<0.500	<0.400	<0.400
MW-9	3/11/2020	<0.400	<0.400	<0.400	5.21	<0.400	<0.500	55.4	1.41	<0.500	18.1	<0.400
	6/18/2020	<0.400	<0.400	<0.400	5.27	<0.400	<0.500	109	1.44	<0.500	45.9	<0.400
	10/8/2020	1.78	<0.400	0.817	39.0	1.28	<0.500	191	2.95	<0.500	72.2	1.55
	12/9/2020	6.49	<0.400	1.63	211	6.98	<0.500	262	3.86	<0.500	158	2.68
MW-10	3/11/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	1.97	<0.400	<0.500	1.53	<0.400
	6/17/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	9.74	<0.400	<0.500	5.00	<0.400
	10/8/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	2.34	<0.400	<0.500	1.81	<0.400
	12/9/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	2.40	<0.400	<0.500	1.95	<0.400
MW-12	3/11/2020	0.803	<0.400	<0.400	8.18	0.515	<0.500	7.01	<0.400	<0.500	4.17	0.423
	3/11/2020 DUP	0.806	<0.400	<0.400	8.47	0.561	<0.500	6.95	<0.400	<0.500	4.25	<0.400
	6/18/2020	1.25	<0.400	<0.400	14.2	0.410	<0.500	2.49	<0.400	<0.500	2.60	1.10
	6/18/2020 DUP	1.30	<0.400	<0.400	14.1	<0.400	<0.500	2.59	<0.400	<0.500	2.68	1.04
	10/7/2020	36.6	<0.400	<0.400	80.9	0.582	<0.500	<0.400	<0.400	<0.500	0.745	184
	10/7/2020 DUP	37.8	<0.400	<0.400	81.7	0.632	<0.500	<0.400	<0.400	<0.500	0.750	196
	12/8/2020	1.55	<0.400	<0.400	9.92	<0.400	<0.500	13.5	<0.400	<0.500	6.47	7.36
	12/8/2020 DUP	1.52	<0.400	<0.400	9.61	<0.400	<0.500	12.9	<0.400	<0.500	6.24	7.12
MW-13	3/10/2020	9.19	<0.400	1.97	72.5	2.04	<0.500	<0.400	<0.400	<0.500	7.59	134
	6/18/2020	0.610	<0.400	<0.400	1.15	<0.400	<0.500	<0.400	<0.400	<0.500	1.12	5.28
	10/7/2020	18.1	<0.400	<0.400	3.47	0.920	<0.500	0.470	<0.400	<0.500	0.870	98.8
	12/8/2020	2.67	<0.400	<0.400	0.606	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	2.30
MW-14	3/11/2020	6.80	<2.00	2.72	186	2.45	<2.50	85.9	<2.00	<2.50	294	<2.00
	6/17/2020	3.50	<2.00	<2.00	82.6	<2.00	<2.50	62.6	<2.00	<2.50	197	<2.00
	10/8/2020	14.6	<2.00	4.79	207	<2.00	<2.50	124	<2.00	<2.50	680	<2.00
	12/9/2020	7.77	<2.00	3.04	180	2.52	<2.50	109	<2.00	<2.50	339	<2.00
MW-15	7/2/2018	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.596	<0.500	<0.500	<0.500	<0.500
	6/6/2019	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.531	<0.500	<0.500	<0.500	<0.500
	6/18/2020	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.540	<0.400	<0.500	<0.400	<0.400
	12/10/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	0.599	<0.400	<0.500	<0.400	<0.400

Please refer to notes at end of table.

Table 3
Groundwater Analytical Results: 2019-2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride
		Concentrations in µg/L (ppb)										
MW-16	3/11/2020	<0.400	<0.400	<0.400	8.67	<0.400	<0.500	79.0	0.552	<0.500	12.7	<0.400
	6/18/2020	1.07	<0.400	<0.400	23.8	<0.400	<0.500	27.3	<0.400	<0.500	5.89	0.420
	10/7/2020	<0.400	<0.400	<0.400	26.7	<0.400	<0.500	172	0.642	<0.500	35.9	<0.400
	12/9/2020	<0.400	<0.400	<0.400	15.7	<0.400	<0.500	122	0.550	<0.500	15.5	<0.400
MW-17	3/10/2020	1.06	<0.400	<0.400	18.7	<0.400	<0.500	4.74	<0.400	<0.500	11.6	<0.400
	6/17/2020	<0.400	<0.400	<0.400	5.11	<0.400	<0.500	4.06	<0.400	<0.500	7.40	<0.400
	10/7/2020	<0.400	<0.400	<0.400	2.28	<0.400	<0.500	1.75	<0.400	<0.500	3.61	<0.400
	12/8/2020	<0.400	<0.400	<0.400	17.9	<0.400	<0.500	4.76	<0.400	<0.500	8.70	<0.400
MW-18i	3/11/2020	<0.400	<0.400	<0.400	1.60	<0.400	<0.500	0.896	<0.400	<0.500	0.502	<0.400
	6/17/2020	<0.400	<0.400	<0.400	0.940	<0.400	<0.500	0.880	<0.400	<0.500	0.400	<0.400
	10/7/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	0.891	<0.400	<0.500	0.419	<0.400
	12/9/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	0.764	<0.400	<0.500	<0.400	<0.400
MW-19	3/11/2020	31.8	<10.0	55.4	1,290	<10.0	<12.5	4,600	28.8	<12.5	1,800	143
	3/11/2020 DUP	35.4	<10.0	60.4	1,450	14.8	<12.5	4,730	29.1	<12.5	2,010	154
	6/18/2020	25.7	<4.00	21.1	1,060	5.60	<5.00	1,000	9.40	<5.00	580	96.3
	6/18/2020 DUP	32.5	<20.0	27.5	956	<20.0	<25.0	1,080	<20.0	<25.0	697	95.0
	10/7/2020	44.5	<20.0	53.2	1,470	<20.0	<25.0	7,450	39.0	<25.0	2,760	52.4
	10/7/2020 DUP	46.9	<20.0	58.8	1,510	<20.0	<25.0	8,110	39.0	<25.0	2,920	53.8
	12/8/2020	54.5	<40.0	<40.0	1,150	<40.0	<50.0	3,880	<40.0	<50.0	1,110	117
	12/8/2020 DUP	70.8	<40.0	<40.0	1,330	<40.0	<50.0	3,300	<40.0	<50.0	1,210	87.9
MW-19i	3/12/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/18/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	10/7/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/10/2020	<0.400	<0.400	<0.400	0.489	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
MW-20i	3/11/2020	<0.400	<0.400	<0.400	9.21	<0.400	<0.500	2.32	<0.400	<0.500	1.26	<0.400
	6/17/2020	<0.400	<0.400	<0.400	1.93	<0.400	<0.500	0.410	<0.400	<0.500	<0.400	<0.400
	10/7/2020	<0.400	<0.400	<0.400	7.66	<0.400	<0.500	1.11	<0.400	<0.500	0.850	<0.400
	12/9/2020	<0.400	<0.400	<0.400	10.0	<0.400	<0.500	1.57	<0.400	<0.500	0.856	<0.400
MW-21i-105	3/12/2020	<0.400	<0.400	<0.400	2.48	<0.400	<0.500	3.60	<0.400	<0.500	2.02	<0.400
	6/18/2020	<0.400	<0.400	<0.400	1.59	<0.400	<0.500	3.08	<0.400	<0.500	1.49	<0.400
	10/8/2020	<0.400	<0.400	<0.400	1.76	<0.400	<0.500	4.60	<0.400	<0.500	1.96	<0.400
	12/9/2020	<0.400	<0.400	<0.400	1.88	<0.400	<0.500	3.53	<0.400	<0.500	1.62	<0.400

Please refer to notes at end of table.

Table 3
Groundwater Analytical Results: 2019-2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride
		Concentrations in µg/L (ppb)										
MW-21i-40	3/11/2020	1.95	<0.400	0.626	47.4	0.411	<0.500	31.2	<0.400	<0.500	17.6	<0.400
	6/17/2020	1.95	<0.400	0.540	45.9	0.400	<0.500	31.1	<0.400	<0.500	14.6	<0.400
	10/7/2020	2.16	<0.400	0.527	50.7	0.433	<0.500	32.7	<0.400	<0.500	18.7	<0.400
	12/9/2020	2.46	<0.400	0.558	53.3	0.486	<0.500	30.0	<0.400	<0.500	15.8	<0.400
MW-22i	3/12/2020	0.587	<0.400	<0.400	16.1	<0.400	<0.500	3.32	<0.400	<0.500	8.23	<0.400
	6/18/2020	0.580	<0.400	<0.400	13.6	<0.400	<0.500	3.17	<0.400	<0.500	7.62	<0.400
	10/8/2020	0.502	<0.400	<0.400	16.0	<0.400	<0.500	3.68	<0.400	<0.500	8.02	<0.400
	12/9/2020	0.565	<0.400	<0.400	15.6	<0.400	<0.500	4.07	<0.400	<0.500	7.86	<0.400
MW-23i	3/12/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/17/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	10/7/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/9/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
MW-24i	3/12/2020	1.30	<0.400	<0.400	15.4	<0.400	<0.500	17.0	<0.400	<0.500	8.42	<0.400
	6/18/2020	0.610	<0.400	<0.400	2.91	<0.400	<0.500	6.24	<0.400	<0.500	2.84	<0.400
	10/9/2020	<0.400	<0.400	<0.400	1.08	<0.400	<0.500	1.35	<0.400	<0.500	<0.400	<0.400
	12/10/2020	1.73	<0.400	<0.400	20.0	<0.400	<0.500	29.7	<0.400	<0.500	13.0	<0.400
MW-24d	12/3/2019	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/12/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/18/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	10/9/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
MW-25i	3/12/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/18/2020	<0.400	<0.400	<0.400	0.440	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	10/7/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/9/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
MW-26	3/11/2020	3.65	<2.00	<2.00	59.7	<2.00	<2.50	79.1	<2.00	<2.50	205	<2.00
	6/17/2020	5.16	<0.800	1.38	64.2	1.90	<1.00	143	2.20	<1.00	299	<0.800
	10/7/2020	2.64	<2.00	<2.00	62.8	<2.00	<2.50	118	<2.00	<2.50	208	<2.00
	12/9/2020	3.34	<2.00	<2.00	64.3	<2.00	<2.50	147	<2.00	<2.50	218	<2.00

Please refer to notes at end of table.

Table 3
Groundwater Analytical Results: 2019-2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride
		Concentrations in µg/L (ppb)										
MW-32s	3/25/2019	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	9/26/2019	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/13/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	10/9/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
EW-1	3/11/2020	<0.400	<0.400	<0.400	0.811	<0.400	<0.500	15.0	<0.400	<0.500	5.04	<0.400
	6/17/2020	<0.400	<0.400	<0.400	1.20	<0.400	<0.500	29.9	0.900	<0.500	6.78	<0.400
	10/7/2020	<0.400	<0.400	<0.400	3.30	<0.400	<0.500	44.7	0.449	<0.500	10.6	<0.400
	12/9/2020	<0.400	<0.400	<0.400	1.61	<0.400	<0.500	32.2	0.766	<0.500	8.64	<0.400
S-1	3/10/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	1.06	<0.400
	6/17/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	0.440	<0.400
	10/7/2020	<0.400	<0.400	<0.400	2.95	<0.400	<0.500	1.20	<0.400	<0.500	2.06	<0.400
	12/8/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	1.30	<0.400
S-2	3/10/2020	6.54	<0.400	<0.400	26.4	0.516	<0.500	<0.400	<0.400	<0.500	1.15	<0.400
	6/17/2020	4.24	<0.400	<0.400	15.5	<0.400	<0.500	<0.400	<0.400	<0.500	0.580	<0.400
	10/7/2020	10.2	<0.400	<0.400	54.4	0.539	<0.500	<0.400	1.01	<0.500	3.08	0.448
	12/8/2020	7.72	<0.400	<0.400	31.4	<0.400	<0.500	<0.400	<0.400	<0.500	1.13	<0.400
MGMS1-3(43)	3/11/2020	157	<10.0	29.7	3,230	60.4	<12.5	228	<10.0	<12.5	495	157
	6/16/2020	114	<10.0	21.8	2,520	31.5	<12.5	116	<10.0	<12.5	264	152
	10/6/2020	124	<10.0	26.0	2,980	45.5	<12.5	219	<10.0	<12.5	507	48.2
	12/10/2020	131	<20.0	<20.0	2,620	34.3	<25.0	151	<20.0	<25.0	294	40.6
MGMS1-2(60)	3/12/2020	1.32	<0.400	<0.400	15.6	<0.400	<0.500	26.5	<0.400	<0.500	11.8	<0.400
	6/16/2020	<0.400	<0.400	<0.400	4.23	<0.400	<0.500	12.4	<0.400	<0.500	6.01	<0.400
	10/6/2020	1.16	<0.400	<0.400	16.5	<0.400	<0.500	24.0	<0.400	<0.500	15.3	<0.400
	12/10/2020	1.54	<0.400	<0.400	13.1	<0.400	<0.500	20.3	<0.400	<0.500	10.0	0.640
MGMS1-1(110)	6/7/2019	3.55	<0.400	<0.400	102	<0.400	<0.500	13.8	<0.400	<0.500	24.2	<0.400
	12/4/2019	4.61	<0.400	<0.400	134	<0.400	<0.500	14.0	<0.400	<0.500	31.9	<0.400
	6/16/2020	4.22	<0.400	0.450	141	<0.400	<0.500	17.6	<0.400	<0.500	33.2	<0.400
	12/8/2020	5.56	<0.400	0.523	163	0.488	<0.500	16.1	<0.400	<0.500	32.7	<0.400

Please refer to notes at end of table.

Table 3
Groundwater Analytical Results: 2019-2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride
		Concentrations in µg/L (ppb)										
MGMS2-4(40)	3/12/2020	24.1	<0.400	2.73	105	0.641	<0.500	86.3	0.453	<0.500	43.3	134
	6/16/2020	27.3	<0.400	1.25	85.0	<0.400	<0.500	14.8	<0.400	<0.500	9.09	138
	10/6/2020	19.1	<0.400	2.45	98.4	0.635	<0.500	101	0.593	<0.500	56.2	148
	12/8/2020	17.8	<0.800	1.85	82.6	<0.800	<1.00	41.0	<0.800	<1.00	19.4	80.2
MGMS2-3(60)	3/12/2020	0.541	<0.400	<0.400	12.3	<0.400	<0.500	21.7	<0.400	<0.500	9.24	0.642
	6/16/2020	0.820	<0.400	<0.400	16.5	<0.400	<0.500	23.7	<0.400	<0.500	10.4	0.850
	10/6/2020	1.21	<0.400	<0.400	28.9	<0.400	<0.500	32.3	<0.400	<0.500	17.9	1.38
	12/8/2020	0.860	<0.400	<0.400	20.2	<0.400	<0.500	21.8	<0.400	<0.500	10.5	0.757
MGMS2-2(110)	6/4/2019	<0.400	<0.400	<0.400	2.37	<0.400	<0.500	3.44	<0.400	<0.500	2.04	0.770
	12/4/2019	<0.400	<0.400	<0.400	5.49	<0.400	<0.500	4.29	<0.400	<0.500	2.73	2.32
	6/16/2020	<0.400	<0.400	<0.400	2.91	<0.400	<0.500	4.19	<0.400	<0.500	2.50	1.17
	12/8/2020	<0.400	<0.400	<0.400	4.63	<0.400	<0.500	3.21	<0.400	<0.500	2.52	1.56
MGMS2-1(132)	6/4/2019	<0.400	<0.400	<0.400	5.43	<0.400	<0.500	2.76	<0.400	<0.500	2.13	2.07
	12/4/2019	<0.400	<0.400	<0.400	7.96	<0.400	<0.500	3.66	<0.400	<0.500	3.07	3.29
	6/16/2020	<0.400	<0.400	<0.400	4.37	<0.400	<0.500	3.79	<0.400	<0.500	2.50	1.99
	12/8/2020	<0.400	<0.400	<0.400	7.82	<0.400	<0.500	3.34	<0.400	<0.500	3.14	2.84
MGMS3-4(40)	3/12/2020	12.8	<0.400	2.43	418	0.638	<0.500	0.529	<0.400	<0.500	0.439	330
	6/16/2020	3.54	<0.400	<0.400	135	<0.400	0.670	0.660	<0.400	<0.500	<0.400	129
	6/16/2020 DUP	3.71	<0.400	<0.400	138	<0.400	0.700	0.600	<0.400	<0.500	<0.400	134
	10/6/2020	4.23	<0.400	<0.400	67.2	<0.400	<0.500	0.850	<0.400	<0.500	<0.400	83.9
	10/6/2020 DUP	4.38	<0.400	<0.400	66.9	<0.400	<0.500	0.828	<0.400	<0.500	<0.400	84.0
	12/10/2020	<8.00	<8.00	<8.00	104	<8.00	<10.0	<8.00	<8.00	<10.0	<8.00	131
	12/10/2020 DUP	<8.00	<8.00	<8.00	125	<8.00	<10.0	<8.00	<8.00	<10.0	<8.00	155
MGMS3-3(60)	3/12/2020	0.761	<0.400	<0.400	14.7	<0.400	<0.500	1.66	<0.400	<0.500	1.72	0.659
	6/16/2020	<0.400	<0.400	<0.400	3.92	<0.400	<0.500	1.17	<0.400	<0.500	0.510	<0.400
	10/6/2020	0.444	<0.400	<0.400	10.9	<0.400	<0.500	2.36	<0.400	<0.500	2.03	<0.400
	12/10/2020	<0.400	<0.400	<0.400	5.76	<0.400	<0.500	1.86	<0.400	<0.500	1.11	<0.400
MGMS3-2(110)	6/3/2019	<0.400	<0.400	<0.400	0.930	<0.400	<0.500	1.89	<0.400	<0.500	1.11	<0.400
	12/4/2019	<0.400	<0.400	<0.400	0.852	<0.400	<0.500	1.84	<0.400	<0.500	0.958	<0.400
	6/16/2020	<0.400	<0.400	<0.400	1.00	<0.400	<0.500	3.01	<0.400	<0.500	1.33	<0.400
	12/10/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	1.45	<0.400	<0.500	<0.400	<0.400

Please refer to notes at end of table.

Table 3
Groundwater Analytical Results: 2019-2020
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride
		Concentrations in µg/L (ppb)										
MGMS3-1(132)	6/5/2019	0.412	<0.400	<0.400	5.97	<0.400	<0.500	9.45	<0.400	<0.500	6.79	<0.400
	12/4/2019	<0.400	<0.400	<0.400	5.34	<0.400	<0.500	8.69	<0.400	<0.500	6.21	<0.400
	6/16/2020	0.430	<0.400	<0.400	4.61	<0.400	<0.500	9.87	<0.400	<0.500	6.01	<0.400
	12/10/2020	<0.400	<0.400	<0.400	2.73	<0.400	<0.500	3.61	<0.400	<0.500	2.46	<0.400
EX-1	3/21/2018	1.3	<0.500	<0.500	22.6	<0.500	<0.500	1.5	<0.500	<0.500	2.7	10.8
	6/28/2018	4.6	<0.500	1.11	722.0	8.72	<0.500	1.9	<0.500	<0.500	0.8	424.0
	9/24/2018	1.42	<0.400	<0.400	3.38	0.751	<0.500	3.07	<0.400	<0.500	2.42	7.56
	12/4/2018	0.876	<0.400	<0.400	8.18	<0.400	<0.500	6.35	<0.400	<0.500	3.60	1.88
MP-1	3/11/2020	3.94	<0.800	5.63	177	1.14	<1.00	1,370	1.77	<1.00	190	<0.800
	6/17/2020	<4.00	<4.00	<4.00	72.0	<4.00	<5.00	427	<4.00	<5.00	61.2	<4.00
	10/8/2020	<2.00	<2.00	<2.00	36.7	<2.00	<2.50	510	<2.00	<2.50	52.3	<2.00
	12/9/2020	1.15	<0.800	<0.800	29.5	<0.800	<1.00	362	<0.800	<1.00	41.3	<0.800
MP-3	6/28/2018	5.24	<0.500	1.78	203	1.31	<0.500	398	1.82	<0.500	65.1	8.96
	9/27/2018	4.06	<0.400	3.52	187	1.60	<0.500	721	0.950	<0.500	148	0.730

Notes:

1. µg/L (ppb) = Micrograms per liter (parts per billion).
2. **Bold** values represent detected concentration of listed analyte.
3. < = Not detected at or above the specified laboratory method reporting limit (MRL).
4. Halogenated volatile organic compounds (HVOCs) analysis by U.S. Environmental Protection Agency (EPA) Method 8260B.

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
EX	2/6/2007	26.7	108	0.49
	3/23/2009	14	43	0.54
	3/16/2010	3.4	89	0.71
	6/7/2011	--	150	<0.10
	12/9/2011	--	<0.50	<0.10
	3/21/2018	302	1.22	0.47
	6/28/2018	119	<0.10	<0.050
	9/24/2018	132	0.461	<0.250
	12/4/2018	117	24.1	<0.250
MW-1	11/9/2017	3.96	46.4	<1.0
	3/20/2018	6.20	1.84	<0.10
	7/1/2018	1.47	<0.10	<0.10
	9/25/2018	5.79	<0.250	<0.250
	12/4/2018	3.38	79.4	<0.250
	3/21/2019	22.0	2.8	<0.250
	6/5/2019	176	32.8	0.802
	9/27/2019	56.9	44.0	<0.250
	12/4/2019	112	134	<0.250
	3/10/2020	14.4	0.393	<0.250
	6/17/2020	38.0	7.45	<0.250
	10/7/2020	401	96.9	<0.250
	12/8/2020	417	71.9	<0.250
	MW-2	11/6/2017	6.34	0.26
7/2/2018		9.85	<0.10	<0.10
3/21/2019		11.0	<0.250	<0.250
6/5/2019		9.86	<0.250	<0.250
9/27/2019		9.82	<0.250	<0.250
12/4/2019		9.72	<0.250	<0.250
3/12/2020		9.04	<0.250	<0.250
6/17/2020		10.9	<0.250	<0.250
10/8/2020		9.48	<0.250	<0.250
12/9/2020		9.78	<0.250	<0.250
MW-3	11/8/2017	1.68	2.7	<1.0
	3/20/2018	<0.40	19.7	<0.10
	7/2/2018	0.569	15.4	1.49
	9/26/2018	1.56	5.64	<0.250
	12/7/2018	1.18	10.2	<0.250
	3/20/2019	<0.0200	17.1	<0.250
	6/7/2019	<0.0200	15.1	<0.250
	9/27/2019	2.04	3.90	<0.250
	12/4/2019	0.212	11.5	<0.250
	3/10/2020	0.0210	14.7	<0.250
	6/17/2020	<0.0200	7.92	<0.250
	10/7/2020	0.998	5.57	<0.250
	12/8/2020	<0.0200	9.16	<0.250

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
MW-5	11/7/2017	2.86	<0.10	<0.10
	3/21/2018	<0.05	2.63	<0.10
	6/29/2018	0.819	<0.10	<0.10
	9/27/2018	9.55	<0.250	<0.250
	12/7/2018	1.22	<0.250	<0.250
	3/26/2019	2.40	0.866	<0.250
	6/7/2019	2.94	<0.250	<0.250
	12/4/2019	0.570	<0.250	<0.250
	3/12/2020	0.114	<0.250	<0.250
	6/18/2020	0.114	<0.250	<0.250
	10/6/2020	9.20	<0.250	<0.250
	12/10/2020	0.294	<0.250	<0.250
MW-6	11/7/2017	0.608	0.35	<0.10
	7/1/2018	4.17	<0.10	<0.10
	9/25/2018	4.30	<0.250	<0.250
	3/20/2019	5.17	0.738	<0.250
	6/5/2019	0.964	0.883	<0.250
	9/27/2019	6.36	<0.250	<0.250
	12/4/2019	2.18	<0.250	<0.250
	3/12/2020	9.42	<0.250	<0.250
	6/17/2020	1.87	<0.250	<0.250
	10/8/2020	3.14	<0.250	<0.250
	12/9/2020	2.67	0.315	<0.250
	MW-7	2/6/2007	3.00	60.7
6/10/2008		4.89	67.5	0.1
3/23/2009		11	56	<0.10
3/16/2010		2.4	99	<0.50
6/7/2011		--	140	<0.10
12/9/2011		--	<0.50	<0.10
11/7/2017		9.09	<0.10	<0.10
3/21/2018		13.4	<0.10	<0.10
3/21/2018 DUP		16.9	<0.10	<0.10
6/29/2018		7.9	10.8	0.10
9/27/2018		16.7	<0.250	<0.250
12/7/2018		22.4	13.3	<0.250
12/7/2018 DUP		22.1	13.5	<0.250
3/20/2019		34.5	13.1	<0.250
3/20/2019 DUP		33.7	13.4	<0.250
6/5/2019		16.6	30.4	<0.250
6/5/2019 DUP		17.0	30.3	<0.250

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
MW-7 (cont.)	9/26/2019	19.8	11.5	<0.250
	9/26/2019 DUP	20.3	11.5	<0.250
	12/3/2019	33.1	47.4	<0.250
	12/3/19 DUP	34.9	49.7	<0.250
	3/11/2020	6.89	18.7	<0.250
	3/11/2020 DUP	6.89	18.7	<0.250
	6/18/2020	5.21	27.6	<0.250
	6/18/2020 DUP	6.33	27.6	<0.250
	10/8/2020	14.5	1.92	<0.250
	10/8/2020 DUP	14.3	1.83	<0.250
	12/9/2020	34.5	88.6	<0.250
	12/9/2020 DUP	33.3	88.9	<0.250
MW-8	6/10/2008	<0.0500	167	<0.1
	11/6/2017	<0.050	207	<0.10
	3/19/2018	<0.40	284	<0.10
	6/29/2018	<0.050	333	<0.10
	9/25/2018	<0.0200	235	<0.250
	12/7/2018	0.0230	260	<0.250
	3/22/2019	0.0350	544	<0.250
	6/3/2019	<0.0200	176	<0.250
	12/3/2019	<0.0200	276 E	<0.250
	3/11/2020	0.732	311	<1.25
	6/17/2020	<0.0200	108 H-01	<0.250
	10/6/2020	<0.0200	248 H-01	<0.250
12/10/2020	<0.0200	276	<0.250	
MW-9	9/21/2010	1.4	89	<0.10
	11/9/2017	17.4	559	<0.10
	3/21/2018	<0.050	230	<0.10
	6/29/2018	14.2	382	0.61
	9/27/2018	17.0	468	<0.250
	12/7/2018	5.60	311	<0.250
	3/20/2019	0.198	173	<0.250
	6/7/2019	0.022	125	<0.250
	9/26/2019	0.680	138	<0.250
	12/3/2019	0.618	101	<0.250
	3/11/2020	0.0850	264	<0.250
	6/18/2020	<0.0200	128	<0.250
	10/8/2020	5.76	172	<0.250
12/9/2020	11.1	302	<0.250	
MW-10	11/6/2017	35.6	333	0.270
	6/29/2018	29.0	486	<0.10
	9/25/2018	37.2	413	<0.250
	9/25/2018 DUP	38.0	412	<0.250
	3/21/2019	45.0	412	<0.250
	6/6/2019	36.5	363	0.463
	9/25/2019	37.3	429	<0.5
	12/4/2019	36.6	460	<0.250
	3/11/2020	18.2	491	<1.25
	6/17/2020	13.2	489 H-01	<0.250 H-01
	10/8/2020	34.8	541	<0.250
	12/9/2020	37.7	515	<0.250

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
MW-12	10/19/2010	--	59	--
	6/7/2011	--	1.1	<0.10
	12/7/2011	--	67	<0.10
	9/22/2015	110	47	--
	11/9/2017	55.4	0.57	<0.25
	3/20/2018	39.4	<0.10	<0.10
	3/20/2018 DUP	39.9	<0.10	<0.10
	7/1/2018	33.0	<0.10	<0.10
	9/25/2018	126	<0.250	<0.250
	9/25/2018 DUP	129	<0.250	<0.250
	12/4/2018	37.2	82.2	0.487
	12/4/2018 DUP	37.1	80.0	0.526
	3/20/2019	53.2	<0.250	<0.250
	3/20/2019 DUP	48.2	<0.250	<0.250
	6/5/2019	19.8	2.34	<0.250
	6/5/2019 DUP	22.4	2.32	<0.250
	9/26/2019	107	0.371	<0.250
	9/26/2019 DUP	122	0.383	<0.250
	12/4/2019	22.8	36.4	<0.250
	12/4/2019 DUP	20.2	35.6	<0.250
	3/11/2020	26.6	12.0	<0.250
	3/11/2020 DUP	25.6	11.9	<0.250
	6/18/2020	12.2	1.66	<0.250
	6/18/2020 DUP	12.3	1.61	<0.250
	10/7/2020	125	<0.250	<0.250
	10/7/2020 DUP	122	<0.250	<0.250
12/8/2020	12.8	49.1	0.364	
12/8/2020 DUP	13.0	49.9	0.380	
MW-13	9/22/2015	48	135	--
	11/7/2017	35.0	0.52	<0.10
	3/20/2018	191	<0.10	<0.10
	7/1/2018	23.5	<0.10	<0.10
	9/25/2018	37.7	<0.250	<0.250
	12/5/2018	49.8	<0.250	<0.250
	3/19/2019	110	<0.250	<0.250
	6/6/2019	78.5	<0.250	<0.250
	9/26/2019	76.2	<0.250	<0.250
	12/3/2019	63.2	<0.250	<0.250
	3/10/2020	52.0	<0.250	<0.250
	6/18/2020	18.1	<0.250	<0.250
	10/7/2020	56.6	<0.250	<0.250
	12/8/2020	39.8	<0.250	<0.250

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
MW-14	11/8/2017	34.7	50.3	<1.0
	3/20/2018	50.7	17.1	<0.10
	6/28/2018	31.6	104	<2.5
	9/26/2018	41.0	150	<0.250
	12/5/2018	53.7	75.5	<0.250
	3/19/2019	190	51.3	<0.250
	6/6/2019	33.9	28.6	0.958
	9/25/2019	29.6	145	<0.250
	12/4/2019	245	85.5	<0.250
	3/11/2020	32.0	137	<0.250
	6/17/2020	23.9	118 H-01	<0.250
	10/8/2020	32.5	305	<0.250
	12/9/2020	21.3	200	<0.250
MW-15	11/6/2017	<0.050	9.78	<0.10
	7/2/2018	<0.050	6.06	<0.10
	6/6/2019	<0.0200	2.42	<0.250
	6/18/2020	<0.0200	1.34	<0.250
	12/10/2020	<0.0200	5.85	<0.250
MW-16	11/6/2017	<0.050	9.95	<0.10
	3/19/2018	<0.40	15.7	<0.10
	7/2/2018	<0.050	19.4	<0.10
	9/25/2018	<0.0200	6.10	<0.250
	12/6/2018	<0.0200	10.2	<0.250
	3/22/2019	5.31	7.90	<0.250
	6/4/2019	<0.0200	8.58	<0.250
	9/25/2019	<0.0200	7.15	<0.250
	12/3/2019	<0.0200	7.93	<0.250
	3/11/2020	0.465	10.5	<0.250
	6/18/2020	<0.0200	2.44	<0.250
	10/7/2020	<0.0200	7.10	<0.250
	12/9/2020	<0.0200	9.58	<0.250
MW-17	11/8/2017	0.634	43.4	<1.0
	6/28/2018	<0.050	7.84	<0.10
	9/26/2018	2.13	0.760	<0.250
	3/19/2019	5.77	25.3	<0.250
	6/6/2019	0.119	24.7	<0.250
	9/26/2019	2.12	1.10	<0.250
	12/3/2019	0.353	15.9	<0.250
	3/10/2020	1.21	11.5	<0.250
	6/17/2020	<0.0200	10.6 H-01	<0.250
	10/7/2020	3.44	0.636	<0.250
	12/8/2020	0.481	24.3	<0.250

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
MW-18i	6/10/2008	<0.0500	0.35	<0.1
	11/7/2017	<0.050	1.07	<0.10
	3/21/2018	<0.050	0.75	<0.10
	7/2/2018	<0.050	1.13	<0.10
	9/27/2018	<0.0200	1.00	<0.250
	12/6/2018	<0.0200	0.715	<0.250
	3/21/2019	<0.0200	0.509	<0.250
	6/3/2019	<0.0200	0.755	<0.250
	9/25/2019	<0.0200	0.831	<0.250
	12/3/2019	<0.0200	0.846	<0.250
	3/11/2020	<0.0200	0.445	<0.250
	6/17/2020	<0.0200	0.420	<0.250
	10/7/2020	<0.0200	0.415	<0.250
	12/9/2020	<0.0200	0.618	<0.250
MW-19	10/19/2010	--	19	--
	9/22/2015	46	135	--
	11/9/2017	80	41	<1.0
	3/21/2018	150	47.8	<0.10
	3/21/2018 DUP	152	46.5	<0.10
	6/28/2018	194	<0.10	<0.10
	9/25/2018	122	120	<0.250
	9/25/2018 DUP	125	121	<0.250
	12/5/2018	188	118	<0.250
	12/5/2018 DUP	188	119	<0.250
	3/20/2019	242	195	<0.250
	3/20/2019 DUP	192	191	<0.250
	6/7/2019	145	34.8	1.06
	9/26/2019	113	232	<0.250
	9/26/2019 DUP	119	233	<0.250
	12/3/2019	131	129	<0.250
	12/3/2019 DUP	125	136	<0.250
	3/11/2020	109	213	<1.25
	3/11/2020 DUP	107	205	<1.25
	6/18/2020	88.0	30.8	<0.250
6/18/2020 DUP	90.4	27.2	<0.250	
10/7/2020	187	224	<0.250	
10/7/2020 DUP	155	228	<0.250	
12/8/2020	180	147	<0.250	
12/8/2020 DUP	176	157	<0.250	

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
MW-19i	11/8/2017	0.236	<0.10	<0.10
	3/20/2018	<0.40	<0.10	<0.10
	7/2/2018	0.158	<0.10	<0.10
	9/27/2018	0.213	<0.250	<0.250
	12/6/2018	0.240	<0.250	<0.250
	3/25/2019	0.212	<0.250	<0.250
	6/3/2019	0.178	<0.250	<0.250
	12/4/2019	0.169	<0.250	<0.250
	3/12/2020	<0.0200	<0.250	<0.250
	6/18/2020	0.191	<0.250	<0.250
	10/7/2020	0.178	<0.250	<0.250
	12/10/2020	0.226	<0.250	<0.250
MW-20i	11/7/2017	0.125	0.28	<0.10
	3/21/2018	1.01	1.06	<0.10
	7/2/2018	0.115	0.37	<0.10
	9/25/2018	0.244	1.11	<0.250
	12/6/2018	<0.0200	<0.250	<0.250
	3/22/2019	0.0270	0.261	<0.250
	6/3/2019	0.353	1.77	<0.250
	9/25/2019	<0.0200	0.617	<0.250
	12/3/2019	0.0300	1.84	<0.250
	3/11/2020	<0.0200	0.332	<0.250
	6/17/2020	<0.0200	0.585	<0.250
	10/7/2020	<0.0200	0.360	<0.250
12/9/2020	0.176	0.643	<0.250	
MW-21i-40	6/10/2008	0.0594	<0.100	<0.100
	11/8/2017	<0.050	1.90	<1.0
	3/22/2018	0.071	1.70	<0.10
	6/29/2018	<0.050	5.12	<1.0
	9/27/2018	<0.0200	3.61	<0.250
	12/6/2018	<0.0200	3.16	<0.250
	3/21/2019	0.0360	3.41	<0.250
	6/3/2019	<0.0200	1.49	<0.250
	9/25/2019	<0.0200	3.49	<0.250
	12/3/2019	<0.0200	4.61	<0.250
	3/11/2020	<0.0200	2.90	<0.250
	6/17/2020	<0.0200	2.11	<0.250
	10/7/2020	<0.0200	5.67	<0.250
12/9/2020	<0.0200	6.15	<0.250	

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
MW-21i-105	6/10/2008	0.0645	<0.100	<0.100
	11/8/2017	<0.050	1.6	<1.0
	3/22/2018	13.0	15.8	0.10
	6/29/2018	12.3	13.1	<0.10
	9/26/2018	0.409	0.759	<0.250
	12/6/2018	3.05	5.29	<0.250
	3/21/2019	49.6	0.755	<0.250
	6/6/2019	45.7	7.57	1.25
	9/25/2019	28.3	4.46	1.81
	12/4/2019	42.5	4.15	2.11
	3/12/2020	32.6	3.54	4.79
	6/18/2020	44.6	4.18	12.1
	10/8/2020	45.6	5.85	10.6
	12/9/2020	34.4	8.54	5.76
MW-22i	11/7/2017	0.354	<1.0	<1.0
	3/22/2018	1.25	0.63	<0.10
	6/29/2018	0.469	<1.0	<1.0
	9/26/2018	0.369	<0.250	<0.250
	12/5/2018	0.378	<0.250	<0.250
	3/21/2019	0.448	<0.250	<0.250
	6/6/2019	0.329	<0.250	<0.250
	9/25/2019	0.339	<0.250	<0.250
	12/4/2019	0.395	<0.250	<0.250
	3/12/2020	0.111	<0.250	<0.250
	6/18/2020	0.331	<0.250	<0.250
	10/8/2020	0.325	<0.250	<0.250
12/9/2020	0.339	<0.250	<0.250	
MW-23i	6/10/2008	<0.0500	0.440	<0.100
	11/8/2017	<0.0500	0.78	<0.100
	3/21/2018	<0.0500	0.72	<0.100
	6/28/2018	<0.0500	0.53	<0.100
	9/27/2018	<0.0200	1.04	<0.250
	12/6/2018	<0.0200	0.520	<0.250
	3/22/2019	<0.0200	0.592	<0.250
	6/3/2019	<0.0200	0.604	<0.250
	12/4/2019	<0.0200	0.534	<0.250
	3/12/2020	<0.0200	0.639	<0.250
	6/17/2020	<0.0200	0.372	<0.250
	10/7/2020	<0.0200	0.796	<0.250
	12/9/2020	<0.0200	0.667	<0.250

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
MW-24i	6/7/2011	--	0.50	<0.10
	12/7/2011	--	1.60	<0.10
	11/9/2017	<0.050	3.09	<0.10
	3/21/2018	0.687	7.36	<0.10
	6/28/2018	<0.050	2.37	<0.050
	9/27/2018	<0.0200	7.56	<0.250
	12/4/2018	0.0670	2.97	<0.250
	3/25/2019	0.0200	4.07	<0.250
	6/7/2019	<0.0200	2.19	<0.250
	9/27/2019	0.116	<0.250	<0.250
	12/3/2019	<0.0200	2.86	<0.250
	3/12/2020	<0.0200	4.87	<0.250
	6/18/2020	<0.0200	2.70	<0.250
	10/9/2020	<0.0200	1.70	<0.250
12/10/2020	<0.0200	9.40	<0.250	
MW-24d	11/6/2017	0.153	<0.10	<0.10
	3/20/2018	<0.40	<0.10	<0.10
	6/27/2018	0.160	<0.10	<0.050
	9/28/2018	0.145	<0.250	<0.250
	12/10/2018	0.993	<0.250	<0.250
	3/25/2019	0.147	<0.250	<0.250
	6/4/2019	0.131	<0.250	<0.250
	9/27/2019	0.050	3.76	<0.250
	12/3/2019	0.142	<0.250	<0.250
	3/12/2020	0.130	<0.250	<0.250
	6/18/2020	0.211	<0.250	<0.250
10/9/2020	0.140	<0.250	<0.250	
MW-25i	11/8/2017	0.138	0.53	<0.25
	3/21/2018	<0.050	0.40	<0.10
	6/29/2018	<0.050	0.27	<0.10
	9/27/2018	<0.0200	0.775	<0.250
	12/6/2018	<0.0200	0.541	<0.250
	3/22/2019	0.0250	0.0389	<0.250
	6/3/2019	<0.0200	0.383	<0.250
	9/25/2019	<0.0200	0.710	<0.250
	12/3/2019	<0.0200	0.405	<0.250
	3/12/2020	<0.0200	0.453	<0.250
	6/18/2020	<0.0200	0.357	<0.250
	10/7/2020	<0.0200	0.644	<0.250
	12/9/2020	<0.0200	0.485	<0.250

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
MW-26	11/8/2017	34.1	101	<2.5
	3/20/2018	30.0	271	<0.25
	6/29/2018	22.4	213	<0.10
	9/24/2018	30.2	212	<0.250
	12/5/2018	35.3	152	<0.250
	3/22/2019	60.6	544	<0.250
	6/3/2019	41.3	476	<0.250
	9/26/2019	32.4	383	<0.500
	12/3/2019	24.7	279	<0.250
	3/11/2020	48.9	628	<1.25
	6/17/2020	42.9	573 H-01	<0.250 H-01
	10/7/2020	30.1	358	<0.250
	12/9/2020	41.1	484	<0.250
MW-32i	11/10/2017	<0.050	1.33	<0.10
MW-32s	11/10/2017	0.235	0.58	<0.10
	3/22/2018	<0.050	0.16	<0.10
	10/1/2018	<0.0200	<0.250	<0.250
	12/10/2018	0.0690	1.81	<0.250
	3/25/2019	<0.0200	<0.250	<0.250
	9/26/2019	0.0630	<0.250	<0.25
	3/13/2020	<0.0200	<0.250	<0.250
10/9/2020	<0.0200	<0.250	<0.250	
EW-1	11/9/2017	<0.050	0.50	<0.10
	7/1/2018	<0.050	2.91	<0.10
	9/27/2018	<0.0200	0.686	<0.250
	3/25/2019	<0.0200	3.69	<0.250
	6/4/2019	<0.0200	3.42	<0.250
	12/4/2019	<0.0200	0.708	<0.250
	3/11/2020	<0.0200	2.56	<0.250
	6/17/2020	<0.0200	4.24	<0.250
	10/7/2020	<0.0200	1.46	<0.250
12/9/2020	0.177	2.32	<0.250	
S-1	11/8/2017	7.13	4.14	<0.10
	3/20/2018	35.5	11.4	0.24
	6/28/2018	<1.3	3.02	<0.10
	9/26/2018	0.259	3.03	<0.250
	12/5/2018	<0.0200	2.16	<0.250
	3/19/2019	0.846	3.35	<0.250
	6/5/2019	0.141	1.95	<0.250
	9/25/2019	<0.0200	3.72	<0.250
	12/4/2019	<0.0200	2.04	<0.250
	3/10/2020	<0.0200	1.08	<0.250
	6/17/2020	<0.0200	1.13	<0.250
	10/7/2020	<0.0200	1.86	<0.250
	12/8/2020	0.0210	1.40	<0.250

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
S-2	11/8/2017	5.64	1.05	<0.10
	3/20/2018	6.1	1.25	<0.10
	6/28/2018	8.05	3.28	0.054
	9/26/2018	7.55	5.93	<0.250
	12/5/2018	7.76	<0.250	<0.250
	3/19/2019	25.6	3.23	0.259
	6/5/2019	6.06	<0.250	<0.250
	9/25/2019	0.691	1.77	<0.250
	12/4/2019	6.83	0.408	<0.250
	3/10/2020	6.96	0.906	<0.250
	6/17/2020	6.34	<0.250	<0.250
	10/7/2020	5.97	5.45	<0.250
	12/8/2020	6.85	<0.250	<0.250
MGMS1-3(43)	10/19/2010	--	390	--
	11/7/2017	217	120	<1.0
	3/22/2018	214	<0.10	<0.10
	7/1/2018	198	<0.10	<0.10
	9/28/2018	240	75.8	<0.250
	12/4/2018	246	30.6	<0.250
	3/26/2019	238	13.5	<0.250
	6/7/2019	209	<0.25	<0.250
	9/27/2019	233	84.1	<0.250
	12/4/2019	216	45.3	<0.250
	3/11/2020	199	12.3	<0.250
	6/16/2020	157	<0.250	<0.250
	10/6/2020	214	40.7	<0.250
12/10/2020	190	10.8	<0.250	
MGMS1-2(60)	11/7/2017	<0.050	1.91	<0.10
	3/22/2018	0.054	3.18	<0.10
	7/1/2018	<0.050	1.83	<0.10
	10/1/2018	<0.0200	3.65	<0.250
	12/4/2018	0.104	0.697	<0.250
	3/26/2019	<0.0200	1.39	<0.250
	6/7/2019	<0.0200	1.08	<0.250
	9/27/2019	<0.0200	2.58	<0.250
	12/4/2019	<0.0200	0.732	<0.250
	3/12/2020	<0.0200	3.25	<0.250
	6/16/2020	<0.0200	0.375	<0.250
	10/6/2020	<0.0200	2.49 M-02	<0.250
	12/10/2020	<0.0200	1.46	<0.250
MGMS1-1(110)	11/7/2017	0.822	0.73	<0.10
	7/1/2018	0.134	0.11	<0.10
	10/1/2018	0.595	0.898	<0.250
	6/7/2019	0.179	0.533	<0.250
	12/4/2019	0.225	0.587	<0.250
	6/16/2020	0.211	0.856	<0.250
	12/8/2020	0.237	<0.250	<0.250

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
MGMS2-4(40)	9/21/2010	130	560	<0.10
	6/7/2011	--	200	<0.10
	12/7/2011	--	8.0	<0.10
	11/9/2017	87.1	<0.10	<0.10
	3/22/2018	84.2	<0.10	<0.10
	7/1/2018	83.6	0.76	<0.10
	9/28/2018	85.2	9.38	<0.250
	12/10/2018	80.7	<0.250	<0.250
	3/25/2019	85.2	<0.250	<0.250
	6/4/2019	78.7	<0.250	<0.250
	9/27/2019	78.9	1.34	<0.250
	12/4/2019	76.1	<0.250	<0.250
	3/12/2020	74.9	<0.250	<0.250
	6/16/2020	75.8	6.57	0.414
10/6/2020	80.8	6.08	0.253	
12/8/2020	68.6	28.5	0.385	
MGMS2-3(60)	11/9/2017	1.03	0.12	<0.10
	3/22/2018	0.153	0.68	<0.10
	7/1/2018	<0.050	0.77	<0.10
	12/10/2018	1.39	<0.250	<0.250
	3/25/2019	0.407	<0.250	<0.250
	6/4/2019	<0.0200	0.852	<0.250
	9/27/2019	0.719	<0.250	<0.250
	12/4/2019	1.15	<0.250	<0.250
	3/12/2020	0.0280	0.678	<0.250
	6/16/2020	0.0200	0.519	<0.250
	10/6/2020	0.306	<0.250	<0.250
12/8/2020	0.136	0.558	<0.250	
MGMS2-2(110)	11/9/2017	<0.050	0.37	<0.10
	7/1/2018	0.050	0.28	<0.10
	9/28/2018	<0.0200	0.412	<0.250
	6/4/2019	<0.0200	0.402	<0.250
	12/4/2019	<0.0200	0.400	<0.250
	6/16/2020	<0.0200	0.317	<0.250
	12/8/2020	0.0230	0.333	<0.250
MGMS2-1(132)	11/9/2017	<0.050	<0.10	<0.10
	7/1/2018	<0.050	<0.10	<0.10
	9/28/2018	0.0500	<0.250	<0.250
	6/4/2019	<0.0200	<0.250	<0.250
	12/4/2019	<0.0200	<0.250	<0.250
	6/16/2020	<0.0200	<0.250	<0.250
	12/8/2020	0.0230	<0.250	<0.250

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
MGMS3-4(40)	9/22/2015	1.1	<.10	--
	11/10/2017	1.71	<0.10	<0.10
	3/22/2018	1.55	<0.10	<0.10
	7/1/2018	0.971	<0.10	<0.10
	9/28/2018	1.71	<0.250	<0.250
	9/28/2018 DUP	1.68	<0.250	<0.250
	12/10/2018	1.04	<0.250	<0.250
	3/26/2019	2.67	<0.250	<0.250
	6/3/2019	1.31	<0.250	<0.250
	6/3/2019 DUP	1.32	<0.250	<0.250
	6/3/2019 DUP	1.32	<0.250	<0.250
	9/27/2019	1.14	<0.250	<0.250
	9/27/2019 DUP	1.26	<0.250	<0.250
	12/4/2019	0.906	<0.250	<0.250
	12/4/2019 DUP	0.918	<0.250	<0.250
	3/12/2020	2.09	<0.250	<0.250
	6/16/2020	0.784	<0.250	<0.250
	6/16/2020 DUP	0.789	<0.250	<0.250
	10/6/2020	1.68	<0.250	<0.250
	10/6/2020 DUP	1.64	<0.250	<0.250
12/10/2020	1.73	<0.250	<0.250	
12/10/2020 DUP	1.76	<0.250	<0.250	
MGMS3-3(60)	11/10/2017	<0.050	<0.10	<0.10
	3/22/2018	0.272	0.39	<0.10
	7/1/2018	0.100	0.29	<0.10
	9/28/2018	<0.0200	0.393	<0.250
	12/10/2018	<0.0200	<0.250	<0.250
	3/26/2019	<0.0200	0.495	<0.250
	6/3/2019	<0.0200	0.371	<0.250
	9/27/2019	<0.0200	<0.250	<0.250
	12/4/2019	<0.0200	0.364	<0.250
	3/12/2020	<0.0200	0.257	<0.250
	6/16/2020	<0.0200	0.262	<0.250
	10/6/2020	<0.0200	0.296	<0.250
	12/10/2020	<0.0200	0.310	<0.250
MGMS3-2(110)	11/10/2017	<0.050	0.48	<0.10
	7/1/2018	<0.050	0.43	<0.10
	9/28/2018	<0.0200	0.506	<0.250
	6/3/2019	<0.0200	0.467	<0.250
	12/4/2019	<0.0200	0.451	<0.250
	6/16/2020	<0.0200	0.370	<0.250
	12/10/2020	<0.0200	0.389	<0.250

Please refer to notes at end of table

Table 4
Groundwater Analytical Results - Ammonia, Nitrate, and Nitrite
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Ammonia (as Nitrogen)	Nitrate-Nitrogen	Nitrite-Nitrogen
		Concentrations in mg/L (ppm)		
MGMS3-1(132)	11/10/2017	<0.050	0.52	<0.10
	7/1/2018	<0.050	0.46	<0.10
	9/28/2018	<0.0200	0.468	<0.250
	6/5/2019	<0.0200	0.560	<0.250
	12/4/2019	<0.0200	0.629	<0.250
	6/16/2020	<0.0200	0.591	<0.250
	12/10/2020	<0.0200	0.412	<0.250
MP-1	2/6/2007	42.4	247	0.18
	3/23/2009	35	210	1.2
	3/16/2010	37	990	0.76
	6/7/2011	--	160	<0.10
	12/9/2011	--	120	0.91
	11/9/2017	12.2	23.0	<0.50
	3/21/2018	7.13	37.8	<0.10
	6/28/2018	8.71	38.2	<0.10
	9/26/2018	10.9	113	<0.250
	12/4/2018	6.01	80.8	<0.250
	3/20/2019	7.05	77.6	<0.250
	6/7/2019	8.24	61.6	0.366
	9/26/2019	2.15	97.7	0.384
	12/3/2019	2.39	118	<0.250
	3/11/2020	8.82	110	<0.250
	6/17/2020	5.81	161 H-01	<0.250
10/8/2020	5.22	115	<0.250	
12/9/2020	1.95	106	<0.250	
MP-3	6/28/2018	18.8	138	0.42

Notes:

1. mg/L (ppm) = Milligrams per liter (parts per million).
2. **Bold** value represents detected concentration of listed analyte.
3. -- = Not sampled or not analyzed.
4. < = Not detected at or above the specified laboratory method reporting limit (MRL).
5. Ammonia as nitrogen by Method 350.1.
6. Nitrate as nitrogen and nitrite as nitrogen by Method 300.0.
7. E = Estimated value.
8. H-01 = This sample was analyzed outside the recommended holding time.
9. M-02 = Due to matrix interference, this analyte cannot be accurately quantified.
The reported result is estimated.

Table 5
Interim Action: Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Volatile Organic Compounds										Attenuation Chemistry	Field Parameters	
		Tetrachloro ethene	Trichloro ethene	cis-1,2-Dichloro ethene	trans-1,2-Dichloro ethene	Vinyl chloride	Ethene	1,1-Dichloro ethene	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1,1-Trichloro ethane	Total Organic Carbon	Dissolved Oxygen	Oxidation Reduction Potential
Concentrations in µg/L												(mg/L)	(mg/L)	(mV)
MW-7	2/6/2007	31,500	352	<100	<100	<100	N/A	<100	<100	<100	<100	<1.0	1.20	245.7
	12/16/2008	15,000	450	130	<50	<50	N/A	<50	<50	<50	<50	2.4	0.72	-103.2
	3/23/2009	3,300	270	420	<15.0	<15.0	N/A	<15.0	<15.0	<0.50	<15.0	6.7	0.69	-614.5
	6/18/2009	890	350	520	<3.0	<3.0	N/A	<3.0	3.7	<3.0	5.2	N/A	6.97	-16.4
	9/18/2009	2,600	250	930	<3.0	<3.0	<1.0	5.5	9.8	<3.0	10	4.1	0.59	121.7
	12/18/2009	1,600	160	330	<5.0	<5.0	<1.0	<5.0	6.7	<5.0	6.7	2.5	1.23	162.1
	3/16/2010	550	56	180	<2.0	<2.0	<1.0	<2.0	<2.0	<2.0	2.0	2.6	1.37	147.7
	6/17/2010	200	72	360	<1.5	<1.5	<1.0	<1.5	<1.5	<1.5	2.7	2.8	1.86	240.0
	9/23/2010	750	110	690	<3.0	4.8	<1.0	<3.0	3.3	<3.0	3.5	8.2	0.64	-483.4
	12/10/2010	220	36	94	<0.90	1.7	1.19	<0.90	1.8	<0.90	1.6	0.84	6.29	111.6
	3/11/2011	420	82	150	0.91	9.3	7.76	1.6	6.6	<0.90	5.1	1.10	6.65	132.3
	6/7/2011	430	110	1,400	3.3	7.9	<1.0	3.4	4.8	<2.5	4.0	4.7	0.45	108.6
	9/19/2011	410	84	1,300	<5.0	78	N/A	<5.0	<5.0	<5.0	<5.0	3,400	4.53	695.8
	12/9/2011	200	32	3,400	6.8	110	38.7	6.9	8.0	<5.0	<5.0	1,600	1.19	-117.5
	3/12/2012	41	8.6	1,600	<5.0	600	71	<5.0	9.2	<5.0	<5.0	1,000	2.97	96.8
	06/22/2012	25	5.2	500	<2.0	290	130	<2.0	9.0	<2.0	<2.0	790	6.28	-137.9
	9/14/2012	28	5.2	180	0.70	80	47	0.54	3.8	<0.50	<0.50	790	2.29	93.3
	12/14/2012	11	6.8	130	<0.50	18	19.5	<0.50	1.9	<0.50	<0.50	550	0.34	24.1
	3/15/2013	1.6	0.78	110	<0.50	11	13.3	<0.50	0.69	<0.50	<0.50	250	1.02	53.3
	6/14/2013	1.6	<0.50	58	<0.50	16	5.86	<0.50	0.51	<0.50	<0.50	220	0.29	47.9
	9/20/2013	<0.50	<0.50	56	<0.50	10	18.6	<0.50	1.5	<0.50	<0.50	270	0.45	-189.3
12/16/2013	0.51	<0.50	6.9	<0.50	9.1	5.0	<0.50	2.9	<0.50	<0.50	250	0.44	-66.1	
3/24/2014	9.8	2.6	13	<0.50	7.6	220	<0.50	1.6	<0.50	<0.50	77	0.43	76.9	
6/25/2014	<0.50	<0.50	0.62	<0.50	1.4	21.9	<0.50	0.19	<0.50	<0.50	120	0.6	-90.5	
9/30/2014	<0.50	<0.50	4.5	<0.50	9.8	<1.0	<0.50	2.7	<0.50	<0.50	160	1.93	-112.0	
12/15/2014	0.61	1.5	16	<0.50	21	<1.0	<0.50	4.5	<0.50	<0.50	28.5	1.61	-34.0	
3/20/2015	<0.50	1.1	8.4	<0.50	1.0	<6.2	<0.50	1.0	<0.50	<0.50	23.5	1.19	-76.8	
6/17/2015	1.2	1.0	12	<0.50	12.6	<10.0	<0.50	2.6	<0.50	<0.50	46	0.81	-4.9	
9/23/2015	4.5	4.2	12.7	<0.50	4.8	<10.0	<0.50	1.8	<0.50	<0.50	40.6	0.87	-30.5	
12/8/2015	0.94	1.7	4.1	<0.50	1.9	<10.0	<0.50	<0.50	<0.50	<0.50	9.8	1.98	84.1	

Please refer to notes at end of table.

Table 5
Interim Action: Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Volatile Organic Compounds										Attenuation Chemistry	Field Parameters	
		Tetrachloro ethene	Trichloro ethene	cis-1,2-Dichloro ethene	trans-1,2-Dichloro ethene	Vinyl chloride	Ethene	1,1-Dichloro ethene	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1,1-Trichloro ethane	Total Organic Carbon	Dissolved Oxygen	Oxidation Reduction Potential
Concentrations in µg/L												(mg/L)	(mg/L)	(mV)
MW-7 (continued)	6/17/2016	0.69	2.1	10.9	<0.50	5.4	<10.0	<0.50	0.60	<0.50	<0.50	18.9	1.67	-120.1
	9/29/2016	<0.50	6.0	10.9	<0.50	5.5	N/A	<0.50	1.1	<0.50	<0.50	N/A	0.96	164.1
	12/14/2016	0.78	<0.50	9.4	<0.50	1.0	N/A	<0.50	<0.50	<0.50	<0.50	N/A	1.13	5.6
	3/28/2017	1.2	0.73	<0.50	<0.50	<0.50	N/A	<0.50	<0.50	<0.50	<0.50	N/A	0.89	-25.4
	6/14/2017	<0.50	0.55	2.5	<0.50	2.5	<10.0	<0.50	<0.50	<1.0	<0.50	9.1	1.08	-60.5
	9/27/2017	2.6	1.60	1.7	<0.50	1.7	<10.0	<0.50	<0.50	<1.0	<0.50	7.8	1.75	110.2
	11/7/2017	6.3	7.8	2.6	<0.50	1.5	<10.0	<0.50	<0.50	<0.50	<0.50	3.1	2.65	68.6
	3/21/2018	0.228 J	2.86	17.6	<0.500	4.93	<13.0	<0.500	0.495 J	<0.500	<0.500	9.96	6.03	10.5
	6/29/2018	9.89	3.53	5.50	<0.500	1.47	<10.0	<0.500	0.461 J	<0.500	<0.500	5.0	0.56	187.5
	9/27/2018	6.50	10.8	8.48	<0.400	2.08	N/A	<0.400	1.23	<0.400	<0.400	N/A	1.21	-9.0
	12/7/2018	30.4	18.1	17.7	<0.400	1.62	N/A	0.472	3.97	<0.400	<0.400	N/A	1.89	18.5
	3/20/2019	22.8	10.8	22.2	<0.400	0.605	<1.0	<0.400	1.87	<0.400	<0.400	9.07	3.20	93.4
	6/5/2019	28.4	12.7	20.2	<0.400	1.15	<1.0	0.559	2.91	<0.400	<0.400	4.77	6.02	92.2
	9/26/2019	41.7	17.9	21.0	<0.400	0.420	N/A	0.672	2.98	<0.400	<0.400	N/A	0.67	182.9
	12/3/2019	66.1	31.8	29.7	<0.400	<0.400	<1.0	0.839	4.61	<0.400	<0.400	7.51	6.61	194.0
	3/11/2020	47.4	14.3	26.5	<0.400	0.476	<1.0	<0.400	0.936	<0.400	<0.400	5.98	3.39	109.1
	6/18/2020	43.0	10.1	11.1	<0.400	<0.400	<1.0	<0.400	0.850	<0.400	<0.400	5.10	1.03	230.9
10/8/2020	50.2	19.7	23.6	<0.400	<0.400	<1.0	0.481	1.97	<0.400	<0.400	15.4	1.65	18.5	
12/9/2020	108	45.4	56.3	0.552	<0.400	<1.0	1.41	7.05	<0.400	<0.400	8.45	2.50	139.5	
MP-1	2/6/2007	1,610	421	347	8.5	23.6	N/A	<5.0	18.4	<5.0	11.2	<1.00	0.39	208.9
	12/16/2008	1,600	230	70	<5.0	<5.0	N/A	<5.0	<5.0	<5.0	10	1.80	1.37	-78.5
	3/23/2009	1,200	180	89	<4.0	<4.0	N/A	<4.0	6.0	<4.0	10	2.0	1.05	127.3
	6/18/2009	1,500	180	43	<4.0	<4.0	N/A	<4.0	4.3	<4.0	12	N/A	3.65	-43.7
	9/18/2009	1,100	310	240	8.9	7.3	<1.0	<0.40	14	<4.0	8.2	1.50	0.48	99.7
	12/18/2009	1,000	180	58	<4.0	<4.0	<1.0	<4.0	<4.0	<4.0	7.1	1.60	0.78	155.3
	3/16/2010	1,500	400	410	13	10	2.47	4.7	22	<3.0	8.6	2.4	0.89	83.2
	6/17/2010	800	140	120	<3.0	<3.0	<1.0	<3.0	3.2	<3.0	5.4	2.4	3.22	228.3
	9/23/2010	730	120	41	<3.0	<3.0	<1.0	<3.0	<3.0	<3.0	4.0	2.0	0.53	-464.0
	12/10/2010	1,000	150	27	<3.0	<3.0	<1.0	<3.0	<3.0	<3.0	4.5	1.0	0.52	-4.6
	3/14/2011	1,200	180	150	<3.0	5.9	<0.0010	<3.0	7.1	<3.0	6.4	0.96	1.35	159.6
	6/7/2011	640	130	75	<2.5	<2.5	<1.0	<2.5	4.9	<2.5	3.3	1.6	0.52	48.9
	9/19/2011	30	72	4.1	<1.5	1.6	N/A	<1.5	2.4	<1.5	1.9	3.7	0.69	913.5
	12/9/2011	640	120	49	3.1	<2.5	3.28	<2.5	2.6	<2.5	3.1	8.3	0.83	-51.7
	3/9/2012	490	140	440	6.3	21	15.9	2.8	9.4	<1.5	3.5	16	0.23	77.7
	6/22/2012	690	120	530	2.9	48	66.6	2.8	5.6	<2.5	12	26	0.83	-51.7
	9/14/2012	340	83	170	2.2	4.5	16	<1.5	4.0	<1.5	2.0	23	0.43	98.2
12/14/2012	230	48	170	1.7	1.8	21.1	<0.90	2.0	<0.90	1.0	18	0.28	-15.2	

Please refer to notes at end of table.

Table 5
Interim Action: Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Volatile Organic Compounds										Attenuation Chemistry	Field Parameters	
		Tetrachloro ethene	Trichloro ethene	cis-1,2-Dichloro ethene	trans-1,2-Dichloro ethene	Vinyl chloride	Ethene	1,1-Dichloro ethene	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1,1-Trichloro ethane	Total Organic Carbon	Dissolved Oxygen	Oxidation Reduction Potential
		Concentrations in µg/L										(mg/L)	(mg/L)	(mV)
MP-1 (continued)	3/15/2013	230	69	140	2.5	1.8	5.86	0.94	5.1	<0.90	1.0	35	0.44	60.4
	6/14/2013	330	70	190	1.6	1.8	2.96	1.4	4.5	<0.90	1.4	28	0.34	187.2
	9/20/2013	260	66	77	1.5	<0.90	3.17	<0.90	2.9	<0.90	0.95	35	0.44	1.2
	12/16/2013	290	70	67	0.92	<0.90	<1.0	1.1	1.7	<0.90	1.2	26	1.10	10.3
	3/24/2014	360	54	240	<1.5	<1.5	33	<1.5	2.2	<1.5	1.8	38	0.69	-18.7
	6/23/2014	1,200	130	290	1.7	5.0	19.6	2.3	4.9	<1.5	9.5	34	3.00	-14.0
	9/30/2014	360	63	110	<2.0	16	<1.0	<2.0	2.8	<2.0	<2.0	29	4.09	42.3
	12/15/2014	320	59	58	<1.5	<1.5	<1.0	<1.5	1.7	<1.5	<1.5	2.4	0.88	-28.6
	3/20/2015	570	96	190	1.5	25	<6.2	1.5	3.6	<1.0	1.0	7.8	1.04	29.8
	6/18/2015	376	80.8	91	0.87	<0.84	<10.0	1.5	2.9	<0.84	<0.84	6.0	1.75	-148.5
	9/22/2015	343	68.3	38.3	<1.2	<1.2	<1.0	1.4	1.8	<1.2	<1.2	2.2	1.66	105.5
	12/8/2015	308	62.6	50.9	<1.2	<1.2	<1.0	1.5	1.8	<1.2	<1.2	9.9	1.20	82.8
	3/8/2016	433	100	148	1.2	<0.84	<1.0	2.1	7.5	<0.84	<0.84	5.1	1.13	29.5
	6/17/2016	206	67.3	125	0.97	<0.50	<10.0	1.5	5.0	<0.50	<0.50	<1.0	3.71	-8.6
	9/28/2016	99.4	35.5	40.5	<0.50	3.3	<10.0	3.1	1.3	<0.50	<0.50	2620	1.32	135.2
	12/13/2016	2.9	1.0	209	0.55	4.3	<10.0	0.92	0.64	<0.50	<0.50	130	3.57	12.1
	3/30/2017	<0.50	0.79	177	6.0	186	328	<0.50	7.5	<0.50	<0.50	137	0.79	-137.7
	6/14/2017	16.2	8.5	143	1.9	29.4	83.2	<0.50	2.3	<1.0	<0.50	38.9	0.87	-53.2
	9/26/2017	307	65.9	83.0	0.83	2.3	<10.0	3.4	4.5	<1.0	<0.50	4.3	0.93	80.5
	11/9/2017	198	74.0	105	0.91	2.6	<10.0	4.3	3.3	<0.50	<0.50	3.7	0.66	-104.8
3/21/2018	245	64.5	151	1.02	1.63	<13.0	4.04	3.17	<0.500	<0.500	8.3	0.36	175.8	
6/28/2018	747	140	353	1.74	5.26	<10.0	9.34	10.2	<0.500	0.555	8.2	0.45	159.1	
9/26/2018	322	57	60.2	<8.00	<8.00	<1.0	<8.00	<8.00	<8.00	<8.00	3.12	0.99	126.4	
12/4/2018	355	76.7	130	0.836	1.24	<1.0	6.59	<0.400	2.79	<0.400	6.09	2.28	-22.7	
3/20/2019	146	36.6	69.0	<0.400	1.55	<1.0	3.08	1.43	<0.400	<0.400	3.34	5.86	72.6	
6/7/2019	769	111	205	<8.00	<8.00	<1.0	<8.00	<8.00	<8.00	<8.00	8.2	0.73	29.2	
9/29/2019	176	26.8	37.1	<0.800	<0.800	<1.0	1.14	1.36	<0.800	<0.800	1.94	0.70	-16.2	
12/3/2019	306	57.8	40.6	<0.800	<0.800	<1.0	1.80	1.57	<0.800	<0.800	2.27	5.01	181.8	
3/11/2020	1,370	190	177	1.14	<0.800	<1.0	5.63	3.94	<0.800	1.77	2.28	0.94	99.5	
6/17/2020	427	61.2	72.0	<4.00	<4.00	<1.0	<4.00	<4.00	<4.00	<4.00	5.91	0.96	237.3	
10/8/2020	510	52.3	36.7	<2.00	<2.00	<1.0	<2.00	<2.00	<2.00	<2.00	1.74	1.80	1.6	
12/9/2020	362	41.3	29.5	<0.800	<0.800	<1.0	<0.800	1.15	<0.800	<0.800	1.76	1.50	-30.7	

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Table 5
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NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Volatile Organic Compounds										Attenuation Chemistry	Field Parameters	
		Tetrachloro ethene	Trichloro ethene	cis-1,2-Dichloro ethene	trans-1,2-Dichloro ethene	Vinyl chloride	Ethene	1,1-Dichloro ethene	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1,1-Trichloro ethane	Total Organic Carbon	Dissolved Oxygen	Oxidation Reduction Potential
Concentrations in µg/L												(mg/L)	(mg/L)	(mV)
EX	2/6/2007	2,810	564	68.2	<10.0	<10.0	N/A	<10.0	<10.0	<10.0	40	1.45	0.24	164.8
	12/16/2008	4,500	830	490	<15.0	<15.0	N/A	<15.0	54	<15.0	71	3.30	0.74	-174.5
	3/23/2009	1,400	420	50	<5.0	<5.0	N/A	<5.0	<5.0	<5.0	43	3.0	0.47	68.8
	6/18/2009	24	11	4.2	<0.50	<0.50	N/A	<0.50	<0.50	<0.50	1.1	N/A	0.37	-9.3
	9/18/2009	2,100	380	120	0.76	1.1	<1.0	3.3	4.1	<0.50	38	4.9	0.60	109.0
	12/18/2009	700	56	5.6	<2.5	<2.5	55.6	<2.5	<2.5	<2.5	3.7	1.8	2.13	170.1
	3/16/2010	150	33	20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.2	2.4	0.88	102.6
	6/17/2010	150	39	92	<0.50	2.2	<1.0	<0.50	0.97	<0.50	2.3	3.3	0.84	239.5
	9/23/2010	2,400	220	90	0.53	1.8	<1.0	1.6	1.5	<0.50	20	3.6	0.93	-521.6
	12/21/2010	900	99	30	<0.50	0.71	<1.0	0.59	0.83	<0.50	6.7	<0.50	0.91	131.7
	3/31/2011	6,800	910	240	<4.0	5.1	1.91	8.1	8.2	<4.0	110	1.9	--	--
	6/7/2011	1,400	170	140	<4.0	<4.0	<1.0	<4.0	<4.0	<4.0	15	3.5	0.70	115.2
	9/19/2011	4,100	460	290	<5.0	14	N/A	11	7.9	<5.0	73	560	0.63	907.9
	12/9/2011	<50	<50	12,000	9.3	140	11.4	19	16	<5.0	17	320	1.23	-68.3
	3/9/2012	33	10	1,400	8.6	290	24.2	<4.0	5.0	<4.0	<4.0	89	0.14	-33.6
	6/22/2012	3.0	1.1	170	1.3	120	150	0.68	3.4	<0.50	0.59	110	1.23	-68.3
	9/14/2012	3.0	<1.5	320	<1.5	42	47.2	<1.5	1.5	<1.5	<1.5	77	0.15	-29.5
	12/14/2012	0.87	<0.50	26	<0.50	12	5.92	<0.50	<0.50	<0.50	<0.50	59	0.25	3.3
	3/15/2013	1.2	<0.50	<0.50	<0.50	4.4	<1.0	<0.50	<0.50	<0.50	<0.50	64	0.37	67.0
	6/14/2013	0.79	<0.50	1.6	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	12	0.54	158.8
	9/20/2013	4.1	2.6	71	0.68	30	35.4	0.54	1.9	<0.50	<0.50	42	0.43	-175.4
	12/16/2013	2.0	1.4	34	<0.50	28	45.3	<0.50	3.8	<0.50	<0.50	46	1.66	11.9
	3/24/2014	20	7.5	30	<0.50	11	91.1	<0.50	0.80	<0.50	<0.50	35	0.51	158.7
	6/23/2014	29	15	160	0.97	38	81.5	1.1	2.9	<0.50	<0.50	34	0.41	-50
	9/30/2014	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/15/2014	22	2.7	10	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	158	2.41	-52.2
	3/19/2015	170	56	690	1.9	2.8	<6.2	2.1	3.5	<0.50	2.5	<5.0	1.05	18.2
	6/18/2015	186	42	420	1.6	3.2	<10.0	2.6	2.6	<0.50	0.88	7.5	2.29	-35.2
	9/22/2015	302	61.9	543	2.6	24.4	<1.0	3.7	2.9	<0.50	0.65	22.6	0.90	23.7
	12/8/2015	94.4	21.3	427	<0.50	2.1	<1.0	<0.50	<0.50	<0.50	<0.50	7.5	--	--

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NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Volatile Organic Compounds										Attenuation Chemistry	Field Parameters	
		Tetrachloro ethene	Trichloro ethene	cis-1,2-Dichloro ethene	trans-1,2-Dichloro ethene	Vinyl chloride	Ethene	1,1-Dichloro ethene	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1,1-Trichloro ethane	Total Organic Carbon	Dissolved Oxygen	Oxidation Reduction Potential
Concentrations in µg/L												(mg/L)	(mg/L)	(mV)
EX (continued)	3/8/2016	274	71.1	1,160	3.6	13.3	<1.0	2.9	4.0	<1.2	5.0	22	0.36	113.3
	6/17/2016	592	90.8	1,040	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<5.0	1.2	2.72	4.8
	9/28/2016	39.4	549	2,230	3.8	128	N/A	3.5	4.6	<1.7	2.5	N/A	1.61	138.1
	12/12/2016	4.3	0.96	8.1	<0.50	51.9	N/A	<0.50	<0.50	<0.50	<0.50	N/A	2.00	-24
	3/28/2017	6.1	1.9	5.2	<0.50	<0.50	23.5	<0.50	<0.50	<0.50	<0.50	347	1.50	89.9
	6/14/2017	9.5	3.0	11.7	0.56	1.3	11.2	<0.50	10.7	<1.0	<0.50	14.0	3.48	-12.4
	9/26/2017	0.82	0.63	6.9	<0.50	10.1	17.5	<0.50	8.8	<1.0	<0.50	25.5	1.18	-140.5
	3/21/2018	1.48	2.72	22.6	<0.500	10.8	28.3	<0.500	1.34	<0.500	<0.500	15.4	0.19	74.4
	6/28/2018	1.91	0.758	722	8.72	424	99.2	1.11	4.55	<0.500	<0.500	43.6	0.39	-62.6
	9/24/2018	3.07	2.42	3.38	0.751	7.56	2.9	<0.400	1.42	<0.400	<0.400	13.2	1.55	150.7
12/4/2018	6.35	3.60	8.18	<0.400	1.88	<1.0	<0.400	0.876	<0.400	<0.400	11.0	5.80	-10.0	
MW-12	6/7/2011	53	25	59	1.0	<0.50	<1.0	<0.50	1.8	<0.50	0.70	0.94	3.16	110.4
	9/19/2011	860	690	4,700	55	63	N/A	45	240	2.5	65	8.3	0.84	906.3
	12/7/2011	520	380	2,900	33	40	6.15	28	130	1.3	34	59	1.00	109.0
	3/12/2012	770	540	3,800	45	46	<1.0	44	210	<15.0	48	65	1	45.3
	6/22/2012	270	200	1,700	39	22	<1.0	16	100	<5.0	13	56	0.66	117.1
	9/14/2012	1,100	730	5,400	73	84	<1.0	58	270	<15.0	76	100	0.43	140.7
	12/13/2012	38	23	62	0.97	<0.50	<1.0	<0.50	1.0	<0.50	0.53	4.9	1.07	128.6
	3/15/2013	760	540	4,300	56	54	<1.0	40	200	1.8	53	95	0.62	117.3
	6/13/2013	610	500	4,800	53	59	<1.0	39	240	<15.0	46	62	0.39	205.2
	9/20/2013	510	400	3,400	49	50	<1.0	37	170	1.6	37	110	0.59	-10.7
	12/16/2014	150	110	800	10	9.8	<1.0	7.6	36	<2.5	5.8	23	1.22	40.4
	3/24/2014	180	170	1,900	25	47	<1.0	18	110	0.77	8.6	41	1.94	29.1
	6/24/2014	42	34	310	2.3	<1.5	<1.0	1.9	14	<1.5	1.6	13	3.68	1.5
	9/30/2014	680	480	3,500	45	42	<1.0	39	190	<15.0	36	93	6.09	47.1
	12/11/2014	25	15	34	0.64	<0.50	<1.0	<0.50	0.73	<0.50	<0.50	1.9	0.65	-110.0
	3/20/2015	580	340	2,110	29	37	<6.2	25	102	<5.0	18	4	0.89	75.7
	6/19/2015	514	356	2,570	25	31.1	<10.0	28.2	151	<10.0	23.6	4.8	0.71	10.2
9/22/2015	343	239	2,250	23.4	22.5	<1.0	16.9	120	<8.3	15.7	4.4	1.06	65.3	
12/8/2015	44.9	22	40.1	0.72	<0.50	<10.0	<0.50	0.84	<0.50	0.52	16.5	0.99	28.1	

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Well Number	Sample Date	Volatile Organic Compounds										Attenuation Chemistry	Field Parameters	
		Tetrachloro ethene	Trichloro ethene	cis-1,2-Dichloro ethene	trans-1,2-Dichloro ethene	Vinyl chloride	Ethene	1,1-Dichloro ethene	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1,1-Trichloro ethane	Total Organic Carbon	Dissolved Oxygen	Oxidation Reduction Potential
Concentrations in µg/L												(mg/L)	(mg/L)	(mV)
MW-12 (continued)	3/8/2016	325	209	1,380	16.2	21.3	<10.0	15.4	79.9	<3.6	7.7	5.5	0.71	62.2
	6/16/2016	314	288	3,310	31.6	52.3	<10.0	29.9	174	<8.4	12.8	3.7	2.68	59.7
	9/27/2016	387	163	867	11.4	14.8	<10.0	11.5	44	<10.0	3.9	5240	0.98	252.5
	12/14/2016	62.3	42.2	744	2.3	20.5	<10.0	4.7	16.5	<10.0	<10.0	1930	0.46	-91.3
	3/30/2017	55.9	29.6	1,120	6.1	28.3	75.2	3.8	11.4	<2.5	<2.5	490	2.92	-17.9
	6/12/2017	42.4	18.1	893 J	7.6	48.4	120	4.7	14.0	<3.1	<3.1	530	0.91	-34.2
	9/28/2017	<1.7	<1.7	457	5.4	47.7	16.0	<1.7	19.5	<1.7	<1.7	243	1.19	-87.4
	11/9/2017	<0.50	<0.50	22.2	1.6	49.1	<10.0	<0.50	4.5	<0.50	<0.50	326 J	1.61	-119.0
	3/20/2018	<0.500	0.271 J	5.64	1.33	2.77	<13.0	<0.500	0.522	<0.500	<0.500	89.1	8.95	-136.3
	7/1/2018	0.304 J	0.996	4.02	1.57	1.45	<10.0	<0.500	0.913	<0.500	<0.500	66.0	1.77	114.3
	9/25/2018	<0.400	<0.400	1.46	0.520	1.23	<1.0	<0.400	0.730	<0.400	<0.400	79.5	1.27	-174.0
	12/4/2018	1.29	1.29	4.30	0.415	1.69	<1.0	<0.400	0.470	<0.400	<0.400	36.4	5.51	-30.5
	3/20/2019	2.11	1.33	6.70	0.675	1.64	<1.0	<0.400	0.655	<0.400	<0.400	34.4	2.34	-38.6
	6/5/2019	3.64	3.45	9.36	0.756	2.74	<1.0	<0.400	0.719	<0.400	<0.400	16.6	1.72	69.9
	9/26/2019	<0.400	0.459	5.31	0.565	6.82	1.1	<0.400	6.26	<0.400	<0.400	46.1	0.29	-227.1
	12/5/2019	2.37	1.41	2.61	<0.400	0.413	<1.0	<0.400	<0.400	<0.400	<0.400	23.8	9.18	185.3
	3/11/2020	7.01	4.25	8.47	0.561	0.423	<1.0	<0.400	0.806	<0.400	<0.400	12.0	5.10	91.3
	6/18/2020	2.59	2.68	14.1	<0.400	1.04	<1.0	<0.400	1.30	<0.400	<0.400	10.5	0.90	173.1
	10/7/2020	<0.400	0.750	81.7	0.632	196	56	<0.400	37.8	<0.400	<0.400	39.5	2.49	-156.9
	12/8/2020	13.5	6.47	9.92	<0.400	7.36	3.6	<0.400	1.55	<0.400	<0.400	4.60	2.34	120.9
MW-24i	6/7/2011	6.6	1.4	2.0	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	1.2	6.40	59.0
	9/16/2011	27	24	270	1.7	19	N/A	2.5	13	<0.50	5.6	7.0	0.61	646.9
	12/7/2011	19	14	100	<0.50	7.5	2.29	0.84	5.0	<0.50	2.9	290	3.50	-147.5
	3/12/2012	30	11	79	<0.50	4.5	2.03	<0.50	5.9	<0.50	2.3	33	2.11	-1.2
	6/22/2012	0.85	<0.50	14	<0.50	2.6	1.52	<0.50	1.8	<0.50	<0.50	44	3.50	-147.5
	9/14/2012	31	20	58	<0.50	<0.50	<1.0	0.87	4.4	<0.50	0.79	15	0.40	-54.0
	12/14/2012	2.1	0.65	51	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	16	2.11	6.3
	3/15/2013	23	15	48	<0.50	<0.50	<1.0	<0.50	2.8	<0.50	0.57	9.5	0.79	13.1
	6/14/2013	6.2	3.6	28	<0.50	<0.80	<1.0	<0.50	2.7	<0.50	<0.50	11	0.39	130.2
	9/20/2013	15	5.9	15	<0.50	<0.80	<1.0	<0.50	1.0	<0.50	<0.50	11	1.92	-31.2
	12/16/2013	6.7	3.4	8.4	<0.50	<0.50	<1.0	<0.50	1.3	<0.50	<0.50	7.9	3.08	16.9
	3/24/2014	10	5.5	16	<0.50	<0.80	<1.0	<0.50	1.3	<0.50	<0.50	9.4	3.16	-55.4
	6/23/2014	1.3	5.2	13	<0.50	2.1	29.1	<0.50	1.2	<0.50	<0.50	8.4	4.70	-49.7
	9/30/2014	20	10	21	<0.50	<0.50	<1.0	<0.50	1.8	<0.50	<0.50	12.0	2.01	129.7
	12/15/2014	2.4	1.1	12	<0.50	<0.50	<1.0	<0.50	0.60	<0.50	<0.50	<1.0	6.27	-13.9

Please refer to notes at end of table.

Table 5
Interim Action: Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Volatile Organic Compounds										Attenuation Chemistry	Field Parameters	
		Tetrachloro ethene	Trichloro ethene	cis-1,2-Dichloro ethene	trans-1,2-Dichloro ethene	Vinyl chloride	Ethene	1,1-Dichloro ethene	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1,1-Trichloro ethane	Total Organic Carbon	Dissolved Oxygen	Oxidation Reduction Potential
Concentrations in µg/L												(mg/L)	(mg/L)	(mV)
MW-24i (continued)	3/20/2015	6.1	3.1	5.9	<0.50	<0.50	<6.2	<0.50	0.58	<0.50	<0.50	<1.0	10.28	38.6
	6/18/2015	<0.50	<0.50	3.4	<0.50	<0.50	<10.0	<0.50	<0.50	<0.50	<0.50	1.6	1.08	-158.7
	9/22/2015	2.2	0.8	4.7	<0.50	<0.50	<1.0	<0.50	1.9	<0.50	<0.50	2.3	1.85	99.4
	12/8/2015	189	36.4	18	<0.50	<0.50	<1.0	<0.50	0.74	<0.50	<0.50	3.5	1.36	99.2
	3/8/2016	4.1	1.6	3.5	<0.50	<0.50	<10.0	<0.50	<0.50	<0.50	<0.50	1.0	1.75	47.8
	6/17/2016	11.5	6.3	7.8	<0.50	<0.50	<10.0	<0.50	0.99	<0.50	<0.50	<1.0	3.12	14.0
	9/28/2016	5.8	3.1	5.4	<0.50	<0.50	<10.0	<0.50	0.53	<0.50	<0.50	5.3	2.58	123.9
	12/12/2016	1.1	<0.50	<0.50	<0.50	<0.50	<10.0	<0.50	<0.50	<0.50	<0.50	1.5	5.64	2.6
	3/30/2017	1.0	<0.50	0.70	<0.50	<0.50	<10.0	<0.50	<0.50	<0.50	<0.50	3.4	5.24	14.3
	6/15/2017	6.6	2.8	3.2	<0.50	<0.50	<10.0	<0.50	<0.50	<1.0	<0.50	1.2	3.72	-13.4
	9/26/2017	30.1	16.6	24.5	<0.50	<0.50	<10.0	<0.50	2.1	<1.0	<0.50	1.2	1.21	-10.7
	11/9/2017	12.7	5.9	9.6	<0.50	<0.50	<10.0	<0.50	1.1	<0.50	<0.50	1.3	3.11	-100.1
	3/21/2018	19.1	10.2	13.5	<0.500	<0.500	<13.0	<0.500	1.42	<0.500	<0.500	0.734 B J	0.95	129.6
	6/28/2018	10.3	5.93	13.6	1.09	<0.500	<10.0	<0.500	1.44	<0.500	<0.500	<1.0	2.69	129.9
	9/27/2018	24.8	14.3	25.0	<0.400	<0.400	N/A	<0.400	2.18	<0.400	<0.400	N/A	1.67	106.3
	12/4/2018	10.2	3.76	5.13	<0.400	<0.400	N/A	<0.400	0.800	<0.400	<0.400	N/A	5.24	-6.9
	3/25/2019	11.7	5.91	8.46	<0.400	<0.400	<1.0	<0.400	0.888	<0.400	<0.400	<1.00	4.52	18.1
	6/7/2019	7.39	3.55	4.99	<0.400	<0.400	<1.0	<0.400	0.601	<0.400	<0.400	<1.00	4.39	5.8
	9/27/2019	<0.400	<0.400	<0.400	<0.400	<0.400	1.6	<0.400	<0.400	<0.400	<0.400	<1.00	5.30	-252.2
	12/3/2019	8.78	3.72	3.82	<0.400	<0.400	<1.0	<0.400	0.775	<0.400	<0.400	<1.00	3.09	1.3
3/12/2020	17.0	8.42	15.4	<0.400	<0.400	<1.0	<0.400	1.30	<0.400	<0.400	<1.00	7.57	66.9	
6/18/2020	6.24	2.84	2.91	<0.400	<0.400	<1.0	<0.400	0.610	<0.400	<0.400	<1.00	7.63	-43.8	
10/9/2020	1.35	<0.400	1.08	<0.400	<0.400	<1.0	<0.400	<0.400	<0.400	<0.400	1.09	3.60	-63.2	
12/10/2020	29.7	13.0	20.0	<0.400	<0.400	N/A	<0.400	1.73	<0.400	<0.400	N/A	9.37	77.2	
MGMS2-40	6/7/2011	4,400	1,400	1,600	17	48	<1.0	30	65	<15.0	57	2.2	0.86	49.5
	9/12/2011	790	380	7,400	20	58	N/A	28	44	<15.0	48	110	2.63	338.9
	12/7/2011	61	39	5,300	<15.0	460	14.5	<15.0	35	<15.0	<15.0	300	6.28	-137.9
	3/8/2012	9.9	5.4	470	2.8	260	368	2.3	38	<2.0	5.2	290	1.22	-73.6
	6/19/2012	7.2	2.5	20	1.3	63	566	<0.50	53	<0.50	<0.50	500	6.28	-137.9
	9/12/2012	89	80	310	3.2	440	264	2.8	39	<1.5	5.0	140	1.16	-40.1
	12/11/2012	10	3.4	33	1.3	4.0	110	<0.50	4.8	<0.50	<0.50	280	0.55	-82.3
	3/15/2013	5.6	2.2	300	2.0	270	121	1.9	28	<0.50	2.5	81	0.33	-24.3
	6/11/2013	0.94	<0.50	7.9	<0.50	4.8	55.6	<0.50	8.3	<0.50	<0.50	110	0.42	-116.7
	9/17/2013	16	17	290	1.4	330	143	4.8	28	<0.50	1.6	98	0.27	-209.9
	12/16/2013	2.4	1.4	8.4	<0.50	3.4	33.3	<0.50	9.7	<0.50	<0.50	110	1.19	-41.9
	3/24/2014	2.6	1.8	84	<0.50	270	930	2.9	45	<0.50	<0.50	120	1.06	-126.1
	6/26/2014	21	22	88	0.84	90	207	10	31	<0.50	<0.50	120	2.22	-23.7
	9/23/2014	170	110	590	2.4	800	12.1	30	30	<0.50	3.2	94	1.31	-119.0
12/12/2014	3.4	2.3	10	<0.50	18	34	<0.50	35	<0.50	<0.50	7.9	1.41	-162.1	

Please refer to notes at end of table.

Table 5
Interim Action: Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Volatile Organic Compounds										Attenuation Chemistry	Field Parameters	
		Tetrachloro ethene	Trichloro ethene	cis-1,2-Dichloro ethene	trans-1,2-Dichloro ethene	Vinyl chloride	Ethene	1,1-Dichloro ethene	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1,1-Trichloro ethane	Total Organic Carbon	Dissolved Oxygen	Oxidation Reduction Potential
Concentrations in µg/L												(mg/L)	(mg/L)	(mV)
MGMS2-40 (continued)	3/20/2015	31	22	47	<0.50	17	8.1	3.9	4.3	<0.50	<0.50	8	20.02	-83.7
	6/19/2015	18.4	12.8	53.8	<0.50	48.3	33.7	1.3	13.8	<0.50	<0.50	11	13.5	-117.5
	9/25/2015	67.4	45.9	105	0.61	57.8	<10.0	4.2	12.3	<0.50	0.92	10.9	9.67	-145.1
	12/8/2015	4.0	2.8	7.2	<0.50	3.3	22.8	<0.50	13.5	<0.50	<0.50	7.9	6.14	-96.9
	3/8/2016	6.5	6.2	36.0	<0.50	36	63.7	1.6	20.6	<0.50	<0.50	7.4	5.52	-161.7
	6/17/2016	223	146	744	2.8	227	31	26.4	24.9	<0.50	3.1	3.8	1.60	-72.2
	9/29/2016	33.3	24.8	115	<0.50	142	N/A	<0.50	12.1	<0.50	<0.50	N/A	5.16	194.5
	12/16/2016	2.6	1.9	5.2	<0.50	2.0	N/A	<0.50	10.3	<0.50	<0.50	N/A	0.80	-28.1
	3/31/2017	4.3	14.4	236	0.60	235	N/A	14.3	57.6	<0.50	<0.50	N/A	0.68	-92.2
	6/15/2017	5.1	4.9	46.2	<0.50	98.9	128	3.5	38.6	<0.50	<0.50	7.0	1.29	-109.6
	9/29/2017	41.5	31.3	195	0.74	428	47.4	6.8	21.7	<1.0	0.67	6.4	1.03	-43.7
	11/9/2017	13.2	9.2	61.6	0.52	170	95.7	0.86	21.3	<0.50	<0.50	6.2	1.24	-113.3
	3/22/2018	46.0	27.3	109	0.571	122	32.7	4.22	25.9	<0.500	0.259 J	9.58	6.89	-112.9
	7/1/2018	62.1	48.9	151	0.971	38.2	<10.0	5.93	12.7	<0.500	1.04	5.2	3.15	-50.8
	9/28/2018	66.9	43.3	140	<0.800	106	3.6	1.44	8.74	<0.800	<0.800	5.91	1.50	97.3
	12/10/2018	18.7	12.0	24.9	<0.400	123	78	0.563	20.9	<0.400	<0.400	5.08	2.05	-111.4
	3/25/2019	62.0	35.9	136	0.752	155	26	2.58	26.6	<0.400	<0.400	4.61	0.97	151.7
	6/4/2019	14.6	10.4	37.8	<0.400	145	19	0.960	28.2	<0.400	<0.400	4.83	0.64	104.5
	9/27/2019	17.0	13.1	73.8	<0.400	101	1.4	0.729	11.2	<0.400	<0.400	4.76	7.37	-133.9
	12/4/2019	32.3	17.9	40.5	<0.400	65.4	4.2	0.778	20.6	<0.400	<0.400	5.01	4.39	-82.2
3/12/2020	86.3	43.3	105	0.641	134	2.1	2.73	24.1	<0.400	0.453	5.13	8.14	-78.9	
6/16/2020	14.8	9.09	85.0	<0.400	138	6.1	1.25	27.3	<0.400	<0.400	4.13	0.93	177.2	
10/6/2020	101	56.2	98.4	0.635	148	3.8	2.45	19.1	<0.400	<0.400	5.15	1.17	28.8	
12/8/2020	41.0	19.4	82.6	<0.800	80.2	2.0	1.85	17.8	<0.800	<0.800	5.37	1.07	-19.5	
MW-13	9/28/2016	5,090	951	148	<2.5	<2.5	<10.0	<2.5	<2.5	<2.5	<2.5	33,600	2.71	158.7
	12/16/2016	1,020	394	509	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<5.0	2,220	0.66	-111.4
	3/30/2017	176	57.6	101	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<5.0	341	4.36	-61.8
	6/15/2017	97.7	56.3	272	1.6	4.1	N/A	1.2	<1.0	<1.0	<1.0	N/A	1.41	-105.7
	9/27/2017	3.3	1.3	3220	7.3	25.0	<10.0	5.0	<1.0	<1.0	<1.0	55.8	2.16	-103.9
	11/7/2017	<4.2	<4.2	1,360	5.4	25.0	11.6	<4.2	<4.2	<4.2	<4.2	85.5	2.19	-89.2
	3/20/2018	0.396 J	2.19	1,730	5.20	211	191	2.55	0.879	<0.500	<0.500	73.7	5.79	-114.8
	7/1/2018	<0.500	0.781	1680	26.9	2030	500	5.98	18.3	0.148 J	<0.500	52.9	1.13	-31.0
	9/25/2018	0.410	0.800	9.78	1.26	113	61	<0.400	1.91	<0.400	<0.400	20.8	1.22	-146.8
	12/5/2018	0.567	0.413	6.17	0.682	55.2	7.1	<0.400	<0.400	<0.400	<0.400	51.7	7.71	-130.6
	3/19/2019	<0.400	0.433	2.69	<0.400	2.02	<1.0	<0.400	<0.400	<0.400	<0.400	48.5	2.58	-79.2
	6/6/2019	<0.400	0.673	4.62	<0.400	2.89	<1.0	<0.400	<0.400	<0.400	<0.400	21.2	0.02	48.4
	9/26/2019	<0.400	<0.400	1.94	0.439	2.01	<1.0	<0.400	1.07	<0.400	<0.400	34.3	0.50	-261.4
	12/3/2019	<0.400	<0.400	1.06	0.488	1.42	<1.0	<0.400	1.50	<0.400	<0.400	29.1	2.41	-149.4
	3/10/2020	<0.400	7.59	72.5	2.04	134	18.0	1.97	9.19	<0.400	<0.400	20.1	5.76	-122.2
	6/18/2020	<0.400	1.12	1.15	<0.400	5.28	<1.0	<0.400	0.610	<0.400	<0.400	21.9	0.90	182.1
	10/7/2020	0.470	0.87	3.47	0.920	98.8	120	<0.400	18.1	<0.400	<0.400	9.99	0.26	-126.4
	12/8/2020	<0.400	<0.400	0.606	<0.400	2.30	<1.0	<0.400	2.67	<0.400	<0.400	23.2	2.11	-100.5

Please refer to notes at end of table.

Table 5
Interim Action: Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Volatile Organic Compounds										Attenuation Chemistry	Field Parameters	
		Tetrachloro ethene	Trichloro ethene	cis-1,2-Dichloro ethene	trans-1,2-Dichloro ethene	Vinyl chloride	Ethene	1,1-Dichloro ethene	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1,1-Trichloro ethane	Total Organic Carbon	Dissolved Oxygen	Oxidation Reduction Potential
Concentrations in µg/L												(mg/L)	(mg/L)	(mV)
MW-14	9/27/2016	100	218	61.8	0.94	<0.50	<10.0	2.1	7.2	<0.50	1.7	8.8	8.1	221.2
	12/13/2016	0.56	0.97	1.3	<0.50	<0.50	<10.0	<0.50	<0.50	<0.50	<0.50	5.1	3.1	55.0
	3/27/2017	14.7	33.4	69.2	<0.50	0.62	<10.0	0.57	<0.50	<0.50	<0.50	5.1	3.1	55.0
	6/13/2017	58.3	204	432	2.7	2.5	N/A	5.3	10	<1.0	2.1	N/A	0.94	61.3
	9/26/2017	62.4	265	279	2.8	<0.84	<10.0	2.6	6.2	<0.84	1.1	3.8	1.89	80.6
	11/8/2017	39.3	160	306	2.2	0.91	<10.0	2.1	4.5	<0.84	<0.84	8.5	1.85	106.9
	3/20/2018	36.0	150	500	2.56	1.35	<13.0	3.64	5.42	<0.500	0.579	8.76	0.58	21.7
	6/28/2018	34.9	247	255	2.52	0.687	<10.0	2.54	10.5	<0.500	1.57	6.6	6.59	203.6
	9/26/2018	84.3	484	361	4.50	<4.00	<1.0	4.40	12.1	<4.00	<4.00	4.56	1.55	100.1
	12/5/2018	83.4	260	333	<4.00	<4.00	<1.0	<4.00	5.43	<4.00	<4.00	13.4	4.40	55.3
	3/19/2019	31.4	178	223	2.06	<2.00	<1.0	<2.00	5.4	<2.00	<2.00	4.89	8.17	88.6
	6/6/2019	19.1	76.4	151	0.937	<0.400	<1.0	1.09	1.74	<0.400	<0.400	6.64	2.96	80.3
	9/25/2019	91.8	327	264	3.60	0.482	<1.0	4.58	12.5	<0.400	1.47	5.06	0.77	67.5
	12/4/2019	107	351	242	2.88	<0.400	<1.0	3.17	7.81	<0.400	0.704	50.0	4.41	110.9
	3/11/2020	85.9	294	186	2.45	<2.00	NA	2.72	6.80	<2.00	<2.00	N/A	3.30	108.2
	6/17/2020	62.6	197	82.6	<2.00	<2.00	<1.0	<2.00	3.50	<2.00	<2.00	4.22	1.16	205.3
10/8/2020	124	680	207	<2.00	<2.00	<1.0	4.79	14.6	<2.00	<2.00	2.79	0.82	18.1	
12/9/2020	109	339	180	2.52	<2.00	<1.0	3.04	7.77	<2.00	<2.00	3.05	1.05	94.4	
MW-19	9/26/2016	1,520	592	235	<5.0	10.1	<10.0	11.0	10.4	<5.0	14.5	1.9	3.27	174.4
	12/12/2016	1,730	975	1,030	11.6	31.9	<10.0	14.2	78.7	<5.0	15.5	8.1	9.22	175.2
	3/28/2017	755	896	1,990	21.5	63.2	<10.0	26.7	214	<5.0	19.9	4.8	2.5	35.8
	6/14/2017	566	506	486	6.2	17.2	N/A	15.8	41.8	<2.5	8.2	N/A	1.54	-22.7
	9/26/2017	3,710	1,480	1,160	5.4	111	44.3	28.9	11.1	<2.5	40.4	8.1	1.92	185.2
	11/9/2017	1,530	1,020	1,660	24.0	115	11.8	24.9	104	0.75 J	20.2	6.9	2.26	-75.2
	3/21/2018	1,250	1,340	2,430	11.2	413	32.3	31.4	59.0	0.225 J	17.0	29.9	1.43	135.6
	6/28/2018	177	191	4190	18.4	799	271	36.3	81.6	<0.500	11.7	58.2	2.18	-30.8
	9/25/2018	3,830	2,270	1,960	<0.400	116	9.8	<0.400	<0.400	<0.400	<0.400	16.8	1.30	57.4
	12/5/2018	3,090	1,490	1,750	18.4	79.0	2.1	39.3	91.8	0.453	21.8	10.5	5.11	-29.9
	3/20/2019	2,970	2,090	1,910	13.9	75.8	2.1	39.5	49.7	<8.00	23.7	19.1	4.26	108.6
	6/7/2019	894	793	1,910	20.4	80.8	2.9	52.6	108	<10.0	<10.0	9.34	0.72	61
	9/26/2019	4,340	1,620	1,160	12.1	39.1	3.1	40.2	41.9	<4.00	30.6	5.38	1.73	-172.4
	12/3/2019	1,670	1,200	1,250	<20.0	25.6	<1.0	28.6	57.4	<20.0	<20.0	6.88	6.52	205.1
	3/11/2020	4,730	2,010	1,450	14.8	154	7.5	60.4	35.4	<10.0	29.1	13.6	3.01	87.0
	6/18/2020	1,080	697	956	5.60	96.3	5.0	27.5	32.5	<20.0	9.40	40.1	3.12	162.1
10/7/2020	8,110	2,920	1,510	<20.0	53.8	<1.0	58.8	46.9	<20.0	39.0	19.7	1.1	-83.5	
12/8/2020	3,880	1,210	1,330	<40.0	117	<1.0	<40.0	70.8	<40.0	<40.0	17.3	2.36	106.3	

Please refer to notes at end of table.

Table 5
Interim Action: Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Volatile Organic Compounds										Attenuation Chemistry	Field Parameters	
		Tetrachloro ethene	Trichloro ethene	cis-1,2-Dichloro ethene	trans-1,2-Dichloro ethene	Vinyl chloride	Ethene	1,1-Dichloro ethene	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1,1-Trichloro ethane	Total Organic Carbon	Dissolved Oxygen	Oxidation Reduction Potential
Concentrations in µg/L												(mg/L)	(mg/L)	(mV)
MW-26	9/26/2016	160	288	61.1	1.6	<0.50	N/A	1.1	3.9	<0.50	2.4	N/A	1.64	236.7
	12/13/2016	167	410	85.9	2.0	<0.50	<10.0	2.4	8.9	<0.50	3.3	2.4	0.88	102.4
	3/29/2017	214	452	170	<0.50	<0.50	<10.0	<0.50	<0.50	<0.50	<0.50	1.3	1.34	165.2
	6/13/2017	160	311 E, J	113	2.0	0.65	NA	1.9	6.7	<1.0	2.1	N/A	3.80	74.6
	9/26/2017	68.4	192	192	2.1	0.98	<10.0	1.0	5.1	<1.0	0.83	7.1	5.56	77.3
	11/8/2017	88.1	170	204	2.3	1.8	<10.0	1.5	4.8	<0.50	1.0	5.9	1.75	99.8
	3/20/2018	108	190	157	1.85	1.75	<13.0	1.35	4.85	<0.500	1.20	5.84	7.28	156.4
	6/29/2018	138	221	114	1.88	1.02	<10.0	1.46	5.05	<0.500	1.94	3.9	0.88	224.6
	9/24/2018	117	233	141	2.14	1.18	<1.0	1.24	4.24	<0.400	1.19	5.13	4.17	152.8
	12/5/2018	139	210	147	1.89	0.85	<1.0	1.09	3.02	<0.400	0.846	<1.00	4.16	36.5
	3/22/2019	139	383	142	3.18	<0.800	<1.0	2.18	7.74	<0.800	2.09	3.48	1.12	100.2
	6/3/2019	148	336	92.2	2.35	<2.00	<1.0	<2.00	5.75	<2.00	2.10	2.76	5.68	69.1
	9/26/2019	133	272	104	2.6	<2.00	<1.0	<2.00	5.14	<2.00	<2.00	4.38	0.40	-6.1
	12/3/2019	137	216	95.0	<2.00	<2.00	<1.0	<2.00	2.63	<2.00	<2.00	5.56	3.12	49.2
	3/11/2020	79.1	205	59.7	<2.00	<2.00	<1.0	<2.00	3.65	<2.00	<2.00	3.72	10.81	72.3
	6/17/2020	143	299	64.2	1.90	<0.800	N/A	1.38	5.16	<0.800	2.20	N/A	2.19	-17.1
	10/7/2020	118	208	62.8	<2.00	<2.00	<1.0	<2.00	2.64	<2.00	<2.00	4.06	9.73	109.3
12/9/2020	147	218	64.3	<2.00	<2.00	<1.0	<2.00	3.34	<2.00	<2.00	4.04	3.99	119.1	
MGMS1-43	9/26/2016	230	366	1,980	24.2	52	<10.0	13.5	81.9	<8.3	<8.3	9.0	5.09	184.2
	12/16/2016	64.1	171	1,810	20.1	239	<10.0	9.5	92.6	<8.4	<8.4	6.2	6.06	-17.5
	3/31/2017	45.8	119	1,430	15.2	348	14.8	12.5	90.8	<8.4	<8.4	7.0	3.02	-40.7
	6/12/2017	24.4	116	2,620	18.7	681	N/A	16.7	173	<8.3	<8.3	N/A	1.17	-109.8
	9/29/2017	70.7	126	901	12.9	117	<10.0	6.9	60.1	<2.5	<2.5	6.1	8.73	90.7
	11/7/2017	108	211	2,350 J	26.6	181	<10.0	13.7	153	<2.5	<2.5	5.6	2.04	74.5
	3/22/2018	80.1	278	2,450	34.9	236	<13.0	18.0	192	<0.500	0.780	13.8	10.71	-11.7
	7/1/2018	107	246	1,880	32.8	118	<10.0	13.8	116	<0.500	0.588	7.5	3.48	-1.6
	9/28/2018	252	528	3,150	47.4	134	<1.0	27.8	141	<8.00	<8.00	5.52	1.98	97.4
	12/4/2018	146	388	2,750	48.1	129	<1.0	22.5	148	<0.400	1.08	6.06	8.31	-2.0
	3/26/2019	145	372	3,210	42.2	105	<1.0	22.3	160	<8.00	<8.00	5.58	0.96	-10.1
	6/7/2019	115	315	3,090	40.8	145	<1.0	26.5	169	<8.00	<8.00	6.73	1.24	-12.5
	9/27/2019	212	434	3,240	53.9	113	<1.0	30.5	156	<8.00	<8.00	6.32	0.42	-295.7
	12/4/2019	162	398	2,860	40.9	11.8	<1.0	17.5	124	<8.00	<8.00	5.60	6.76	-32.5
	3/11/2020	228	495	3,230	60.4	157	1.4	29.7	157	<10.0	<10.0	4.82	8.24	-40.1
	6/16/2020	116	264	2,520	31.5	152	3.4	21.8	114	<10.0	<10.0	6.56	1.3	166.4
	10/6/2020	219	507	2,980	45.5	48.2	<1.0	26.0	124	<10.0	<10.0	5.30	1.07	127.5
12/10/2020	151	294	2,620	34.3	40.6	<1.0	<20.0	131	<20.0	<20.0	5.51	1.26	95.2	

Please refer to notes at end of table.

Table 5
Interim Action: Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Volatile Organic Compounds										Attenuation Chemistry	Field Parameters	
		Tetrachloro ethene	Trichloro ethene	cis-1,2-Dichloro ethene	trans-1,2-Dichloro ethene	Vinyl chloride	Ethene	1,1-Dichloro ethene	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1,1-Trichloro ethane	Total Organic Carbon	Dissolved Oxygen	Oxidation Reduction Potential
Concentrations in µg/L												(mg/L)	(mg/L)	(mV)
MGMS3-40	9/26/2016	1.7	1.4	226	2.0	52.1	<10.0	0.60	4.5	<0.50	<0.50	36.2	2.7	165.3
	12/16/2016	0.63	<0.50	1.3	0.97	0.88	55.2	<0.50	1.0	<0.50	<0.50	86.9	5.95	-9.20
	3/28/2017	1.4	0.60	1,050	6.0	323	68.1	3.3	22.5	0.68	<0.50	5.0	1.57	-125.8
	6/12/2017	0.97	<0.50	1.7	<0.50	<0.50	N/A	<0.50	3.3	<0.50	<0.50	N/A	5.22	-94.1
	9/26/2017	0.79	<0.50	0.69	<0.50	<0.50	22.8	<0.50	1.1	<1.0	<0.50	3.8	10.02	-82.8
	11/10/2017	0.85	<0.50	8.0	<0.50	15.8	54.8	<0.50	4.3	<0.50	<0.50	6.5	0.93	-111.6
	3/22/2018	1.45	0.528	9.81	0.179 J	39.8	242	<0.500	8.57	<0.500	<0.500	8.74	6.95	-130.8
	7/1/2018	0.498 J	0.169 J	7.58	<0.500	8.98	27.4	<0.500	1.39	<0.500	<0.500	4.6	3.18	-28.6
	9/28/2018	0.970	<0.400	143	<0.400	129	33	0.560	9.08	<0.400	<0.400	4.38	6.62	-61.7
	12/10/2018	0.603	<0.400	1.77	<0.400	5.44	4.9	<0.400	1.54	<0.400	<0.400	3.42	1.05	-122.9
	3/26/2019	0.680	<0.400	117	<0.400	151	38	0.709	8.36	<0.400	<0.400	4.00	0.74	92.6
	6/3/2019	0.530	<0.400	74.7	<0.400	157	45	0.440	7.22	<0.400	<0.400	3.66	0.89	-24.3
	9/27/2019	0.578	<0.400	80.5	<0.400	106	8.4	0.413	5.09	<0.400	<0.400	2.86	0.35	-182.8
	12/4/2019	1.35	<0.400	2.66	<0.400	5.79	<1.0	<0.400	1.67	<0.400	<0.400	2.69	2.92	-91.1
	3/12/2020	0.529	0.439	418	0.638	330	40	2.43	12.8	<0.400	<0.400	4.00	3.98	-136.4
	6/16/2020	0.660	<0.400	138	<0.400	134	12.0	<0.400	3.71	<0.400	<0.400	3.08	0.48	186.5
10/6/2020	0.850	<0.400	67.2	<0.400	84.0	4.1	<0.400	4.38	<0.400	<0.400	3.15	0.56	-84.6	
12/10/2020	<8.00	<8.00	125	<8.00	155	16	<8.00	<8.00	<8.00	<8.00	3.49	0.70	-93.0	

Notes:

1. µg/L (ppb) = Micrograms per liter (parts per billion)
2. mg/L = milligrams per liter
3. mV = millivolts
4. N/A = Not analyzed
5. -- = Not sampled
6. B = The analyte was found in the associated method blank
7. J = Value is estimated
8. Ethene is analyzed by EPA Method RSK-175M. All other VOCs were analyzed by EPA Method 8260.
9. **Bold** value represents detected concentration of listed analyte.
10. < = Not detected at or above the specified laboratory method reporting limit (MRL).
11. E = Analyte concentration exceeded the calibration range. Reported result is estimated.

Table 6
North SVE System – Operation Monitoring
NuStar Vancouver Facility
Vancouver, Washington

Date	Branch 4		Branch 5		Post Blower		Notes
	PID	Pressure	PID	Pressure	PID	Pressure	
10/12/2011	0.0	-13.0	0.0	-12.0	7.2	0.1	--
11/2/2011	--*	-25.0	6.7	-25.0	--	--	--
11/17/2011	0.8	-16.0	6.9	-16.0	7.0	0.1	PID complications; Routinely reported error code. Potential moisture issues.
12/5/2011	--	--	--	--	--	--	System off on arrival and would not restart. Contractor identified electrical issues. Blower removed for replacement.
12/14/2011	--	--	--	--	--	--	System not operating, pending blower replacement. Blower reinstalled January 10, 2012.
1/23/2012	--	-15.0	6.5	-15.0	3.9	0.1	Water in sample port of Branch 4, could not get PID reading.
2/17/2012	0.1	-11.0	0.9	-11.0	2.9	1.0	--
3/22/2012	6.8	-12.0	5.4	-12.0	1.3	0.05	--
4/26/2012	1.3	-4.2	6.4	-4.0	1.0	0.05	--
5/23/2012	0.1	-3.4	3.2	-3.4	0.4	--	--
6/20/2012	0.0	-2.8	0.0	-2.7	0.1	0.2	--
7/24/2012	3.2	-3.2	9.2	-3.2	0.2	0.4	Used Rental PID.
8/22/2012	0.4	-2.4	1.0	-2.4	0.0	0.2	--
9/25/2012	0.1	-1.7	0.5	-1.7	0.0	0.2	Used ACA PID #3.
10/29/2012	--	--	--	--	--	--	System not operating.
11/26/2012	8.4	-4.0	9.2	-4.0	3.0	0.05	Used ACA PID #3.
12/21/2012	0.1	-0.63	0.0	-0.62	0.0	0.1	Used ACA PID #3.
1/24/2013	10.4	-0.45	0.0	-0.15	0.5	0.1	Used ACA PID #3.
2/28/2013	37.1	-0.22	2.1	-0.15	1.3	0.1	Used ACA PID #3.
3/25/2013	--	--	--	--	--	--	System not operating.
4/29/2013	--	--	--	--	--	--	System not operating.
5/24/2013	0.4	-23.0	0.1	-23.0	7.9	0.1	Used APEX PID #3.
6/25/2013	--	-20.0	--	-20.0	--	0.1	--
7/25/2013	6.6	-20.0	13.3	-20.0	6.1	0.1	Used APEX PID #3.
8/27/2013	1.9	-18.0	16.9	-18.0	6.8	0.1	Used APEX PID #3.
9/30/2013	0.0	-20.0	0.0	-20.0	2.1	0.1	Used APEX PID #3.
10/24/2013	1.3	-20.0	1.2	-20.0	2.3	0.1	Used APEX PID #3.
11/25/2013	0.3	-23.0	0.2	-23.0	1.1	0.1	Used APEX PID #3.
12/27/2013	1.0	-21.0	0.6	-21.0	2.6	0.1	Used APEX PID #1

Please refer to notes at end of table.

Table 6
North SVE System – Operation Monitoring
NuStar Vancouver Facility
Vancouver, Washington

Date	Branch 4		Branch 5		Post Blower		Notes
	PID	Pressure	PID	Pressure	PID	Pressure	
1/29/2014	0.2	-20.0	0.1	-20.0	0.0	3.0	--
2/24/2014	2.4	-20.0	2.6	-20.0	2.6	9.0	Used APEX PID #3.
3/31/2014	0.3	-20.0	1.0	-20.0	0.2	1.0	Used APEX PID #4
4/29/2014	2.0	-20.0	1.4	-20.0	0.0	2.0	--
5/27/2014	2.0	-20.0	1.3	-20.0	0.9	2.0	--
7/3/2014	0.5	-20.0	0.3	-18.0	0.4	4.0	--
7/28/2014	4.0	-20.0	2.6	-19.0	0.1	3.0	Used APEX PID #3.
8/25/2014	--	-20.0	--	-19.0	3.7	3.5	Used APEX PID #3.
9/30/2014	2.1	-17.0	0.6	-17.0	1.7	--	--
10/27/2014	0.4	-26.0	1.4	-26.0	2.3	2.0	Used APEX PID #3.
11/25/2014	0.3	-21.0	1.5	-20.0	0.5	--	Used APEX PID #3.
12/29/2014	20.2	-25.0	32.1	-25.0	--	2.0	Used APEX PID #3.
1/26/2015	2.0	-25.0	3.2	-25.0	0.7	3.0	Used APEX PID #3. Knockout drum emptied.
2/26/2015	0.0	-22.0	0.0	-25.0	0.0	0.1	--
3/30/2015	0.0	-23.0	0.2	-27.0	0.0	0.4	Used APEX PID #3.
4/24/2015	0.0	-23.0	0.2	-27.0	0.0	0.4	--
5/28/2015	5.5	-26.0	4.8	-26.0	5.5	0.05	--
7/29/2015	7.5	-17.0	0.3	-17.0	0.5	0.10	Used APEX PID #3.
8/31/2015	0.0	-11.0	0.0	-10.0	0.9	0.05	Used APEX PID #3.
9/28/2015	0.6	-12.0	2.4	-12.0	1.8	0.00	Used APEX PID #3.
10/29/2015	0.5	-12.0	0.3	-13.0	2.9	1.00	Used APEX PID #3.
11/30/2015	0.0	-13.0	0.2	-13.0	0.0	2.00	Used APEX PID #3.
12/28/2015	0.0	-17.0	9.0	-18.0	0.0	0.10	Used APEX PID #3.
2/1/2016	30.4	-28.0	0.0	-25.0	2.6	3.00	Used APEX PID #3.
2/29/2016	0.0	-13.0	0.0	-13.0	0.0	0.10	Used APEX PID #3.
3/29/2016	0.0	-12.0	0.0	-12.0	0.0	0.20	Used APEX PID #3.
4/27/2016	0.2	-11.0	0.0	-5.0	0.0	1.00	Used APEX PID #3. North SVE system turned off.
5/25/2016	--	--	--	--	--	--	North SVE system intentionally turned off for approx . 60 days to evaluate system efficiency.
6/28/2016	20.4	-23.0	14.3	-23.0	0.9	0.10	Used APEX PID #3.

Please refer to notes at end of table.

Table 6
North SVE System – Operation Monitoring
NuStar Vancouver Facility
Vancouver, Washington

Date	Branch 4		Branch 5		Post Blower		Notes
	PID	Pressure	PID	Pressure	PID	Pressure	
7/26/2016	0.0	-20.0	0.4	-20.0	0.6	1.20	Used APEX PID #3.
9/29/2016	1.0	-16.0	0.0	-15.0	0.0	0.10	Used APEX PID #3.
10/25/2016	0.4	-14.0	0.0	-14.0	0.0	0.10	Used APEX PID #3.
11/28/2016	0.0	-12.0	0.0	-12.0	0.0	0.10	Used APEX PID #3.
12/28/2016	0.0	-12.0	0.0	-12.0	0.0	0.10	Used APEX PID #3.
1/30/2017	0.0	-5.0	0.0	-5.0	0.0	0.10	Used APEX PID #3.
2/28/2017	12.5	-15.0	8.7	-14.0	1.0	0.10	--
3/28/2017	0.0	-20.0	0.0	-20.0	0.1	0.00	Used Mini Rae 3000.
4/24/2017	0.8	-20.0	0.0	-20.0	2.0	0.10	Used APEX PID #3.

Notes:

1. PID = photoionization detector
2. PID readings in parts per million (ppm), calibrated to 100 ppm isobutylene.
3. Pressure readings in inches of water, measured with magnehelic gauge.
4. -- = Not available; branch not in use or no measurement collected during the site visit.
5. * = During the 11/2/2011 monitoring event, PID malfunctioned while monitoring Branch 4. Instrument readings would not stabilize.

Table 7
North SVE System – Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Sampling Location	Sample ID	Date	1,1,1- Trichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	Methylene Chloride	Tetrachloro- ethene	Toluene	Trichloro- ethene	Vinyl Chloride
			Concentrations in µg/m ³								
System Effluent	North_EFF-20111012	10/12/2011	69	<16	160	<16	<14	9,500	16	700	<10
System Effluent	Post Blower_North_012312	1/23/2012	<170	<120	<120	<120	<110	16,000	<120	530	<79
System Effluent	North_Effluent_0121712	2/17/2012	<140	<100	<100	<100	<91	11,000	<99	300	<67
System Effluent	North Effluent-032212	3/22/2012	<28	<54	<27	<27	<23	6,600	<25	140	<8.6
System Effluent	North_Effluent_062012	6/20/2012	<1.6	<3.2	<1.6	<1.6	5.3	250	<1.5	15	<0.51
System Effluent	North_Effluent_082212	8/22/2012	<1.6	<3.2	<1.6	<1.6	<1.4	140	<1.5	11	<0.51
System Effluent	North_Effluent_112612	11/26/2012	39	<14	52	<7.1	<6.2	22,000	<6.8	510	<4.6
System Effluent	North_Effluent_122112	12/21/2012	<31	<59	<30	<30	<26	3,500	<28	61	<19
System Effluent	North_Effluent_022813	2/28/2013	<36	<70	<35	<35	<31	4,400	<33	160	<22
System Effluent	SVE North	5/24/2013	<240	<170	280	<170	<380	23,000	<160	1,100	<110
System Effluent	SVE North	6/25/2013	76	<51	88	<51	<110	13,000	<49	730	<33
System Effluent	SVE North	8/27/2013	<150	<110	<110	<110	<230	17,000	<100	800	<69
System Effluent	SVE North Effluent	10/24/2013	<82	<60	<60	<60	<130	10,000	<57	570	<39
System Effluent	SVE North Effluent	12/27/2013	<44	<32	<32	<32	<69	7,000	<30	470	<20
System Effluent	SVE North Effluent	1/29/2014	<10	<40	22	<40	<87	1,300	<38	110	<26
System Effluent	SVE_North_Post Carbon	2/24/2014	55	<83	68	<41	<36	8,700	<39	760	<27
System Effluent	SVE North Post Carbon	3/5/2014	25	<39	29	<20	<17	4,600	<19	300	<13
System Effluent	VCP_North_Effluent	3/31/2014	19	<13	18	<13	<28	3,500	<12	200	<8.2
System Effluent	North_SVE_Effluent_042914	4/29/2014	22	<15	17	<15	<33	3,500	<14	220	<9.8
System Effluent	North_SVE_Effluent_052714	5/27/2014	<31	<23	<23	<23	<50	4,100	<22	280	<15
System Effluent	North_VCP_Effluent	7/3/2014	<23	<17	20	<17	<37	4,500	<16	290	<11
System Effluent	SVE North	7/28/2014	<120	<88	<88	<88	<190	7,200	<84	460	<22
System Effluent	North SVE	9/30/2014	<48	<35	48	<35	<76	7,300	<33	480	<22
System Effluent	SVE North Effluent	10/27/2014	<110	<80	<80	<80	<180	15,000	<76	410	<52
System Effluent	SVE North 11.25.14	11/25/2014	<39	<28	<28	<28	<62	7,100	<27	390	<18
System Effluent	SVENorth122914	12/29/2014	<140	<99	<99	<99	<220	15,000	<94	290	<64
System Effluent	SVE North	1/26/2015	16	<31	<16	<16	<14	1,500	<15	130	<10
System Effluent	SVE North	2/26/2015	<1.6	<3.2	<1.6	<1.6	<1.5	32	<1.5	<2.1	<1.0
System Effluent	SVE North	3/30/2015	15	<9.6	9.5	<4.8	<4.2	1,700	<4.6	130	<3.1
System Effluent	SVE N	4/24/2015	<8.5	<16	<8.2	<8.2	<7.2	550	<7.8	50	<5.3

Please refer to notes at end of table.

Table 7
North SVE System – Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Sampling Location	Sample ID	Date	1,1,1-Trichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Methylene Chloride	Tetrachloroethene	Toluene	Trichloroethene	Vinyl Chloride
			Concentrations in $\mu\text{g}/\text{m}^3$								
System Effluent	SVE North	5/14/2015	<1.6	<3.2	<1.6	<1.6	<1.4	<2.7	<1.5	<2.1	<1.0
System Effluent	SVE North	5/28/2015	<3.8	<7.3	<3.6	<3.6	<3.2	360	3.6	8.0	<2.4
System Effluent	SVE North	7/29/2015	19	<33	21	<16	<14	2,000	<16	210	<11
System Effluent	SVE North	8/31/2015	65	<65	62	<33	<28	7,100	<31	600	<21
System Effluent	SVE North	9/28/2015	21	<22	<11	<11	<9.7	1,400	<11	190	<7.1
System Effluent	SVE North	10/29/2015	<56	<110	59	<55	<48	6,300	<52	550	<35
System Effluent	SVE_North_Effluent_113015	11/30/2015	<54	<140	<72	<72	<72	2,300	<72	86	<72
System Effluent	SVE_North_Effluent_122815	12/28/2015	<32	<62	<31	<31	<27	5,600	<30	110	<20
System Effluent	North_Effluent_020116	2/1/2016	<53	<100	<51	<51	<45	11,000	<48	150	<33
System Effluent	SVE_North_Effluent_022916	2/29/2016	30	<33	29	<16	<14	7,800	<16	160	<11
System Effluent	SVE_North_Effluent_032916	3/29/2016	19	<14	<7.2	<7.2	<6.3	920	<6.9	19	<4.7
System Effluent	North_Effluent	4/27/2016	<15	<29	<14	<14	<13	1,500	<14	75	<9.2
System Effluent	North_Effluent_62816	6/28/2016	<11	<22	<11	<13	<9.6	1,800	<10	83	<7.1
System Effluent	SVE-North-Effluent 72616	7/26/2016	<1.6	<3.2	<1.6	<1.6	<1.4	84	2.0	6	<1.0
System Effluent	SVE-North-Effluent 83016	8/30/2016	<0.30	<0.80	<0.40	<0.40	<0.40	54	<0.40	2	<0.40
System Effluent	SVE_North_Effluent_092916	9/29/2016	<1.6	<3.2	<1.6	<1.6	<1.4	15	<1.5	<2.1	<1.0
System Effluent	SVE_North_Effluent_102516	10/25/2016	<1.6	<3.2	<1.6	<1.6	<1.4	7.9	3.0	<2.1	<1.0
System Effluent	SVE_North_Effluent_112816	11/28/2016	<1.6	<3.2	<1.6	<1.6	<1.4	2.8	3.9	<2.1	<1.0
System Effluent	SVE_North_Effluent_122816	12/28/2016	<1.6	<3.2	<1.6	<1.6	<1.4	<2.7	1.7	<2.1	<1.0
System Effluent	SVE_North_Effluent_013017	1/30/2017	<1.6	<3.2	<1.6	<1.6	<1.4	<2.7	4.6	<2.1	<1.0
System Effluent	SVE_North_Effluent_022817	2/28/2017	<1.6	<3.2	<1.6	<1.6	<1.4	5.9	<1.5	<2.1	<1.0
System Effluent	SVE_North_Effluent_032817	3/28/2017	<1.6	<3.2	<1.6	<1.6	<1.4	3.2	2.9	<2.1	<1.0
System Effluent	SVE_North_Effluent	4/24/2017	<1.6	<3.2	<1.6	<1.6	<1.4	3.9	3.7	<2.1	<1.0

Notes:

1. $\mu\text{g}/\text{m}^3$ = Micrograms per cubic meter.
2. Samples analyzed by Modified EPA Method TO-15.
3. Only analytes detected in at least one sample are presented in this table
4. **Bold** value represents detected concentration of listed analyte
5. < = Not detected at or above the specified laboratory method reporting limit (MRL)

Table 8
South SVE System – Operation Monitoring
NuStar Vancouver Facility
Vancouver, Washington

Date	Pre-Blower		Post Blower (Pre-Carbon)		Post Carbon 1		Post Carbon 2		Notes
	PID	Pressure	PID	Pressure	PID	Pressure	PID	Pressure	
10/12/2011	--	-14.0	17.1	24.0	0	12.0	0.2	4.0	--
10/18/2011	--	-14.0	15.5	--	15.5	14.0	0.5	3.0	Pre-carbon, post blower tap is now covered by noise suppression panels.
11/2/2011	--	-15.0	18.2	26.0	0.0	26.0	2.0	7.0	--
11/17/2011	--	-18.0	8.9	27.0	--*	15.0	--*	6.8	--
12/5/2011	8.3	-18.0	10.7	39.0	0.0	19.0	2.2	6.1	System switch off upon arrival. System restarted. Monitoring event conducted approximately 3 hours after restart.
12/14/2011	11.8	-19.0	21.0	28.0	0.0	18.0	0.7	6.2	--
1/9/2012	7.3	-17.0	8.3	29.0	0.0	18.0	0.0	6.2	--
1/23/2012	7.0	-17.0	8.9	29.0	0.0	17.0	0.0	6.9	--
2/17/2012	6.0	-18.0	11.2	29.0	0.0	18.0	0.0	6.0	--
3/22/2012	13.3	-16.0	10.7	27.0	0.0	15.0	0.0	6.5	--
4/26/2012	10.3	-17.0	11.6	27.0	0.0	16.0	0.0	6.4	--
5/23/2012	10.4	-20.0	10.6	31.0	0.0	19.0	0.0	6.6	--
6/20/2012	7.3	-21.0	7.5	33.0	0.5	20.0	0.0	6.3	--
7/24/2012	19.8	-20.0	41.5	32.0	226.3	20.0	98.8	6.2	Used rental PID.
8/22/2012	8.0	-48.0	10.1	29.0	5.5	18.0	1.1	4.6	--
9/25/2012	10.0	-46.0	13.7	29.0	9.5	15.0	12.8	4.3	Used ACA PID #3.
10/29/2012	8.4	-34.0	18.6	47.0	0.3	28.0	12.9	4.3	Used ACA PID #3; Carbon change-out on 10/29/2012
11/26/2012	13.7	<-100	1.6	18.0	0.1	6.6	3.1	0.66	Used ACA PID #3.
12/21/2012	0.5	-107	0.5	17.0	0.0	6.1	0.0	0.49	Used ACA PID #3.
1/24/2013	5.1	-105	0.5	10.0	0.0	6.5	0.0	0.61	Used ACA PID #3.
2/28/2013	2.8	-105	0.1	18.0	0.0	7.0	0.0	0.60	Used ACA PID #3.
3/25/2013	8.4	-102	0.9	16.0	0.1	7.0	0.0	0.58	Used Apex PID #3
4/29/2013	0.2	-98	0.4	15.0	0.0	6.3	0.1	0.49	Used Apex PID #3
5/24/2013	41.0	-18	49.7	47.0	0.2	26	0.7	5.0	Used Apex PID #3
6/25/2013	--	-15	--	51.0	--	31	--	5.1	--
7/25/2013	12.3	-16	13.9	50.0	0.7	32	0.5	6.0	Used Apex PID #3
8/27/2013	13.2	-16	12.1	52.0	3.8	31	1.2	5.2	Used Apex PID #3
9/30/2013	5.2	-15	15.4	45.0	27.4	30	0.4	5.2	Used Apex PID #3
10/24/2013	3.1	-14	13.2	50.0	6.8	32	1.5	5.2	Used Apex PID #3
11/25/2013	1.4	-19	19.3	51.0	12.4	35	2.8	5.3	Used Apex PID #3
12/27/2013	0.3	-19	7.7	55.0	3.1	32	0.0	5.4	Used Apex PID #1
1/29/2014	2.4	-19	6.7	50.0	5.7	30	0.2	10.0	--
2/24/2014	7.7	-19	19.7	50.0	2.4	30	1.4	10.0	Used Apex PID #3
3/31/2014	2.6	-15	4.6	46.0	5.4	30	0.0	8.0	Used APEX PID #4
4/29/2014	2.0	-14	3.4	48.8	9.7	30	0.0	8.0	--
5/27/2014	3.5	-14	5.0	49.0	10.2	28	0.1	7.0	--

Please refer to notes at end of table.

Table 8
South SVE System – Operation Monitoring
NuStar Vancouver Facility
Vancouver, Washington

Date	Pre-Blower		Post Blower (Pre-Carbon)		Post Carbon 1		Post Carbon 2		Notes
	PID	Pressure	PID	Pressure	PID	Pressure	PID	Pressure	
7/3/2014	1.6	-18	2.4	50.0	1.4	30	0.1	10.0	--
7/28/2014	8.5	-19	9.0	50.0	11.0	30	8.7	8.0	Used Apex PID #3
8/25/2014	4.6	-17	7.5	49.0	15.8	26	11.0	7.0	Used Apex PID #3
9/30/2014	0.5	-14	5.2	40.0	4.0	28	2.7	5.0	--
10/27/2014	--	--	--	--	--	--	--	--	System off upon arrival. Unable to turn back on.
11/3/2014	5.0	-20	23.0	50.0	13.1	20	14.6	8.0	Used Apex PID #3
11/25/2014	--	--	--	--	--	--	--	--	System off for drum replacement.
12/29/2014	--	--	--	--	--	--	--	--	System off.
1/26/2015	27.1	-25	34.6	20.0	1.0	17	0.0	10.0	Used Apex PID #3
2/26/2015	0.8	-20	12.9	30.0	0.2	19	0.1	8.0	--
3/30/2015	0.4	-20	14.2	29.0	0.1	20	0.1	8.0	Used Apex PID #3
4/24/2015	0.4	-20	14.2	29.0	0.1	20	0.1	8.0	--
5/28/2015	1.0	-20	57.5	28.0	63.6	17	33.0	7.0	--
7/29/2015	0.0	-16	14.1	25.0	9.6	14	1.2	5.0	Used Apex PID #3
8/31/2015	0.0	-20	1.2	26.0	6.9	14	1.8	6.0	Used Apex PID #3
9/28/2015	3.0	-20	7.4	26.0	3.8	16	1.1	6.0	Used Apex PID #3
10/29/2015	9.0	-22	11.2	27.0	7.6	16	0.2	8.0	Used Apex PID #3
11/30/2015	--	-18	7.0	30.0	33.6	18	0.4	6.0	Used Apex PID #3
12/28/2015	--	-18	12.5	29.0	1.3	18	0.4	8.0	Used Apex PID #3
2/1/2016	0.1	-24	0.3	19.0	9.2	16	0.0	7.0	Used Apex PID #3
2/29/2016	0.2	-18	25.2	30.0	8.5	17	2.3	6.0	Used Apex PID #3
3/29/2016	0.0	-19	54.0	28.0	13.2	16	3.4	7.0	Used Apex PID #3
4/27/2016	5.0	-28	32.0	50.0	21.3	0.2	22.3	1.0	Used Apex PID #3
5/25/2016	0.2	-100	0.3	3.0	23.2	2	9.7	0.6	Used Apex PID #3
6/28/2016	--	--	--	--	--	--	--	--	System shut down
7/26/2016	8.1	-20	30.4	30.0	26.2	20	18.1	10.0	Used Apex PID #3
9/29/2016	26.3	-18	27.4	28.0	36.7	16	35.7	6.0	Used Apex PID #3
10/25/2016	0.8	-18	13.3	30.0	58.0	18	7.7	8.0	Used Apex PID #3
11/28/2016	0.0	-22	70.1	30.0	78.0	18	54.2	8.0	Used Apex PID #3
12/28/2016	0.0	-100	0.0	2.0	0.4	1.0	1.0	1.0	departure.
1/30/2017	0.0	-22	52.3	33.0	0.0	20.0	0.0	10.0	Used Apex PID #3
2/28/2017	--	--	--	--	--	--	--	--	No sample collected.
3/28/2017	--	--	--	--	--	--	--	--	System not working properly. Knock out drum valve was pulled down and sucking in ambient air. No sample collected.
4/24/2017	--	--	--	--	--	--	--	--	Could not get valve to operate properly. System pulling in ambient air.
7/31/2017	0.0	-18	31.8	31.0	31.2	18.0	27.2	8.0	Used Apex PID #3
8/28/2017	0.0	-18	75.0	32.0	60.0	18.0	50.1	9.0	
9/25/2017	39.2	-18	32.7	30.0	19.7	18.0	20.6	7.5	Used Apex PID #3
10/26/2017	2.8	-22	27.7	30.0	19.0	18.0	17.4	7.0	Used Apex PID #3
11/29/2017	5.2	-20	68.0	30.0	54.0	18.0	56.0	7.0	
12/21/2017	0.3	-20	12.4	30.0	6.7	18.0	5.6	8.0	Pre-Carbon was not sampled due to sampling canister malfunction.

Please refer to notes at end of table.

Table 8
South SVE System – Operation Monitoring
NuStar Vancouver Facility
Vancouver, Washington

Date	Pre-Blower		Post Blower (Pre-Carbon)		Post Carbon 1		Post Carbon 2		Notes
	PID	Pressure	PID	Pressure	PID	Pressure	PID	Pressure	
1/22/2018	0.0	-20	13.6	30.0	10.2	18.0	7.2	7.0	Used Apex PID #3 PID was not within calibration and readings were not recorded. Used Apex PID #3 Used Apex PID #3
2/28/2018	--	-20	--	30.0	--	18.0	--	7.0	
3/29/2018	--	-20	19.0	31.0	28.0	19.0	19.0	8.0	
4/24/2018	2.2	-20	26.8	31.0	29.2	19.0	18.8	8.0	
5/16/2018	13.8	-20	26.6	30.0	40.2	18.0	26.8	8.0	
7/23/2018	30.0	-18	34.5	29.0	37.5	17.0	37.3	7.0	
11/7/2018	3.0	-18	22.9	30.0	20.7	17.0	19.3	6.0	
1/4/2019	0.5	-24	27.3	28.0	23.4	16.0	22.4	6.0	
3/8/2019	0.7	-24	19.2	28.0	12.1	16.0	12.4	6.0	
5/7/2019	4.0	-20	33.0	29.0	25.4	17.0	25.8	7.0	
7/8/2019	0.6	-21	33.6	29.0	26.1	17.0	27.1	7.0	
9/9/2019	1.0	-21	29.7	29.0	27.1	17.0	22.8	6.0	
11/4/2019	0.9	-21	31.6	29.0	18.1	12.0	16.2	6.0	
1/10/2020	0.1	-21	6.3	29.0	4.2	16.0	3.5	6.0	
12/14/2020	0.6	-18	52.9	30.0	25.2	17.0	21.9	6.0	

Notes:

1. PID = photoionization detector
2. PID readings in parts per million (ppm), calibrated to 100 ppm isobutylene.
3. Pressure readings in inches of water, measured with magnehelic gauge.
4. -- = Not available or not applicable.

Table 9
South SVE System – Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Sampling Location	Sample ID	Date	1,1-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Methylene Chloride	Tetrachloroethene	Toluene	1,1,1-Trichloroethane	Trichloroethene	Vinyl chloride	Total Xylenes
			Concentrations in µg/m ³										
Pre Carbon	INF 1006	10/6/2011	<330	<320	470	<320	<280	40,000	<300	520	5,100	<210	<350
Post Carbon	EFF 1006	10/6/2011	<16	<16	390	<16	<14	<27	<15	140	50	<10	<17
Pre Carbon	Post Blower 110211	11/2/2011	<290	<280	430	<280	<250	26,000	<270	<390	2,100	<180	<310
Pre Carbon	SOUTHSVE_PRECARBON_121411	12/14/2011	<580	<570	620	<570	<500	54,000	<540	<780	2,800	<360	<620
Post Carbon	SOUTHSVE_POSTCARBON_121411	12/14/2011	<16	35	23	<16	17	1,600	<15	78	1,300	12	<17
Post Carbon	POST CARBON_SOUTH_012312	1/23/2012	<16	<16	<16	<16	<14	<27	<15	<22	<21	<10	<17
Pre Carbon	South_PreCarbon_021712	2/17/2012	<300	<300	460	<300	<260	28,000	<280	<410	1,200	<190	<330
Post Carbon	South_PostCarbon_021712	2/17/2102	<16	<16	<16	<16	<14	<27	<15	<22	<21	<17	<10
Pre Carbon	South Influent - 032212	3/22/2012	<190	<190	310	<95	<84	30,000	<91	99	960	<31	<100
Post Carbon	South Effluent - 032212	3/22/2012	<1.2	<3.2	<1.6	<1.6	4	<2.7	<1.5	<1.6	<2.1	6.4	<3.5
Pre Carbon	South_SVE_PRECARBON	4/26/2012	<210	<560	<280	<280	<240	32,000 S	<270	<290	640 S	<90	<610
Post Carbon	South-SVE_POSTCARBON	4/26/2012	<1.2	<3.2	<1.6	<1.6	4	<2.7	<1.5	<1.6	<2.1	2.4	<3.5
Pre Carbon	SOUTH_SVE_PRECARBON	5/23/2012	<100	<260	200	<130	<120	19,000	<130	<140	780	<43	<290
Post Carbon	South_SVE_PRECARBON	5/23/2012	<1.2	<3.2	<1.6	<1.6	3	<2.7	<1.5	<1.6	<2.1	3.7	<3.5
Pre Carbon	South_PreCarbon_062012	6/20/2012	<240	<630	360	<320	<280	35,000	<300	<330	1,400	<100	<1040
Post Carbon	South_PostCarbon_062012	6/20/2012	<0.30	<0.80	<0.40	<0.40	1.0	<0.40	<0.40	<0.30	<0.40	1.2	<1.2
Pre Carbon	South_PreCarbon_072412	7/24/2012	<150	<390	240	<200	<170	33,000	<190	<200	1,100	<63	<640
Post Carbon	South_PostCarbon_072412	7/24/2012	<1.2	11	<1.6	<1.6	3.0	<2.7	2.2	<1.6	<2.1	3.9	<5.2
Pre Carbon	South_PreCarbon_082212	8/22/2012	<250	<660	760	<330	<290	47,000	<310	<340	2,000	<110	1,080
Post Carbon	South_PostCarbon_082212	8/22/2012	<21	<55	<27	<27	<24	<47	<26	<28	<37	<8.8	<90
Pre Carbon	South_PreCarbon_092512	9/25/2012	<270	<700	500	<400	<310	50,000	<330	<360	1,900	<230	<770
Post Carbon	South_PostCarbon_092512	9/25/2012	13	18	1,200	11	5.7	<2.7	<1.5	<1.6	<2.1	6.2	<3.5
Pre Carbon	South_PreCarbon_102912	10/29/2012	<320	<850	440	<480	<370	60,000	<400	<440	2,200	<270	<930
Post Carbon	South_PostCarbon_102912	10/29/2012	<5.3	<14	<7	<7	<7	<7	<7	<7	<7	<7	<14
Pre Carbon	South_PreCarbon_112612	11/26/2012	<95	<250	<120	<120	<110	10,000	<120	<130	530	<80	<410
Post Carbon	South_PostCarbon_112612	11/26/2012	<2.7	<7.2	<3.6	<3.6	<3.6	<3.6	<3.6	<2.7	<3.6	<3.6	<10.8
Pre Carbon	South_PreCarbon_122112	12/21/2012	<71	<190	110	<93	<82	14,000	<89	<96	600	<60	<300
Post Carbon	South_PostCarbon_122112	12/21/2012	<1.2	<3.2	<1.6	<1.6	1.6	<2.7	<1.5	<1.6	<2.1	3.0	<5.2
Pre Carbon	South_PreCarbon_012413	1/24/2013	<9.2	<24	14	<12	<11	1,700	<11	<12	100	<7.8	<39
Post Carbon	South_PostCarbon_012413	1/24/2013	<1.2	<3.2	<1.6	<1.6	3.3	<2.7	<1.5	<1.6	<2.1	3.7	<5.2
Pre Carbon	South_PreCarbon_022813	2/28/2013	<5.9	<15	8.5	<7.7	<6.7	940	<7.3	<7.9	84	<5.0	<25.4
Post Carbon	South_PostCarbon_022813	2/28/2013	<1.2	<3.2	<1.6	<1.6	8.1	<2.7	<1.5	<1.6	<2.1	<1.0	<5.2
Pre Carbon	South_PreCarbon_032513	3/25/2013	<29	<75	<38	<38	<33	3,700	<36	<39	160	<24	<123
Post Carbon	South_PostCarbon_032513	3/25/2013	<1.2	<3.2	<1.6	<1.6	2.0	<2.7	<1.5	<1.6	<2.1	2.0	<5.2
Pre Carbon	SVE South Pre Carbon	4/29/2013	<6.3	<16	10	<8.2	<7.2	950	<7.8	<8.4	48	<5.3	<26.9
Post Carbon	SVE South Post Carbon	4/29/2013	<0.30	<0.80	<0.40	<0.40	<0.40	<0.40	<0.40	<0.30	<0.40	0.93	<1.2
Pre Carbon	SVE South Pre Carbon	5/24/2013	<1,100	<1,100	2,400	<1,100	<2,400	240,000	<1,100	<1,500	8,400	<720	<4,300
Post Carbon	SVE South Post Carbon	5/24/2013	<0.81	<0.79	<0.79	<0.79	<1.7	<1.4	<0.75	<1.1	<1.1	<0.51	<3.1

Please refer to notes at end of table.

Table 9
South SVE System – Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Sampling Location	Sample ID	Date	1,1-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Methylene Chloride	Tetrachloroethene	Toluene	1,1,1-Trichloroethane	Trichloroethene	Vinyl chloride	Total Xylenes
			Concentrations in µg/m ³										
Pre Carbon	SVE South Pre Carbon	6/25/2013	<150	<150	630	<150	<330	39,000	<140	<210	1,800	<97	<570
Post Carbon	SVE South Post Carbon	6/25/2013	<0.81	8.1	3.8	<0.79	5.6	<1.4	<0.75	<1.1	<1.1	3.1	<3.1
Pre Carbon	SVE South Pre Carbon	7/25/2013	<120	<120	380	<120	<260	22,000	<110	<160	1,200	<77	<460
Post Carbon	SVE South Post Carbon	7/25/2013	<0.81	17	65	2.1	3.4	<1.4	1.2	<1.1	<1.1	2.6	1.4
Pre Carbon	SVE South Pre Carbon	8/27/2013	<150	<150	520	<150	<330	28,000	<140	<210	1,500	<97	<580
Post Carbon	SVE South Post Carbon	8/27/2013	3.3	13	270	7.0	4.7	<2.7	<1.5	<2.2	<2.1	3.7	<6.0
Pre Carbon	SVE South Precarbon	9/30/2013	<110	<110	450	<110	<240	26,000	<110	<150	1,400	<72	<420
Pre Carbon	SVE South Pre Carbon	10/24/2013	<140	<140	430	<140	<310	27,000	<130	<190	1,100	<90	<530
Post Carbon	SVE South Post Carbon	10/24/2013	3.8	4.9	390	3.3	<5.2	4.3	<2.3	5.4	<3.2	2.6	<5.1
Pre Carbon	SVE South Pre Carbon	11/25/2013	<100	<98	250	<98	<220	21,000	<93	<140	840	<63	<380
Post Carbon	SVE South Post Carbon	11/25/2013	<2.8	4.1	250	<2.8	7.3	<4.8	<2.6	17	56	<1.8	<10.6
Pre Carbon	SVE South Pre Carbon	12/27/2013	<110	<110	270	<110	<240	20,000	<100	<150	900	<70	<420
Post Carbon	SVE South Post Carbon	12/27/2013	2.5	4.5	220	2.4	3.8	3.5	<1.1	6.8	62	<0.77	<4.6
Pre Carbon	SVE South Pre-Carbon	1/29/2014	<80	<79	260	<79	<170	20,000	<75	<110	800	<51	<306
Post Carbon	SVE South Post-Carbon	1/29/2014	4.5	7.2	330	4.8	<8.7	7.9	<3.8	13	98	3.1	<15.3
Pre Carbon	SVE_South_Pre_Carbon	2/24/2014	<190	<490	430	<240	240.0	34,000	600	<250	1,500	<160	<800
Post Carbon	SVE_South_Effluent	2/24/2014	<1.2	<3.2	41	<1.6	<1.4	<2.7	<1.5	<1.6	<2.1	<1.0	<5.2
Pre Carbon	SVE South Pre Carbon	3/5/2014	<110	<280	270	<140	<120	16,000	660	<140	660	<90	1,090
Post Carbon	SVE South Effluent	3/5/2014	3.7	<8.3	310	4.2	4.4	<7.1	<4.0	<4.3	21	<2.7	<13.7
Pre Carbon	VCP_South_Post_Blower	3/31/2014	<83	<82	260	<82	<180	20,000	<78	<110	630	<53	<309
Post Carbon	VCP_South_Effluent	3/31/2014	3.3	4.9	290	4.2	<4.3	<3.4	<1.9	3.3	21	1.4	<7.6
Pre Carbon	South_SVE_Postblower_042914	4/29/2014	<47	<46	180	<46	<100	13,000	<44	<63	550	<30	<180
Post Carbon	South_SVE_Effluent_042914	4/29/2014	5.1	5.0	540	<4.8	<11	<8.2	<4.6	<6.6	37	<3.1	<18.3
Pre Carbon	South_SVE_Postblower_052714	5/27/2014	<57	<55	160	<55	<120	12,000	<53	<76	490	<36	<201
Post Carbon	South_SVE_PostCarbon_052714	5/27/2014	5.0	<4.8	530	<4.8	<11	<8.2	<4.6	14	8.1	<3.1	<18.3
Pre Carbon	South_VCP_Post Blower	7/3/2014	<18	<18	56	<18	<45	2,800	<18	<18	150	<18	<63
Post Carbon	South_VCP_Post Carbon	7/3/2014	<16	<16	760	<16	<35	55	<15	430	3,200	<10	<60
Pre Carbon	SVE Pre Carbon	7/28/2014	<69	<67	200	<67	<150	15,000	<64	<93	750	<43	<254
Post Carbon	SVE Post Carbon	7/28/2014	<68	<67	270	<67	<150	13,000	<63	530	12,000	<43	<253
Pre Carbon	South SVE Pre Carbon	8/25/2014	<140	<130	340	<130	<290	20,000	<130	<180	1,100	<86	<520
Post Carbon	South SVE Post Carbon	8/25/2014	<140	<130	270	<130	<290	9,600	<130	<180	2,700	<86	<520
Pre Carbon	South SVE_Pre Carbon	9/30/2014	<110	<110	250	<110	<230	17,000	<100	<150	930	<69	<410
Post Carbon	South SVE_Post Carbon	9/30/2014	<130	<120	280	<120	<270	23,000	<120	<170	620	<80	<480
Pre Carbon	SVE South Post Blower	11/3/2014	<130	<130	320	<130	<280	24,000	<120	<170	1,100	<81	<490
Post Carbon	SVE South Post Carbon	11/3/2014	<81	<81	130	<81	<180	12,000	<77	<110	290	<52	<309
Pre Carbon	SVE South Pre Carbon	1/26/2015	<190	<500	420	<250	<220	21,000	240	<260	860	<160	<820
Post Carbon	SVE South Post Carbon	1/26/2015	<78	<200	<100	<100	<90	<170	190	<110	<140	<66	<330

Please refer to notes at end of table.

Table 9
South SVE System – Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Sampling Location	Sample ID	Date	1,1-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Methylene Chloride	Tetrachloroethene	Toluene	1,1,1-Trichloroethane	Trichloroethene	Vinyl chloride	Total Xylenes
			Concentrations in µg/m ³										
Pre Carbon	SVE South Pre Carbon	2/26/2015	<150	<390	260	<200	<170	18,000	280	<200	660	<130	<650
Post Carbon	SVE South Post Carbon	2/26/2015	<1.2	<3.2	<1.6	<1.6	3.2	<2.7	<1.5	<1.6	<2.1	2.5	<5.2
Pre Carbon	SVE South Pre Carbon	3/30/2015	<61	<160	200	<79	160	17,000	180	<82	570	<51	<257
Post Carbon	SVE South Post Carbon	3/30/2015	<1.2	<3.2	<1.6	<1.6	2.8	<2.7	2.7	<1.6	51	2.5	<5.2
Pre Carbon	SVE S Pre Carbon	4/24/2015	<37	<97	170	<49	<43	5,400	<46	<50	410	<31	<163
Post Carbon	SVE S Post Carbon	4/24/2015	<6.2	<16	<8.1	<8.1	<7.1	660	<7.7	<8.3	19	<5.2	18
Pre Carbon	SVE South Pre Carbon	5/28/2015	<60	<160	140	<79	92	8,000	240	<81	460	<51	<256
Post Carbon	SVE South Post Carbon	5/28/2015	<4.9	<13	<6.3	<6.3	<5.6	650	<6.0	<6.5	16	<4.1	22.1
Pre Carbon	SVE South Pre Carbon	7/29/2015	<65	<170	190	<85	<75	12,000	<81	<88	790	<55	<183
Post Carbon	SVE South Post Carbon	7/29/2015	10	<27	960	16	<12	440	<13	<14	<18	<8.7	<45
Pre Carbon	SVE South Pre Carbon	8/31/2015	<64	<170	160	<83	<73	12,000	<79	<86	780	<54	<171
Post Carbon	SVE South Post Carbon	8/31/2015	<21	<55	530	<27	<24	3,400	<26	<28	94	<18	<90
Pre Carbon	SVE South Pre Carbon	9/28/2015	<83	<220	170	<110	<94	9,900	<100	<110	660	<70	<360
Post Carbon	SVE South Post Carbon	9/28/2015	3.4	<6.0	340	3.6	<2.6	300	<2.8	39	59	<1.9	<9.8
Pre Carbon	SVE South Pre Carbon	10/29/2015	<130	<350	230	<170	<150	18,000	<170	<180	790	<110	<570
Post Carbon	SVE South Post Carbon	10/29/2015	4.2	5.2	340	4.5	2.6	26	<1.5	67	310	1.7	<5.2
Pre Carbon	SVE_South_Precarbon_113015	11/30/2015	<29	<77	54	<38	<38	3,000	<38	<29	300	<38	<77
Post Carbon	SVE_South_Postcarbon_113015	11/30/2015	<0.80	<0.80	27	0.60	<0.40	<0.40	<0.40	6	11	<0.40	<0.80
Pre Carbon	SVE_SOUTH_PRE CARBON_12/28/15	12/28/2015	<120	<320	180	<160	<140	35,000	<150	<170	1,200	<100	<530
Post Carbon	SVE_SOUTH_POST CARBON_12/28/15	12/28/2015	<1.2	<3.2	28	<1.6	<1.4	<2.7	1.5	2	6.5	<1.0	<4.2
Pre Carbon	SVE_SOUTH_PRE CARBON	2/1/2016	<8.6	<22	20	<11	<9.8	2,900	<11	14	120	<7.2	<37
Post Carbon	SVE_SOUTH_POST CARBON	2/1/2016	2.2	<3.2	160	2.90	<1.4	<2.7	<1.5	92	260	<1.0	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON	3/29/2016	<230	<610	710	<300	<270	71,000	<290	520	2,800	<200	<670
Post Carbon	SVE_SOUTH_POST CARBON	3/29/2016	<69	<180	490	<23	<79	9,300	<86	1500	9,300	<58	<200
Pre Carbon	SVE_SOUTH_PRE CARBON	4/27/2016	<6.4	<17	12	<8.4	<7.4	910	<8.0	<8.7	23	<5.4	<18
Post Carbon	SVE_SOUTH_POST CARBON	4/27/2016	<63	<160	180	<82	<72	11,000	<78	110	2,200	<53	<180
Pre Carbon	SVE_SOUTH_PRE CARBON	5/25/2016	<1.2	<3.2	4	<1.6	<1.4	550	2.9	3	22	<1.0	3.9
Post Carbon	SVE_SOUTH_POST CARBON	5/25/2016	<16	<41	2300	30.00	<18	14,000	<19	130	3,300	<13	<45
Pre Carbon	SVE_SOUTH_PRE CARBON	7/26/2016	<98	<260	340	<130	<110	18,000	<120	<130	970	<83	<420
Post Carbon	SVE_SOUTH_POST CARBON	7/26/2016	<78	<200	760	<120	<89	15,000	<97	220	1,400	<66	<330

Please refer to notes at end of table.

Table 9
South SVE System – Analytical Results
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Sampling Location	Sample ID	Date	1,1-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Methylene Chloride	Tetrachloroethene	Toluene	1,1,1-Trichloroethane	Trichloroethene	Vinyl chloride	Total Xylenes
			Concentrations in µg/m ³										
Pre Carbon	SVE_SOUTH_PRE CARBON	8/30/2016	<86	<230	340	<110	<99	28,000	<110	<120	1,400	<73	<370
Post Carbon	SVE_SOUTH_POST CARBON	8/30/2016	<81	<210	370	<110	<93	19,000	<100	210	910	<68	<350
Pre Carbon	SVE_SOUTH_PRE CARBON	9/29/2016	<73	<190	340	<95	<83	25,000	<90	110	1,300	<61	<310
Post Carbon	SVE_SOUTH_POST CARBON	9/29/2016	<46	<120	410	<60	<53	14,000	<57	140	1,900	<39	<196
Pre Carbon	SVE-SOUTH_PRE CARBON_102516	10/25/2016	<150	<390	380	<190	<170	32,000	<180	<200	1,500	<120	<630
Post Carbon	SVE-SOUTH_POST CARBON_102516	10/25/2016	<100	<260	530	<130	<120	19,000	<130	180	2,700	<85	<430
Pre Carbon	SVE_SOUTH_PRE CARBON_112816	11/28/2016	<260	<670	420	<340	<290	52,000	<320	<350	2,100	<220	<1110
Post Carbon	SVE_SOUTH_POST CARBON_112816	11/28/2016	<79	<210	<100	<100	<90	18,000	<98	360	3,200	<66	<340
Pre Carbon	SVE_SOUTH_PRE CARBON_013017	1/30/2017	<260	<690	660	<340	<300	61,000	<330	400	2,400	<220	<1130
Post Carbon	SVE_SOUTH_POST CARBON_013017	1/30/2017	<1.2	<3.2	<1.6	<1.6	<1.4	24	1.8	<1.6	<2.1	<1.0	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_073117	7/31/2017	<100	<260	400	<130	<110	17,000	340	<130	1,000	<84	<430
Post Carbon	SVE_SOUTH_POST CARBON_073117	7/31/2017	<1.2	<3.2	<1.6	<1.6	2.4	6.5	8.2	<1.6	3.9	2.4	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_082817	8/28/2017	<60	<160	320	<79	<69	32,000	<75	90	1,100	<51	<256
Post Carbon	SVE_SOUTH_POST CARBON_082817	8/28/2017	<1.2	5.8	2	<1.6	2.4	160	2.3	<1.6	3.9	2.2	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_092517	9/25/2017	<21	<55	200	<27	<24	23,000	<26	45	460	<18	<90
Post Carbon	SVE_SOUTH_POST CARBON_092517	9/25/2017	<1.2	8.0	16	<1.6	5.3	6.8	<1.5	<1.6	<2.1	2.2	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_102617	10/26/2017	<40	<100	230	<52	<45	13,000	<49	64	700	<33	<167
Post Carbon	SVE_SOUTH_POST CARBON_102617	10/26/2017	2.0	15	98	2.1	1.6	9.7	<1.5	3.9	<2.1	1.5	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_112917	11/29/2017	<140	<370	280	<180	<160	22,000	<170	<190	820	<120	<600
Post Carbon	SVE_SOUTH_POST CARBON_112917	11/29/2017	3.8	8.5	220	4.0	<2.0	<4.0	<2.2	12	<3.2	2.5	<5.7
Pre Carbon	SVE_SOUTH_PRE CARBON_122117	12/21/2017	--	--	--	--	--	--	--	--	--	--	--
Post Carbon	SVE_SOUTH_POST CARBON_122117	12/21/2017	4.6	4.9	300	5.2	1.7	<2.7	<1.5	20	7.2	1.8	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_012218	1/22/2018	<110	<290	150	<150	<130	13,000	<140	<150	390	<95	<480
Post Carbon	SVE_SOUTH_POST CARBON_012218	1/22/2018	4.3	<6.5	380	<3.2	<2.8	8.1	<3.1	11	16	2.1	<10.6
Pre Carbon	SVE_SOUTH_PRE CARBON_022818	2/28/2018	<19	<49	200	<25	<22	13,000	<23	52	440	<16	<81
Post Carbon	SVE_SOUTH_POST CARBON_022818	2/28/2018	2.8	<3.2	300	4.0	<1.4	<2.7	<1.5	14	51	5.1	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_032918	3/29/2018	<23	<60	180	<30	<26	13,000	<28	46	470	<19	<98
Post Carbon	SVE_SOUTH_POST CARBON_032918	3/29/2018	4.2	5.2	500	7.4	1.5	7.8	<1.5	15	110	1.7	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_042418	4/24/2018	<69	<180	140	<90	<79	12,000	<86	<58	350	<58	<299
Post Carbon	SVE_SOUTH_POST CARBON_042418	4/24/2018	3.4	4.2	470	7.6	1.5	6.6	3.1	8.4	76	1.4	17.9
Pre Carbon	SVE_SOUTH_PRE CARBON_051618	5/16/2018	<50	<130	160	<65	<57	7,800	<62	<68	370	<42	<212
Post Carbon	SVE_SOUTH_POST CARBON_051618	5/16/2018	<4.7	<12	480	6.6	<0.97	<1.3	<0.75	7.1	33	<4	<19.7
Pre Carbon	SVE_South_72318-Pre Carbon	7/23/2018	<63	<170	170	<83	<73	18,000	<79	<85	770	<53	<271
Post Carbon	SVE_South_Post Carbon-72318	7/23/2018	<25	<65	230	<33	<29	8,300	<31	520	6,400	<21	<108

Please refer to notes at end of table.

Table 9
South SVE System – Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Sampling Location	Sample ID	Date	1,1-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Methylene Chloride	Tetrachloroethene	Toluene	1,1,1-Trichloroethane	Trichloroethene	Vinyl chloride	Total Xylenes
			Concentrations in µg/m ³										
Pre Carbon	SVE_South_PreCarbon_110718	11/7/2018	<64	<170	310	<84	<74	31,000	<80	91	1,300	<54	<180
Post Carbon	SVE_South_PostCarbon_110718	11/7/2018	<1.2	<3.2	<1.6	<1.6	<1.4	15	<1.5	<1.6	<2.1	1.6	<3.5
Pre Carbon	SVE_South_PreCarbon_010419	1/4/2019	<64	<160	280	<82	<71	32,000	<77	84	920	<53	<180
Post Carbon	SVE_South_PostCarbon_010419	1/4/2019	<1.2	<3.2	<1.6	<1.6	2.1	<2.7	2.3	<1.6	<2.1	1.5	7.3
Pre Carbon	SVE_South_PreCarbon_030819	3/8/2019	<69	<180	180	<90	<79	21,000	<86	<93	570	<58	<200
Post Carbon	SVE_South_PostCarbon_030819	3/8/2019	<1.2	<3.2	<1.6	<1.6	1.8	5.5	<1.5	<1.6	<2.1	1.3	<3.5
Pre Carbon	SVE_South_PreCarbon_050719	5/7/2019	<69	<180	140	<90	<79	17,000	<85	<93	450	<58	<200
Post Carbon	SVE_South_PostCarbon_050719	5/7/2019	<1.2	<3.2	9.9	<1.6	<1.4	1,300	13	3.0	31	<1.0	11.7
Pre Carbon	SVE_South_PreCarbon_070819	7/8/2019	<64	<170	100	<83	<73	16,000	<79	<86	530	<54	<180
Post Carbon	SVE_South_PostCarbon_070819	7/8/2019	<1.2	6.3	<1.6	<1.6	1.6	7.9	<1.5	<1.6	<2.1	<1.0	1.7
Pre Carbon	SVE_South_PreCarbon_090919	9/9/2019	<28	<74	120	<37	<32	15,000	<35	48	590	<24	<81
Post Carbon	SVE_South_PostCarbon_090919	9/9/2019	2.8	3.6	160	9.1	<1.4	<2.7	<1.5	<1.6	<2.1	<1.0	<3.5
Pre Carbon	SVE_South_PreCarbon_110419	11/4/2019	<33	<87	300	<43	<38	38,000	<41	87	990	<28	<95
Post Carbon	SVE_South_PostCarbon_110419	11/4/2019	2.2	<5.2	160	5.6	<2.3	<4.4	<2.5	<2.7	<3.5	3.2	<5.7
Pre Carbon	SVE-South-PreCarbon-011020	1/10/2020	<12	<31	110	<16	<14	9,200	<15	33	420	<10	<17
Post Carbon	SVE-South-PostCarbon-011020	1/10/2020	<1.7	<4.5	130	<2.3	<2.0	<3.9	<2.2	5.1	<3.1	<1.5	<5.0
Pre Carbon	SVE_South_PreCarbon_121420	12/14/2020	<62	<160	400	<82	160	32,000	130	100	1,300	<53	<180
Post Carbon	SVE_South_PostCarbon_121420	12/14/2020	2.3	<5.4	180	<2.7	<2.4	<4.6	<2.6	8.9	<3.6	<1.7	<5.9

Notes:

1. µg/m³ = Micrograms per cubic meter.
2. Samples analyzed by Modified EPA Method TO-15.
3. Only analytes detected in at least one sample are presented in this table.
4. S = Surrogate recoveries were above acceptable recovery limits. Results may be biased high.
5. **Bold** values represents detected concentration of listed analyte.
6. -- = Not sampled.

Table 10
North SVE System – VOC Mass Removal
NuStar Vancouver Facility
Vancouver, Washington

Sample Date	Post-Blower Pressure (in water)	Air Flow Rate ⁽¹⁾ (cfm)	Total VOCs (mg/m ³)	VOC Removal (lb/day)
10/12/2011	0.1	250	10.5	0.2
1/23/2012	0.1	361	16.5	0.5
2/17/2012	0.05	215	11.3	0.2
3/22/2012	--	210	6.7	0.1
6/20/2012	0.2	217.8	0.3	0.005
8/22/2012	0.2	216	0.2	0.003
11/26/2012	0.05	215	22.6	0.436
12/21/2012	0.1	215	3.6	0.069
2/28/2013	0.1	215	4.6	0.088
5/24/2013	0.1	215	24.4	0.471
6/25/2013	0.1	215	13.8	0.267
8/27/2013	0.1	215	17.8	0.344
10/24/2013	0.1	215	10.6	0.204
12/27/2013	0.1	215	7.5	0.144
1/29/2014	3.0	215	1.4	0.028
2/24/2014	9.0	215	9.5	0.184
3/31/2014	1.0	215	3.7	0.072
4/29/2014	2.0	215	3.7	0.072
5/27/2014	2.0	215	4.4	0.085
7/3/2014	4.0	215	4.8	0.093
7/28/2014	3.0	215	7.7	0.148
9/30/2014	--	215	7.8	0.151
10/27/2014	2.0	215	15.4	0.298
11/25/2014	--	215	7.5	0.145
12/29/2014	2.0	215	15.3	0.296
1/26/2015	3.0	215	1.6	0.032
2/26/2015	0.1	215	0.0	0.001
3/30/2015	0.4	215	1.8	0.036
4/24/2015	0.4	215	0.6	0.012
5/14/2015	--	215	0.0	0.000
5/28/2015	0.05	215	0.4	0.007
7/29/2015	0.10	215	2.2	0.043
8/31/2015	0.05	215	7.8	0.150
9/28/2015	0.00	215	1.6	0.031
10/29/2015	1.00	215	6.9	0.134
11/30/2015	2.00	215	2.4	0.046
12/28/2015	0.10	215	5.7	0.110
2/1/2016	3.00	215	11.2	0.215
2/29/2016	0.10	215	8.0	0.154
3/29/2016	0.20	215	0.9	0.018
4/27/2016	1.00	215	1.6	0.030
5/25/2016	--*	--*	--*	--*

Please refer to notes at end of table.

Table 10
North SVE System – VOC Mass Removal
NuStar Vancouver Facility
Vancouver, Washington

Sample Date	Post-Blower Pressure (in H ₂ O)	Air Flow Rate ⁽¹⁾ (cfm)	Total VOCs (mg/m ³)	VOC Removal (lb/day)
6/28/2016	0.10	215	1.8830	0.036
7/26/2016	1.20	215	0.0916	0.00177
9/29/2016	0.10	215	0.0150	0.00029
10/25/2016	0.10	215	0.0109	0.000211
11/28/2016	0.10	215	0.0067	0.000129
12/28/2016	0.10	215	0.0017	0.0000329
1/30/2017	0.10	215	0.0046	0.0000889
2/28/2017	0.10	215	0.0059	0.000114
3/28/2017	0.10	215	0.0061	0.000118
4/24/2017	0.10	215	0.0076	0.000147

Date	Activity	VOC Removal Rate (lb/day)	Days of Operation	Approximate VOCs Removed (lbs)	Approximate Cumulative VOCs Removed (lbs)
10/10/2011	Startup	--	--	--	--
10/12/2011	Sample	0.2	37	9	9
1/23/2012	Sample	0.5	31	17	26
2/17/2012	Sample	0.2	25	6	32
3/22/2012	Sample	0.1	34	5	37
6/20/2012	Sample	0.005	90	1	38
8/22/2012	Sample	0.003	63	1	39
11/26/2012	Sample	0.436	66	29	68
12/21/2012	Sample	0.069	25	2	70
2/28/2013	Sample	0.088	69	7	77
5/24/2013	Sample	0.471	--	--	77
6/25/2013	Sample	0.267	32	9	86
8/27/2013	Sample	0.344	63	22	108
10/24/2013	Sample	0.204	58	12	120
12/27/2013	Sample	0.144	64	10	130
1/29/2014	Sample	0.028	33	1	131
2/24/2014	Sample	0.184	--	--	131
3/31/2014	Sample	0.072	35	3	134
4/29/2014	Sample	0.072	29	3	137
5/27/2014	Sample	0.085	28	3	140
7/3/2014	Sample	0.093	37	4	144
7/28/2014	Sample	0.148	25	4	148
9/30/2014	Sample	0.151	64	10	158
10/27/2014	Sample	0.298	27	9	167
11/25/2014	Sample	0.145	29	5	172
12/29/2014	Sample	0.296	34	11	183

Please refer to notes at end of table.

Table 10
North SVE System – VOC Mass Removal
NuStar Vancouver Facility
Vancouver, Washington

Date	Activity	VOC Removal Rate	Days of Operation	Approximate VOCs Removed	Approximate Cumulative VOCs Removed
		(lb/day)		(lbs)	(lbs)
1/26/2015	Sample	0.032	28	1	184
2/26/2015	Sample	0.001	31	1	185
3/30/2015	Sample	0.036	32	2	187
4/24/2015	Sample	0.012	25	1	188
5/14/2015	Sample	0.000	20	0	188
5/28/2015	Sample	0.007	14	1	189
6/30/2015	Estimate	0.007	33	1	190
6/30/2015	Estimate	0.000	0	0	190
7/29/2015	Sample	0.043	29	2	192
8/31/2015	Sample	0.150	33	5	197
9/28/2015	Sample	0.031	28	1	198
10/29/2015	Sample	0.134	31	5	203
11/30/2015	Sample	0.046	32	2	205
12/28/2015	Sample	0.110	28	4	209
2/1/2016	Sample	0.215	35	8	217
2/29/2016	Sample	0.154	28	5	222
3/29/2016	Sample	0.018	29	1	223
4/27/2016	Sample	0.030	29	1	224
5/25/2016	Sample	--*	28	--*	221
6/28/2016	Sample	0.0364	34	2	223
7/26/2016	Sample	0.00177	28	1	224
9/29/2016	Sample	0.00029	65	1	225
10/25/2016	Sample	0.000211	26	1	226
11/28/2016	Sample	0.000129	34	1	227
12/28/2016	Sample	0.0000329	30	1	228
1/30/2017	Sample	0.0000889	33	1	229
2/28/2017	Sample	0.000114	29	1	230
3/28/2017	Sample	0.000118	28	1	231
4/24/2017	Sample	0.000147	27	1	232

Notes:

1. Air flow rate read from system gauge.
2. cfm = cubic feet per minute
3. mg/m³ = milligrams per cubic meter
4. lb/day = pounds per day
5. VOCs = volatile organic compounds
6. lbs = pounds
7. * = Not measured/sampled; system intentionally shut down to evaluate system efficiency.
8. -- = Not measured/sampled.

Table 11
South SVE System – VOC Mass Removal
NuStar Vancouver Facility
Vancouver, Washington

Sample Date	Activity	Post-Blower Pressure (in water)	Air Flow Rate ⁽¹⁾ (cfm)	Total VOCs (mg/m ³)	VOC Removal (lb/day)	Days of Operation	Approximate VOCs Removed (lbs)	Approximate Cumulative VOCs Removed (lbs)
10/6/2011	Startup	33.0	590	46	2.4	0.5	2	2
11/2/2011	Sample	27.0	590	29	1.5	27	41	43
12/14/2011	Sample	27.0	590	57	3.0	42	96	139
2/17/2012	Sample	29.0	-- ⁶	30	1.6	65	151	290
3/22/2012	Sample	27.0	658	31	1.9	34	59	349
4/26/2012	Sample	27.0	--	0	0.0	35	33	382
5/23/2012	Sample	31.0	--	20	1.2	29	18	400
6/20/2012	Sample	33.0	--	37	2.2	28	47	447
7/24/2012	Sample	32.0	--	34	2.0	34	72	519
8/22/2012	Sample	29.0	--	51	3.0	29	74	593
9/25/2012	Sample	29.0	--	52	3.1	34	104	697
10/29/2012	Sample	47.0	--	63	3.7	34	116	813
11/26/2012	Sample	18.0	--	11	0.6	28	61	874
12/21/2012	Sample	17.0	--	15	0.9	25	19	893
1/24/2013	Sample	10.0	--	2	0.1	34	17	910
2/28/2013	Sample	18.0	--	1	0.1	35	3	913
3/25/2013	Sample	16.0	--	4	0.2	25	4	917
4/29/2013	Sample	15.0	--	1	0.1	35	6	923
5/24/2013	Sample	47.0	--	251	14.8	--	--	996
6/25/2013	Sample	51.0	--	41	2.5	32	277	1,273
7/25/2013	Sample	50.0	--	24	1.4	30	58	1,331
8/27/2013	Sample	52.0	--	30	1.8	33	53	1,384
9/30/2013	Sample	45.0	--	28	1.6	34	59	1,443
10/24/2013	Sample	50.0	--	29	1.7	24	41	1,484
11/25/2013	Sample	51.0	--	22	1.3	32	48	1,532
12/27/2013	Sample	55.0	--	21	1.3	32	41	1,573

Please refer to notes at end of table.

Table 11
South SVE System – VOC Mass Removal
NuStar Vancouver Facility
Vancouver, Washington

Sample Date	Activity	Post-Blower Pressure (in water)	Air Flow Rate ⁽¹⁾ (cfm)	Total VOCs (mg/m ³)	VOC Removal (lb/day)	Days of Operation	Approximate VOCs Removed (lbs)	Approximate Cumulative VOCs Removed (lbs)
1/29/2014	Sample	50.0	--	21	1.2	33	41	1,614
2/24/2014	Sample	50.0	--	37	2.2	--	--	1,614
3/31/2014	Sample	46.0	--	21	1.2	35	60	1,674
4/29/2014	Sample	48.8	--	14	0.8	29	30	1,704
5/27/2014	Sample	49.0	--	13	0.7	28	22	1,726
7/3/2014	Sample	50.0	--	3	0.2	37	18	1,744
7/28/2014	Sample	50.0	--	16	0.9	25	15	1,759
8/25/2014	Sample	49.0	--	21	1.2	28	31	1,790
9/30/2014	Sample	40.0	--	18	1.1	36	42	1,832
11/3/2014	Sample	50.0	--	25	1.5	30	39	1,871
12/31/2014	Estimated	--	--	--	--	22	33	1,904
1/26/2015	Sample	20.0	--	23	1.3	26	37	1,941
2/26/2015	Sample	30.0	--	19	1.1	31	39	1,980
3/30/2015	Sample	29.0	--	18	1.1	32	36	2,016
4/24/2015	Sample	29.0	--	6	0.4	25	18	2,034
5/28/2015	Sample	28.0	--	9	0.5	34	15	2,049
7/29/2015	Sample	25.0	--	13	0.8	62	41	2,090
8/31/2015	Sample	26.0	--	13	0.8	33	26	2,116
9/28/2015	Sample	26.0	--	11	0.6	28	20	2,136
10/29/2015	Sample	27.0	--	19	1.1	31	28	2,164
11/30/2015	Sample	30.0	--	3	0.2	32	22	2,186
12/28/2015	Sample	29.0	--	36	2.2	28	33	2,219

Please refer to notes at end of table.

Table 11
South SVE System – VOC Mass Removal
NuStar Vancouver Facility
Vancouver, Washington

Sample Date	Activity	Post-Blower Pressure (in water)	Air Flow Rate ⁽¹⁾ (cfm)	Total VOCs (mg/m ³)	VOC Removal (lb/day)	Days of Operation	Approximate VOCs Removed (lbs)	Approximate Cumulative VOCs Removed (lbs)
2/1/2016	Sample	19.0	--	3	0.2	35	41	2,260
2/29/2016	Sample	30.0	--	3	0.2	28	6	2,266
3/29/2016	Sample	28.0	--	75	4.4	29	67	2,333
4/27/2016	Sample	5.0	--	1	0.1	29	66	2,399
5/25/2016	Sample	3.0	--	1	0.03	28	2	2,401
6/28/2016	Sample	-- *	-- *	-- *	-- *	-- *	-- *	2,401
7/26/2016	Sample	30.0	--	19	1.1	62	36	2,437
9/29/2016	Sample	28.0	--	27	1.6	65	89	2,526
10/25/2016	Sample	30.0	--	34	2.0	26	47	2,573
11/28/2016	Sample	30.0	--	55	3.3	34	90	2,663
12/28/2016	No sample collected	2.0	--	--	--	--	--	2,663
1/30/2017	Sample	33.0	--	64	3.8	63	223	2,886
3/28/2017	**System Not Working Properly -- No Data or Samples**	--	--	--	--	--	--	2,886
9/25/2017	Sample	30.0	--	24	1.4	28	48	3,427
10/26/2017	Sample	30.0	--	14	0.8	31	35	3,462
11/29/2017	Sample	30.0	--	23	1.4	34	38	3,500
12/21/2017	Estimated (using November effluent data)	30.0	--	23	1.4	22	30	3,530
1/22/2018	Sample	30.0	--	14	0.8	32	36	3,566
2/28/2018	Sample	30.0	--	14	0.8	37	31	3,597
3/29/2018	Sample	31.0	--	14	0.8	29	24	3,621
4/24/2018	Sample	31.0	--	12	0.7	26	21	3,642
5/16/2018	Sample	30.0	--	8	0.5	22	14	3,656
7/23/2018	Sample	29.0	--	19	1.1	68	55	3,711
11/7/2018	Sample	30.0	--	33	1.9	107	164	3,875

Please refer to notes at end of table.

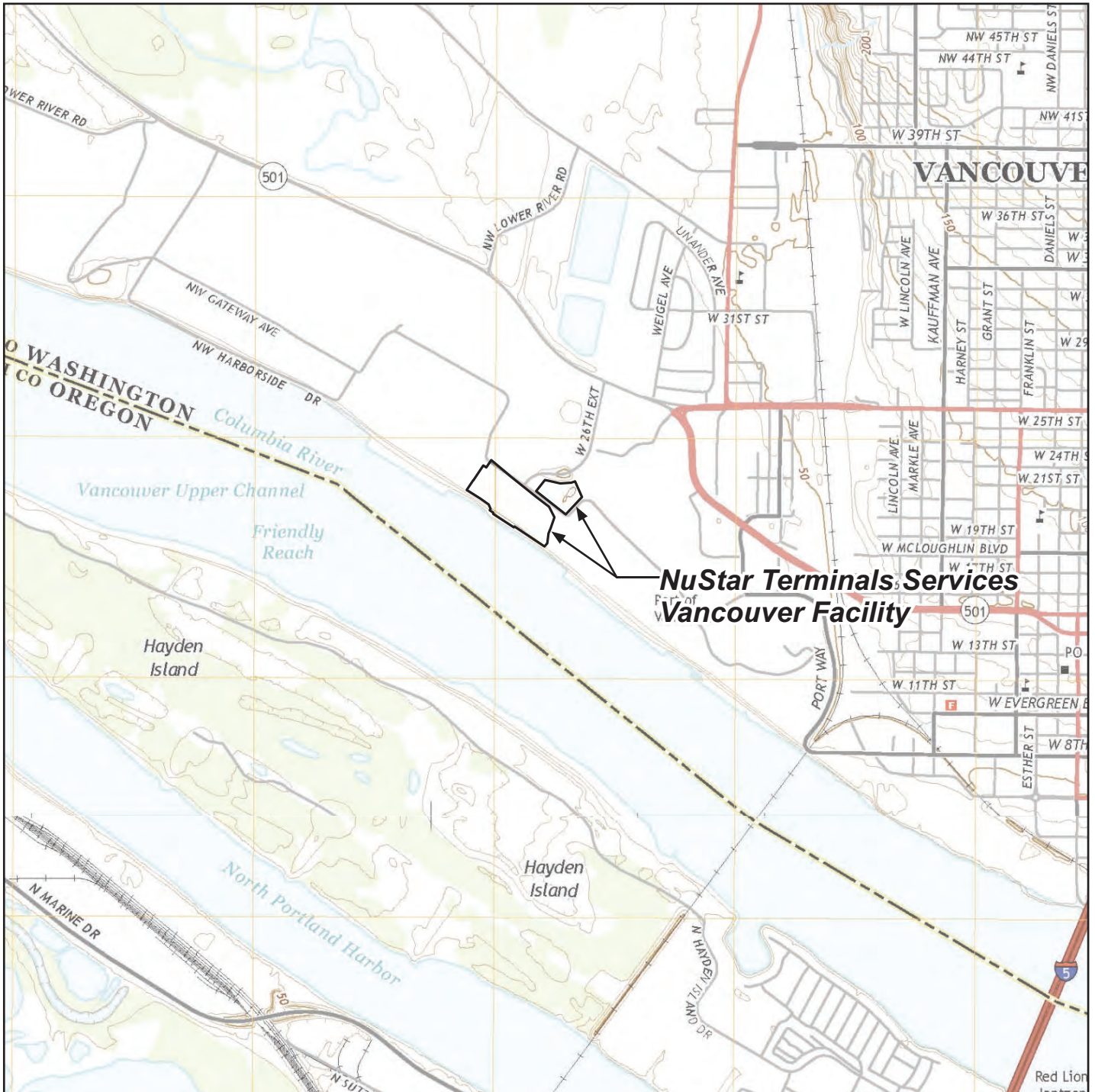
Table 11
South SVE System – VOC Mass Removal
NuStar Vancouver Facility
Vancouver, Washington

Sample Date	Activity	Post-Blower Pressure (in water)	Air Flow Rate ⁽¹⁾ (cfm)	Total VOCs (mg/m ³)	VOC Removal (lb/day)	Days of Operation	Approximate VOCs Removed (lbs)	Approximate Cumulative VOCs Removed (lbs)
1/4/2019	Sample	28.0	--	33	2.0	58	114	3,989
3/8/2019	Sample	28.0	--	22	1.3	63	103	4,092
5/7/2019	Sample	29.0	--	18	1.0	60	70	4,162
7/8/2019	Sample	29.0	--	17	1.0	62	63	4,225
9/9/2019	Sample	29.0	--	16	0.9	63	61	4,286
11/4/2019	Sample	29.0	468	39	1.7	56	73	4,359
1/10/2020	Sample	29.0	468	10	0.4	67	70	4,429
12/14/2020	Sample	30.0	--	34	1.4	6	6	4,435

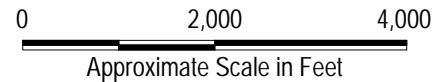
Notes:

1. Air flow rate read from system gauge.
2. cfm = cubic feet per minute
3. mg/m³ = Milligrams per cubic meter
4. lb/day = pounds per day
5. lbs = pounds
6. Flow rate was not measured on dates with dashes (--). For calculations, rate is assumed to be the same as measured the date before.
7. System was down during the October 27, 2014 monitoring event and was restarted on October 29, 2014. It is assumed that the system was down for a total of four days, although the exact duration of shutdown is unknown.
8. * = system was off for part replacement.
9. -- = Not measured/sampled.
10. VOCs = volatile organic compounds

FIGURES



Note: Base map prepared from USGS 7.5-minute quadrangles of Vancouver, WA and Portland, OR-WA, dated 2014 as provided by USGS.gov.



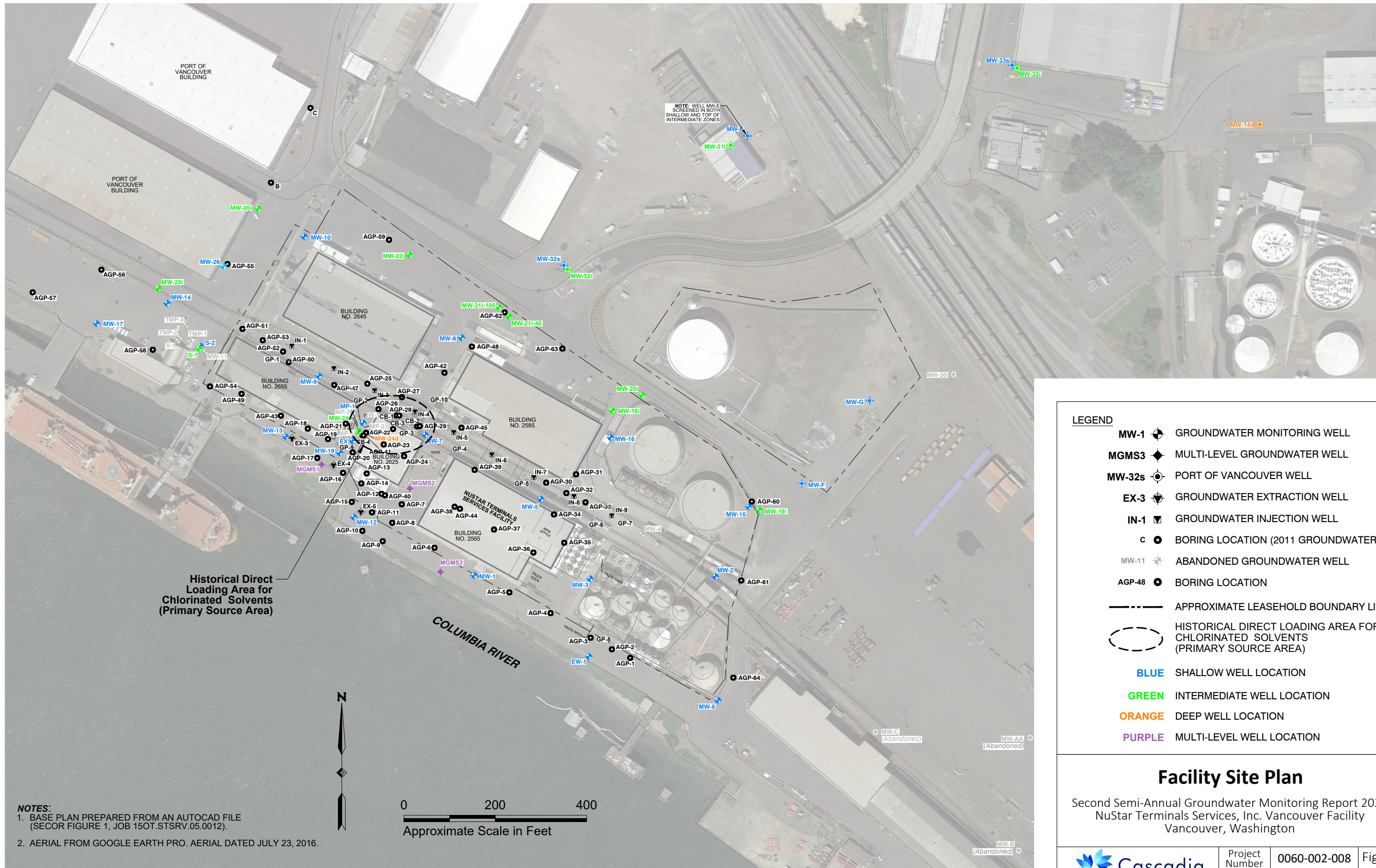
Facility Location Map

Second Semi-Annual Groundwater Monitoring Report 2020
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington



Project Number	0060-002-008
February 2021	

Figure
1



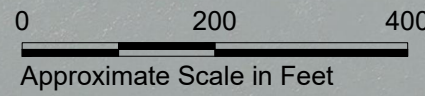
LEGEND

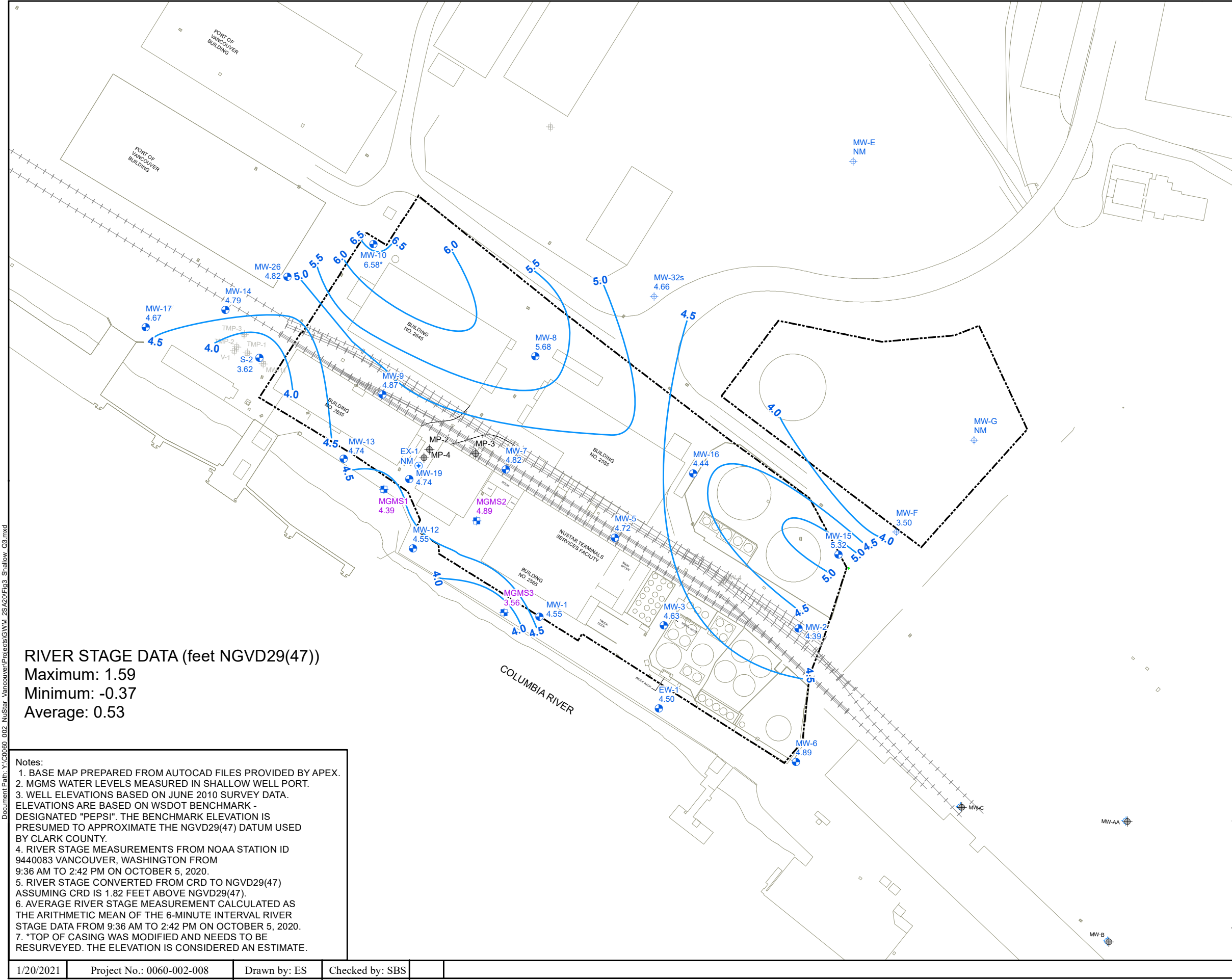
- MW-1 GROUNDWATER MONITORING WELL
- MGMS3 MULTI-LEVEL GROUNDWATER WELL
- MW-32s PORT OF VANCOUVER WELL
- EX-3 GROUNDWATER EXTRACTION WELL
- IN-1 GROUNDWATER INJECTION WELL
- c BORING LOCATION (2011 GROUNDWATER INV.)
- MW-11 ABANDONED GROUNDWATER WELL
- AGP-48 BORING LOCATION
- APPROXIMATE LEASEHOLD BOUNDARY LINE
- HISTORICAL DIRECT LOADING AREA FOR CHLORINATED SOLVENTS (PRIMARY SOURCE AREA)
- BLUE SHALLOW WELL LOCATION
- GREEN INTERMEDIATE WELL LOCATION
- ORANGE DEEP WELL LOCATION
- PURPLE MULTI-LEVEL WELL LOCATION

Facility Site Plan

Second Semi-Annual Groundwater Monitoring Report 2020
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

NOTES:
 1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 150T.STSRV.05.0012).
 2. AERIAL FROM GOOGLE EARTH PRO. AERIAL DATED JULY 23, 2016.

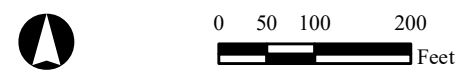




- Legend**
- Port of Vancouver Well
 - Multi-Level Groundwater Well
 - Monitoring Well
 - Historical Groundwater Extraction Well
 - Abandoned Groundwater Well
 - Groundwater Elevation Contour (Feet)
 - Approximate Property Line
 - 5.32 - Groundwater Elevation in Feet
 - NM** - Not Measured
 - BLUE** - Shallow Well Location
 - PURPLE** - Multi Level Well Location
 - Groundwater Flow Direction

RIVER STAGE DATA (feet NGVD29(47))
 Maximum: 1.59
 Minimum: -0.37
 Average: 0.53

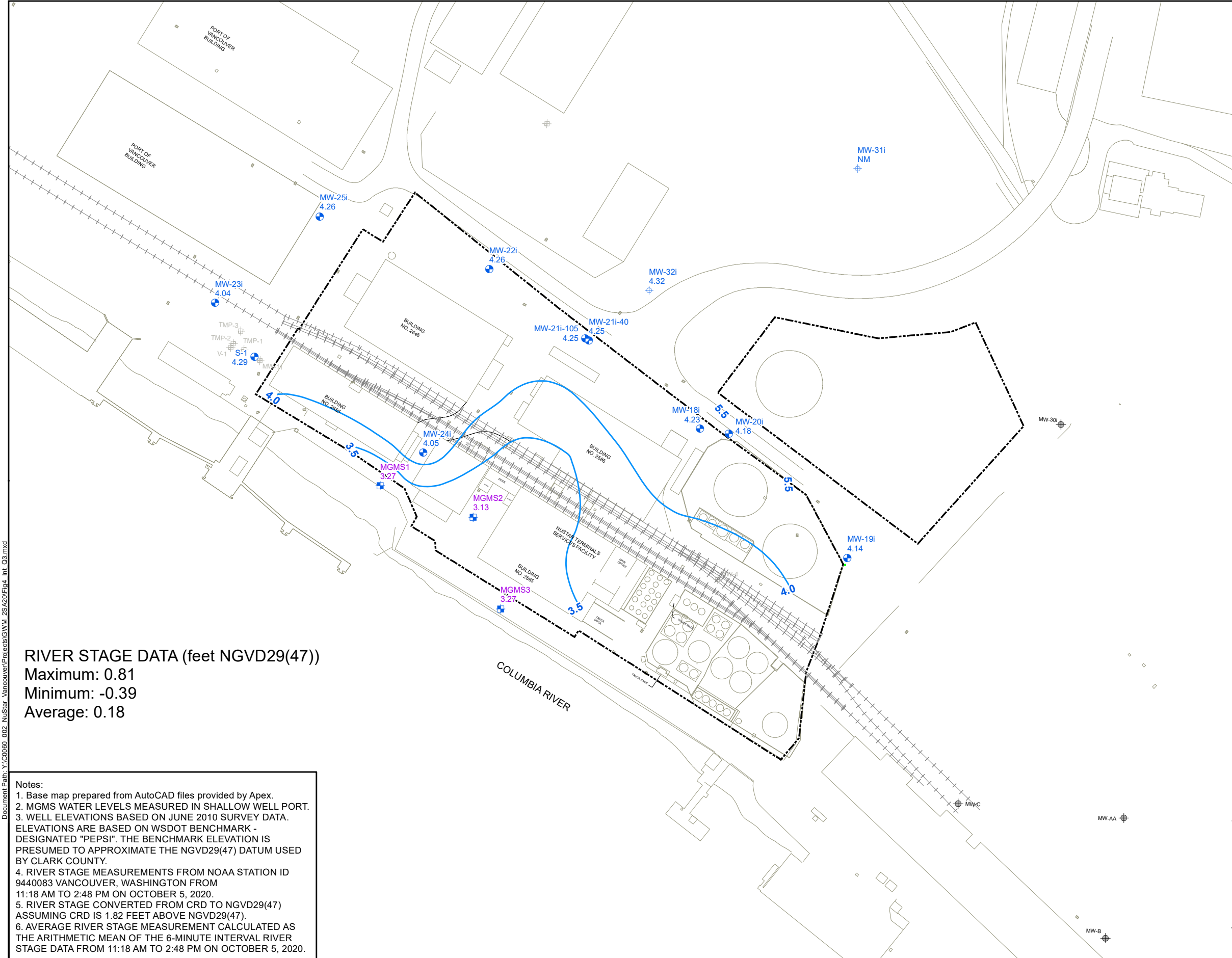
Notes:
 1. BASE MAP PREPARED FROM AUTOCAD FILES PROVIDED BY APEX.
 2. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.
 3. WELL ELEVATIONS BASED ON JUNE 2010 SURVEY DATA. ELEVATIONS ARE BASED ON WSDOT BENCHMARK - DESIGNATED "PEPSI". THE BENCHMARK ELEVATION IS PRESUMED TO APPROXIMATE THE NGVD29(47) DATUM USED BY CLARK COUNTY.
 4. RIVER STAGE MEASUREMENTS FROM NOAA STATION ID 9440083 VANCOUVER, WASHINGTON FROM 9:36 AM TO 2:42 PM ON OCTOBER 5, 2020.
 5. RIVER STAGE CONVERTED FROM CRD TO NGVD29(47) ASSUMING CRD IS 1.82 FEET ABOVE NGVD29(47).
 6. AVERAGE RIVER STAGE MEASUREMENT CALCULATED AS THE ARITHMETIC MEAN OF THE 6-MINUTE INTERVAL RIVER STAGE DATA FROM 9:36 AM TO 2:42 PM ON OCTOBER 5, 2020.
 7. *TOP OF CASING WAS MODIFIED AND NEEDS TO BE RESURVEYED. THE ELEVATION IS CONSIDERED AN ESTIMATE.



Third Quarter- Shallow Groundwater (October 2020)
 Second Semi-Annual Groundwater Monitoring Event 2020
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington



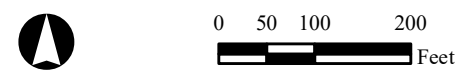
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- Legend**
- Port of Vancouver Well
 - Multi-Level Groundwater Well
 - Monitoring Well
 - Historical Groundwater Extraction Well
 - Abandoned Groundwater Well
 - Groundwater Elevation Contour (Feet)
 - Approximate Property Line
 - 4.14 - Groundwater Elevation in Feet
 - NM - Not Measured
 - GREEN - Intermediate Well Location
 - PURPLE - Multi Level Well Location

RIVER STAGE DATA (feet NGVD29(47))
 Maximum: 0.81
 Minimum: -0.39
 Average: 0.18

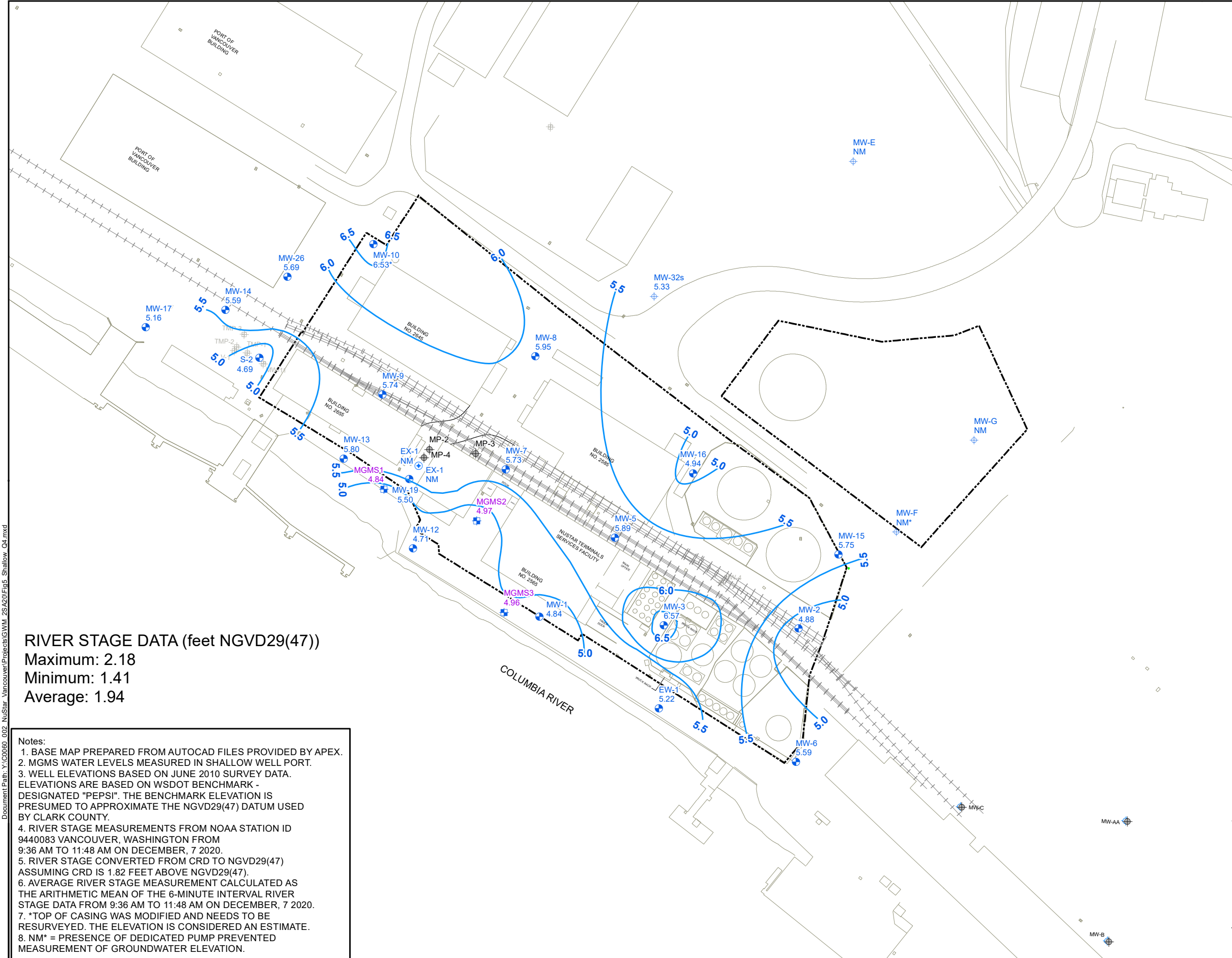
Notes:
 1. Base map prepared from AutoCAD files provided by Apex.
 2. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.
 3. WELL ELEVATIONS BASED ON JUNE 2010 SURVEY DATA. ELEVATIONS ARE BASED ON WSDOT BENCHMARK - DESIGNATED "PEPSI". THE BENCHMARK ELEVATION IS PRESUMED TO APPROXIMATE THE NGVD29(47) DATUM USED BY CLARK COUNTY.
 4. RIVER STAGE MEASUREMENTS FROM NOAA STATION ID 9440083 VANCOUVER, WASHINGTON FROM 11:18 AM TO 2:48 PM ON OCTOBER 5, 2020.
 5. RIVER STAGE CONVERTED FROM CRD TO NGVD29(47) ASSUMING CRD IS 1.82 FEET ABOVE NGVD29(47).
 6. AVERAGE RIVER STAGE MEASUREMENT CALCULATED AS THE ARITHMETIC MEAN OF THE 6-MINUTE INTERVAL RIVER STAGE DATA FROM 11:18 AM TO 2:48 PM ON OCTOBER 5, 2020.



Third Quarter- Intermediate (October 2020)
 Second Semi-Annual Groundwater Monitoring Event 2020
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington



Figure 4

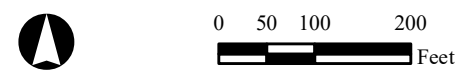


- Legend**
- Port of Vancouver Well
 - Multi-Level Groundwater Well
 - Monitoring Well
 - Historical Groundwater Extraction Well
 - Abandoned Groundwater Well
 - Groundwater Elevation Contour (Feet)
 - Approximate Property Line
 - 5.75 - Groundwater Elevation in Feet
 - NM - Not Measured
 - BLUE - Shallow Well Location
 - PURPLE - Multi Level Well Location
 - Groundwater Flow Direction

RIVER STAGE DATA (feet NGVD29(47))
 Maximum: 2.18
 Minimum: 1.41
 Average: 1.94

Notes:

1. BASE MAP PREPARED FROM AUTOCAD FILES PROVIDED BY APEX.
2. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.
3. WELL ELEVATIONS BASED ON JUNE 2010 SURVEY DATA. ELEVATIONS ARE BASED ON WSDOT BENCHMARK - DESIGNATED "PEPSI". THE BENCHMARK ELEVATION IS PRESUMED TO APPROXIMATE THE NGVD29(47) DATUM USED BY CLARK COUNTY.
4. RIVER STAGE MEASUREMENTS FROM NOAA STATION ID 9440083 VANCOUVER, WASHINGTON FROM 9:36 AM TO 11:48 AM ON DECEMBER, 7 2020.
5. RIVER STAGE CONVERTED FROM CRD TO NGVD29(47) ASSUMING CRD IS 1.82 FEET ABOVE NGVD29(47).
6. AVERAGE RIVER STAGE MEASUREMENT CALCULATED AS THE ARITHMETIC MEAN OF THE 6-MINUTE INTERVAL RIVER STAGE DATA FROM 9:36 AM TO 11:48 AM ON DECEMBER, 7 2020.
7. *TOP OF CASING WAS MODIFIED AND NEEDS TO BE RESURVEYED. THE ELEVATION IS CONSIDERED AN ESTIMATE.
8. NM* = PRESENCE OF DEDICATED PUMP PREVENTED MEASUREMENT OF GROUNDWATER ELEVATION.

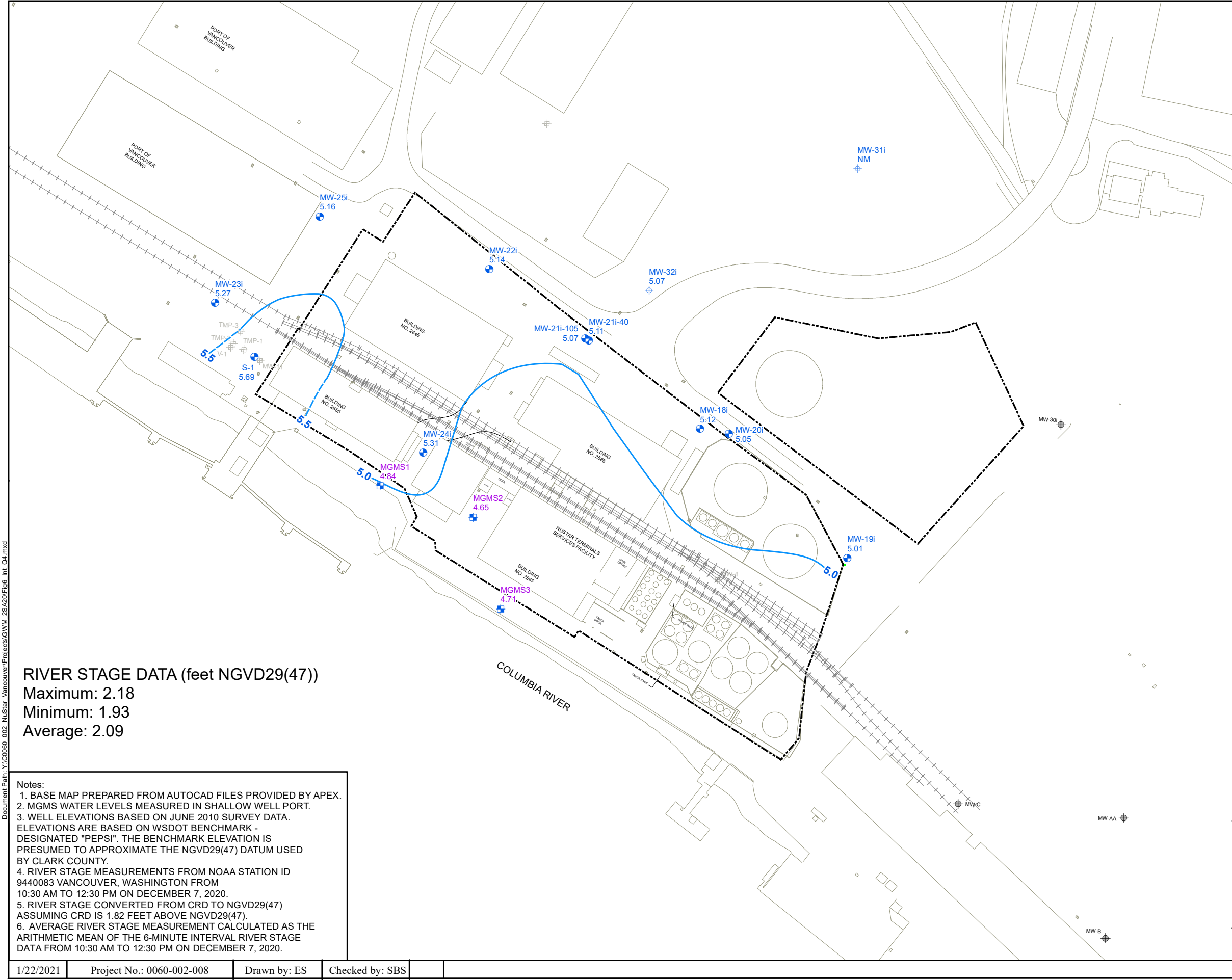


Fourth Quarter- Shallow Groundwater (December 2020)
 Second Semi-Annual Groundwater Monitoring Event 2020
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington



Figure 5

DocumentPath: Y:\C00000_002_NuStar_Vancouver\Projects\GWM_25A20\Fig5_Shallow_04.mxd

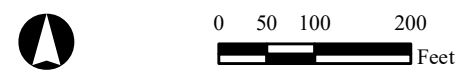


- Legend**
- Port of Vancouver Well
 - Multi-Level Groundwater Well
 - Monitoring Well
 - Historical Groundwater Extraction Well
 - Abandoned Groundwater Well
 - Groundwater Elevation Contour (Feet) - Dashed Where Inferred
 - Approximate Property Line
- 5.01 - Groundwater Elevation in Feet
- NM - Not Measured
- GREEN - Intermediate Well Location
- PURPLE - Multi Level Well Location

RIVER STAGE DATA (feet NGVD29(47))
 Maximum: 2.18
 Minimum: 1.93
 Average: 2.09

Notes:

1. BASE MAP PREPARED FROM AUTOCAD FILES PROVIDED BY APEX.
2. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.
3. WELL ELEVATIONS BASED ON JUNE 2010 SURVEY DATA. ELEVATIONS ARE BASED ON WSDOT BENCHMARK - DESIGNATED "PEPSI". THE BENCHMARK ELEVATION IS PRESUMED TO APPROXIMATE THE NGVD29(47) DATUM USED BY CLARK COUNTY.
4. RIVER STAGE MEASUREMENTS FROM NOAA STATION ID 9440083 VANCOUVER, WASHINGTON FROM 10:30 AM TO 12:30 PM ON DECEMBER 7, 2020.
5. RIVER STAGE CONVERTED FROM CRD TO NGVD29(47) ASSUMING CRD IS 1.82 FEET ABOVE NGVD29(47).
6. AVERAGE RIVER STAGE MEASUREMENT CALCULATED AS THE ARITHMETIC MEAN OF THE 6-MINUTE INTERVAL RIVER STAGE DATA FROM 10:30 AM TO 12:30 PM ON DECEMBER 7, 2020.



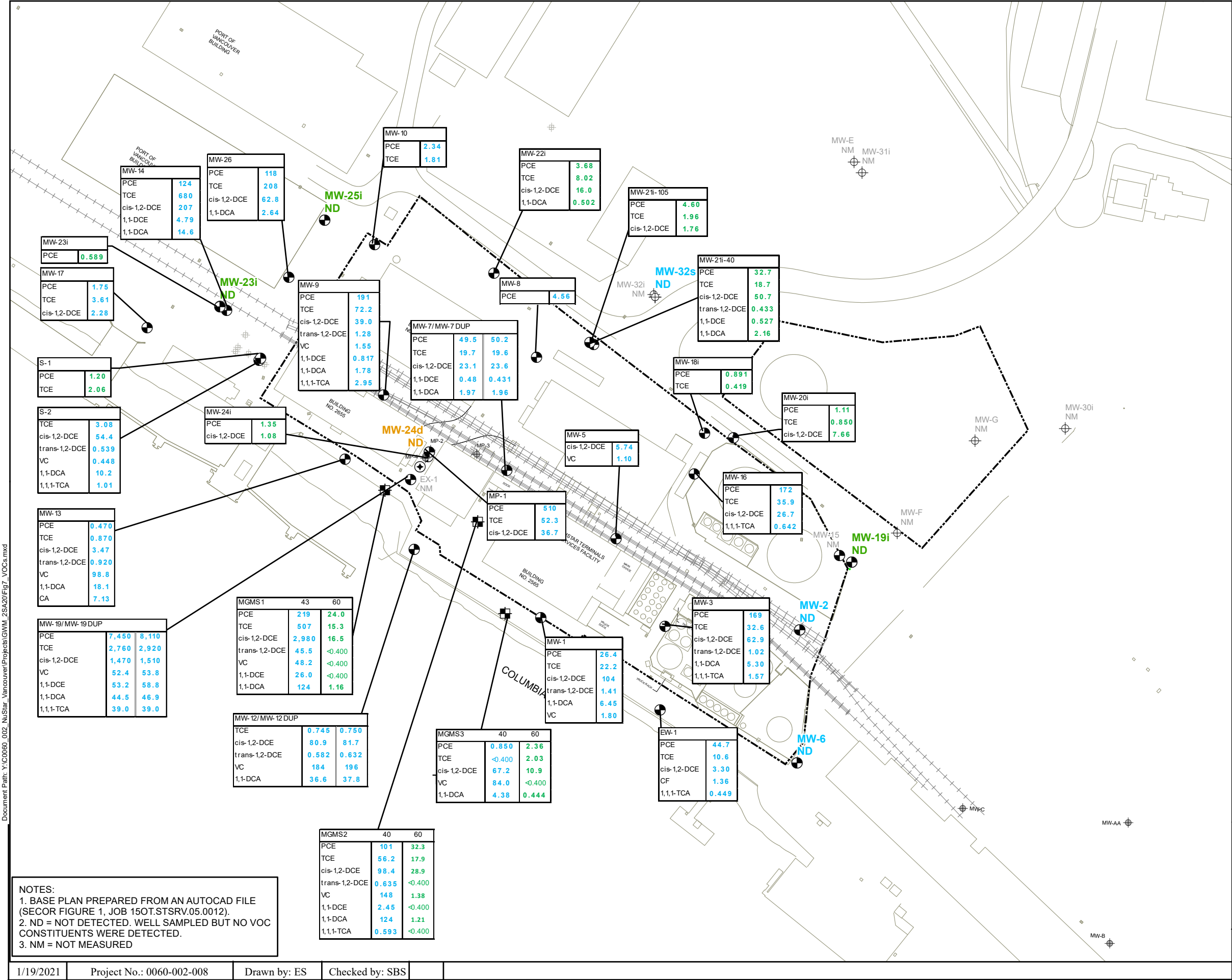
**Fourth Quarter- Intermediate
(December 2020)**

Second Semi-Annual Groundwater Monitoring Event 2020
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington



**Figure
6**

Document Path: Y:\C00000_002_NuStar_Vancouver\Projects\GWM_25A20\Fig6_Int_04.mxd



MGMS1	DEPTH OF PORT SAMPLED (IF NOT SPECIFIED - SINGLE PORT WELL)	
	43	60
PCE	219	24
TCE	507	15.3
cis-1,2-DCE	2,980	16.5
trans-1,2-DCE	45.5	<0.400
VC	48.2	<0.400
1,1-DCE	26.0	<0.400
1,1-DCA	124	1.16

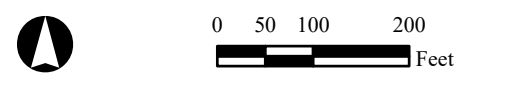
ANALYTE SAMPLED

Legend

- ⊕ Port of Vancouver Well
- ⊞ Multi-Level Groundwater Well
- ⊙ Monitoring Well
- ⊕ Historical Groundwater Extraction Well
- ⊕ Abandoned Groundwater Well
- Approximate Property Line

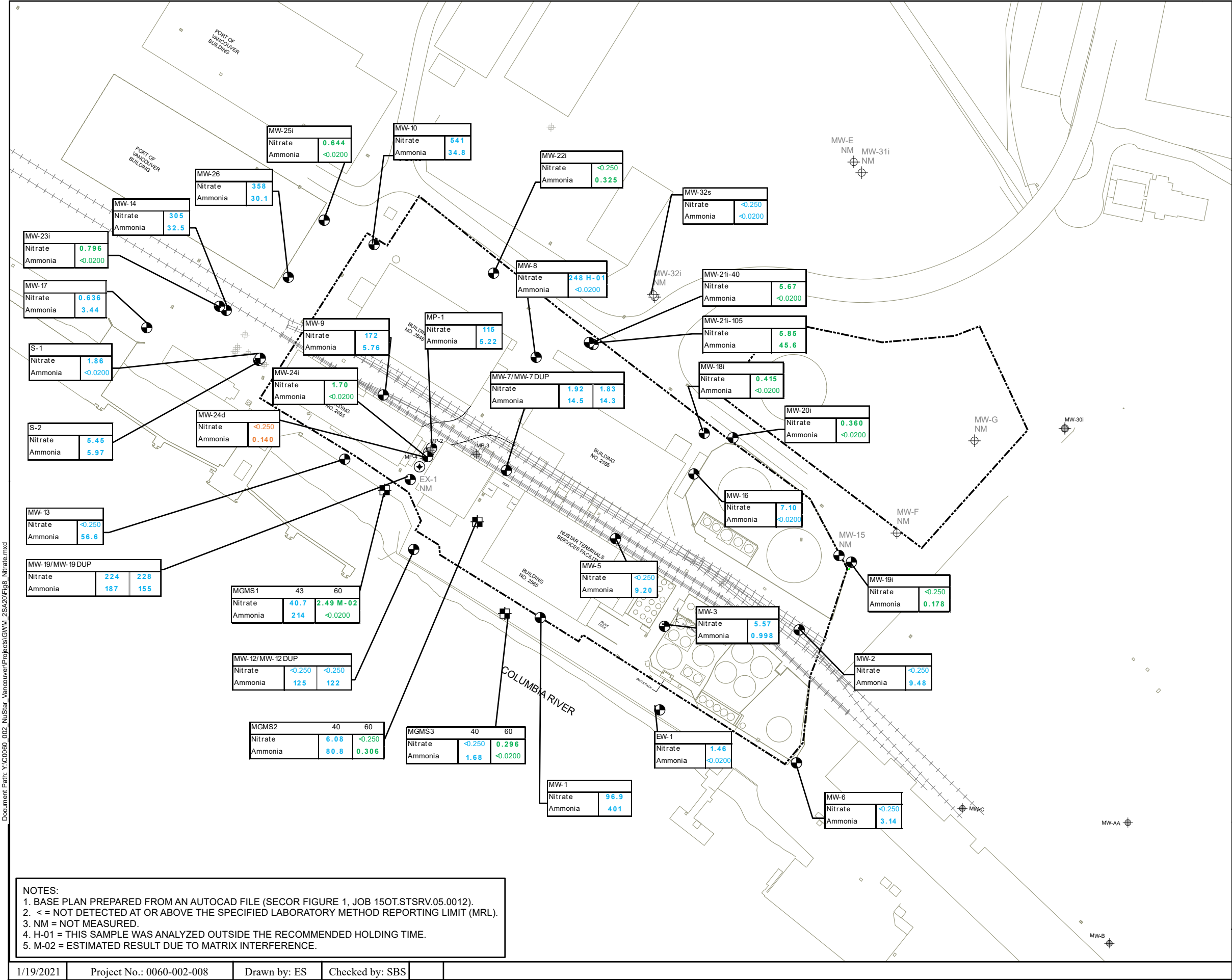
BLUE - Shallow zone concentration data
GREEN - Intermediate zone concentration data
ORANGE - Deep zone concentration data

PCE	TETRACHLOROETHENE
TCE	TRICHLOROETHENE
cis-1,2-DCE	CIS-1,2-DICHLOROETHENE
trans-1,2-DCE	TRANS-1,2-DICHLOROETHENE
VC	VINYL CHLORIDE
1,1-DCE	1,1-DICHLOROETHENE
1,1-DCA	1,1-DICHLOROETHANE
CF	CHLOROFORM
1,1,1-TCA	1,1,1-TRICHLOROETHANE
CA	CHLOROETHANE



VOC Concentrations in Groundwater (October 2020)
 Second Semi-Annual Groundwater Monitoring Event 2020
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington

NOTES:
 1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 150T.STSRV.05.0012).
 2. ND = NOT DETECTED. WELL SAMPLED BUT NO VOC CONSTITUENTS WERE DETECTED.
 3. NM = NOT MEASURED

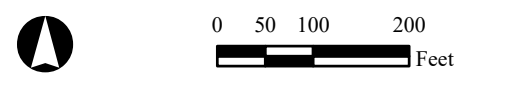


WELL IDENTIFICATION

MW-22i		
Nitrate	<0.250	NITRATE IN mg/L (AS NITROGEN METHOD 300.0)
Ammonia	0.325	AMMONIA IN mg/L (AS NITROGEN METHOD 350.1)

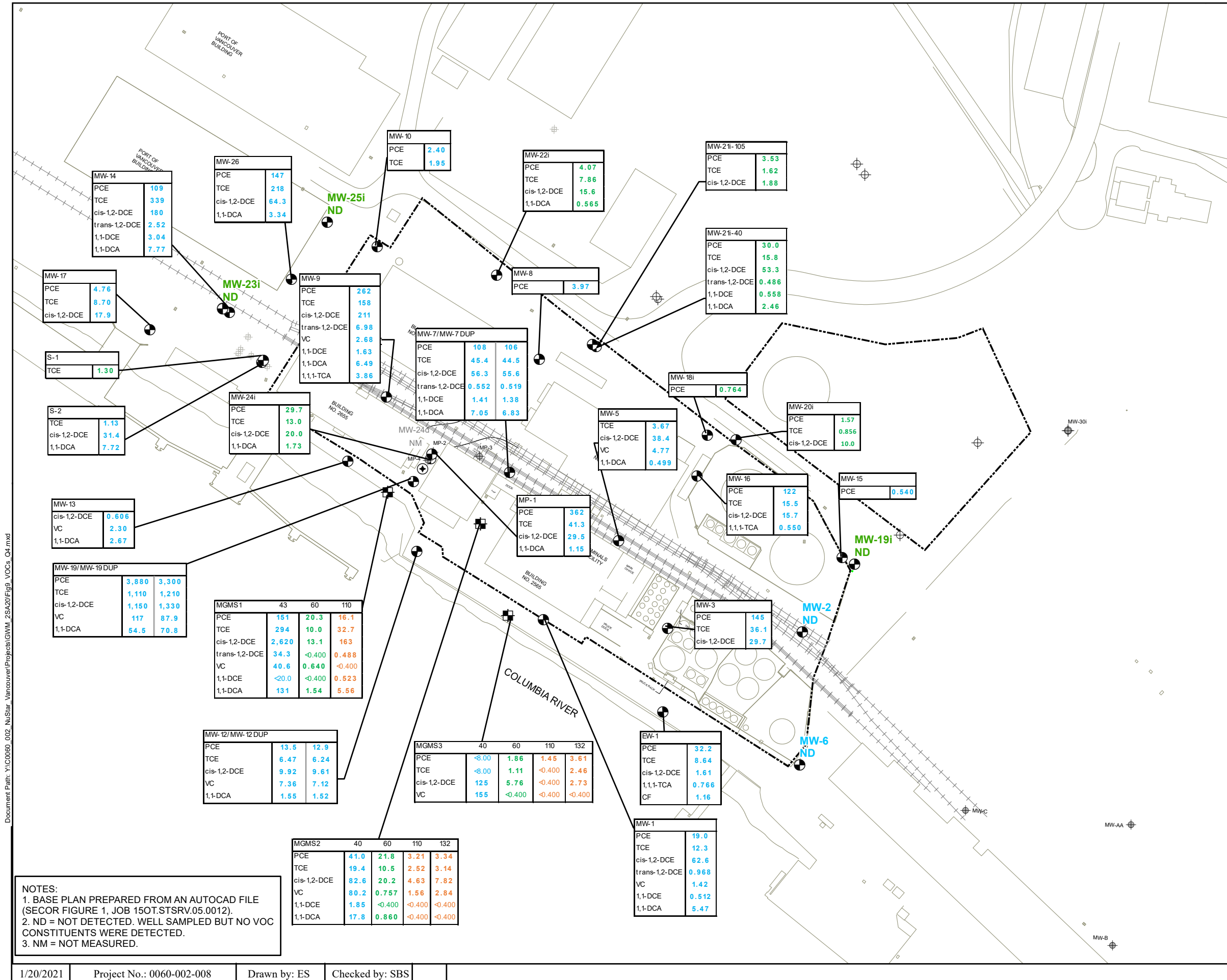
- Legend**
- ⊕ Port of Vancouver Well
 - ⊕ Multi-Level Groundwater Well
 - ⊕ Monitoring Well
 - ⊕ Historical Groundwater Extraction Well
 - ⊕ Abandoned Groundwater Well
 - Approximate Property Line

BLUE - Shallow zone concentration data
GREEN - Intermediate zone concentration
ORANGE - Deep zone concentration data



Nitrate and Ammonia Concentrations in Groundwater (October 2020)
 Second Semi-Annual Groundwater Monitoring Event 2020
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington

NOTES:
 1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 150T.STSRV.05.0012).
 2. < = NOT DETECTED AT OR ABOVE THE SPECIFIED LABORATORY METHOD REPORTING LIMIT (MRL).
 3. NM = NOT MEASURED.
 4. H-01 = THIS SAMPLE WAS ANALYZED OUTSIDE THE RECOMMENDED HOLDING TIME.
 5. M-02 = ESTIMATED RESULT DUE TO MATRIX INTERFERENCE.



WELL IDENTIFICATION DEPTH OF PORT SAMPLED (IF NOT SPECIFIED - SINGLE PORT WELL)

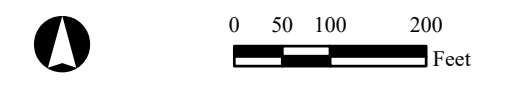
MGMS1	43	60	110
PCE	151	20.3	16.1
TCE	294	10.0	32.7
cis-1,2-DCE	2,620	13.1	163
trans-1,2-DCE	34.3	<0.400	0.49
VC	40.6	0.640	<0.400
1,1-DCE	<20.0	<0.400	0.52
1,1-DCA	131	1.54	5.56

CHEMICAL CONCENTRATION IN µg/L (ONLY DETECTED COMPOUNDS ARE SHOWN)

- ANALYTE SAMPLED
- Legend**
- Port of Vancouver Well
 - Multi-Level Groundwater Well
 - Monitoring Well
 - Historical Groundwater Extraction Well
 - Abandoned Groundwater Well
 - Approximate Property Line

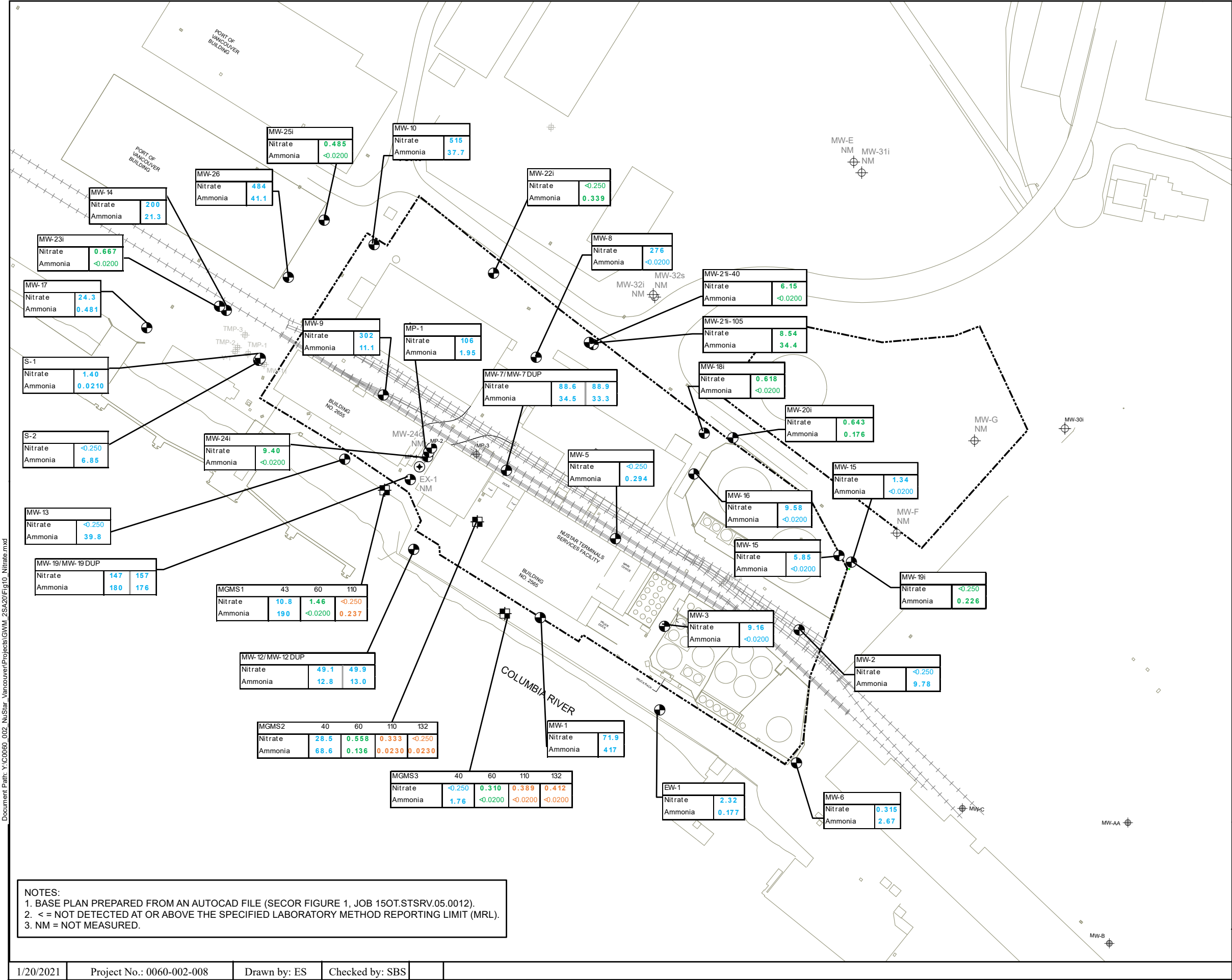
BLUE - Shallow zone concentration data
GREEN - Intermediate zone concentration data
ORANGE - Deep zone concentration data

PCE	TETRACHLOROETHENE
TCE	TRICHLOROETHENE
cis-1,2-DCE	CIS-1,2-DICHLOROETHENE
trans-1,2-DCE	TRANS-1,2-DICHLOROETHENE
VC	VINYL CHLORIDE
1,1-DCE	1,1-DICHLOROETHENE
1,1-DCA	1,1-DICHLOROETHANE
CF	CHLOROFORM
1,1,1-TCA	1,1,1-TRICHLOROETHANE
CA	CHLOROETHANE



VOC Concentrations in Groundwater (December 2020)
 Second Semi-Annual Groundwater Monitoring Event 2020
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington

NOTES:
 1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 150T.STSRV.05.0012).
 2. ND = NOT DETECTED. WELL SAMPLED BUT NO VOC CONSTITUENTS WERE DETECTED.
 3. NM = NOT MEASURED.

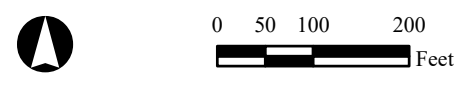


WELL IDENTIFICATION

MW-22i		
Nitrate	<0.250	NITRATE IN mg/L (AS NITROGEN METHOD 300.0)
Ammonia	0.34	AMMONIA IN mg/L (AS NITROGEN METHOD 350.1)

- Legend**
- ⊕ Port of Vancouver Well
 - ⊕ Multi-Level Groundwater Well
 - ⊕ Monitoring Well
 - ⊕ Historical Groundwater Extraction Well
 - ⊕ Abandoned Groundwater Well
 - Approximate Property Line

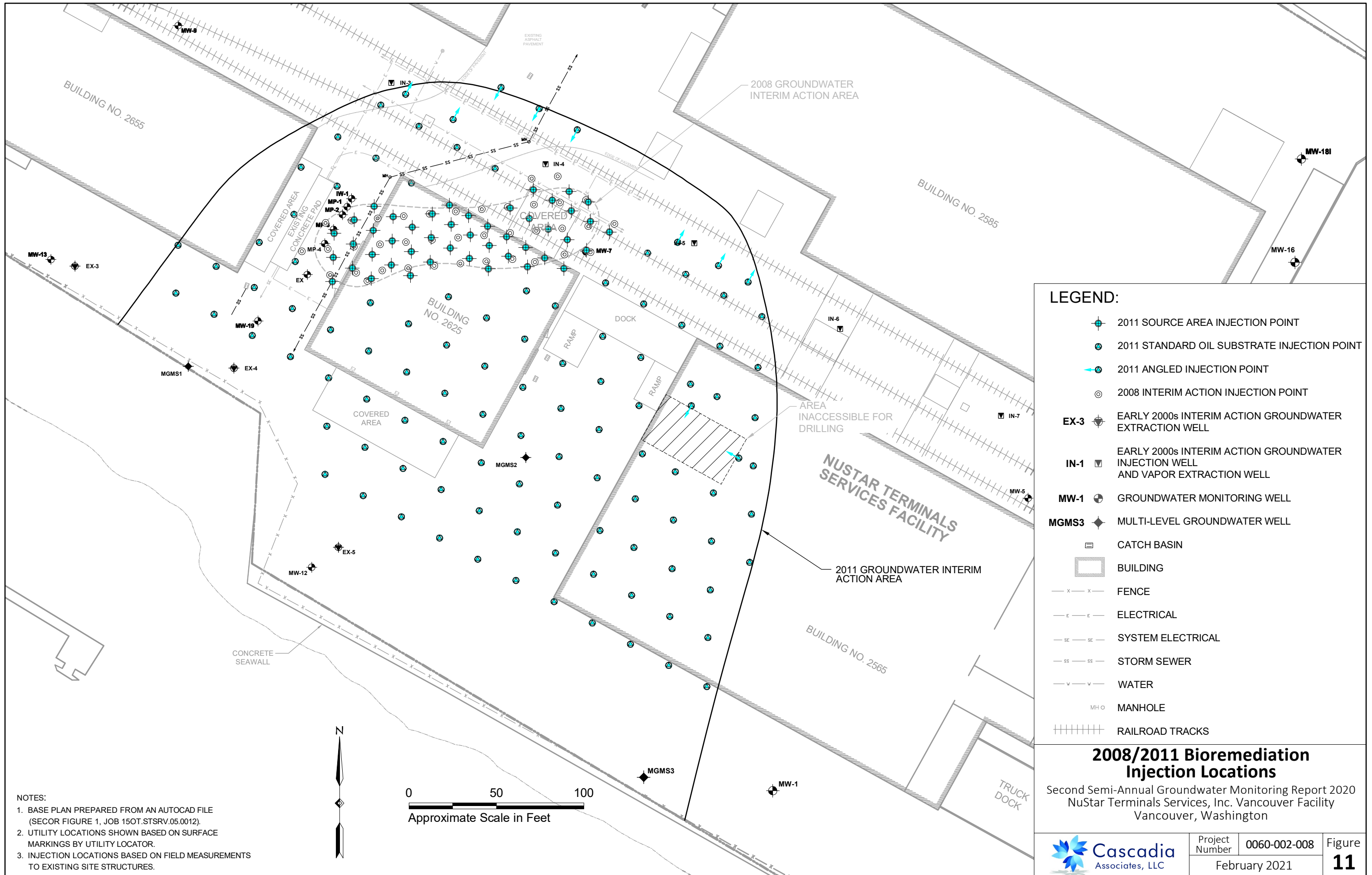
BLUE - Shallow zone concentration data
GREEN - Intermediate zone concentration data
ORANGE - Deep zone concentration data



Nitrate and Ammonia Concentrations in Groundwater (December 2020)
 Second Semi-Annual Groundwater Monitoring Event 2020
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington

NOTES:
 1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 150T.STSRV.05.0012).
 2. < = NOT DETECTED AT OR ABOVE THE SPECIFIED LABORATORY METHOD REPORTING LIMIT (MRL).
 3. NM = NOT MEASURED.







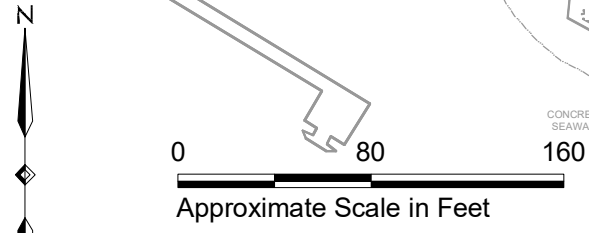
LEGEND:

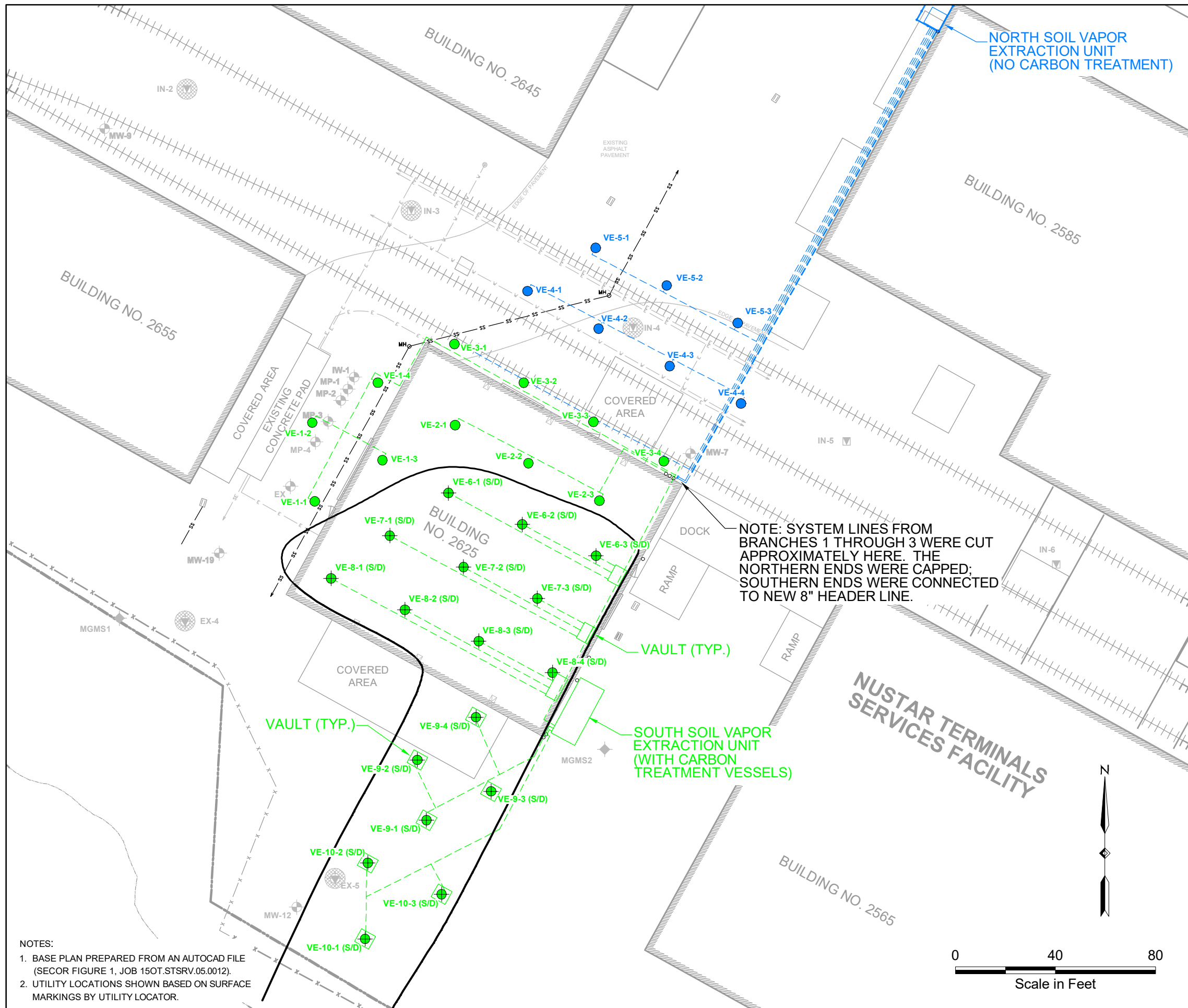
- ENHANCED BIOREMEDIATION INJECTION POINT
- EX-3 EARLY 2000s INTERIM ACTION GROUNDWATER EXTRACTION WELL
- MW-1 GROUNDWATER MONITORING WELL
- MGMS3 MULTI-LEVEL GROUNDWATER WELL
- CATCH BASIN
- BUILDING
- FENCE
- ELECTRICAL
- SYSTEM ELECTRICAL
- STORM SEWER
- WATER
- MANHOLE
- RAILROAD TRACKS

2016 Bioremediation Injection Locations
 Second Semi-Annual Groundwater Monitoring Report 2020
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington

NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 150T.STSRV.05.0012).
2. INJECTION LOCATIONS BASED ON FIELD MEASUREMENTS TO EXISTING SITE STRUCTURES.
3. NORTHWEST AREA INJECTION POINT LOCATIONS ARE APPROXIMATE. NUSTAR SOURCE AREA LOCATIONS ARE BASED ON GPS COORDINATES AND HAVE BEEN MODIFIED SLIGHTLY FROM THE INTERIM ACTION WORK PLAN TO AVOID ENCOUNTERING BURIED INFRASTRUCTURE.





LEGEND:

- VE-6-2 (S/D) 2011 WELL PAIR LOCATION (SHALLOW SCREENED FROM 5-15 FEET BGS) (DEEP SCREENED 15-25 FEET BGS)
- VE-1-2 2008 INTERIM ACTION VAPOR EXTRACTION WELL LOCATION
- VAPOR EXTRACTION WELL (2000-2005)
- EX-3 EARLY 2000s INTERIM ACTION GROUNDWATER EXTRACTION WELL
- IN-1 EARLY 2000s INTERIM ACTION GROUNDWATER INJECTION WELL AND VAPOR EXTRACTION WELL
- MW-1 GROUNDWATER MONITORING WELL
- MGMS3 MULTI-LEVEL GROUNDWATER WELL
- CATCH BASIN
- BUILDING
- FENCE
- ELECTRICAL
- SYSTEM ELECTRICAL
- STORM SEWER
- WATER
- MANHOLE
- RAILROAD TRACKS
- UNDERGROUND SOIL VAPOR EXTRACTION (SVE) PIPING
- BLUE** NORTH VAPOR EXTRACTION UNIT
- GREEN** SOUTH VAPOR EXTRACTION UNIT

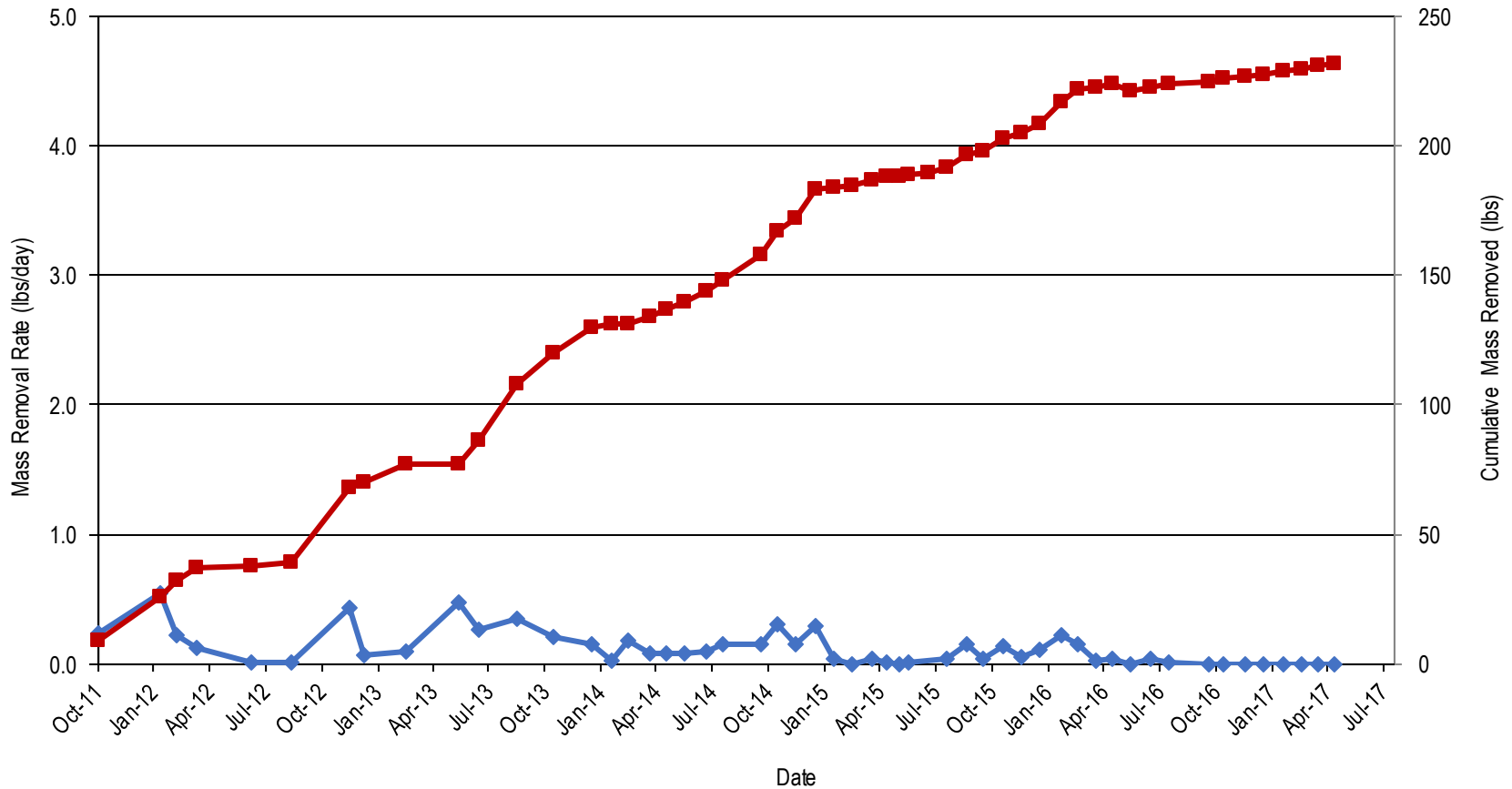
NOTE: SYSTEM LINES FROM BRANCHES 1 THROUGH 3 WERE CUT APPROXIMATELY HERE. THE NORTHERN ENDS WERE CAPPED; SOUTHERN ENDS WERE CONNECTED TO NEW 8" HEADER LINE.

NOTES:
 1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 150T.STSRV.05.0012).
 2. UTILITY LOCATIONS SHOWN BASED ON SURFACE MARKINGS BY UTILITY LOCATOR.

2011 SVE Layout

Second Semi-Annual Groundwater Monitoring Report 2020
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington

	Project Number	0060-002-008	Figure
	February 2021		13



Legend:

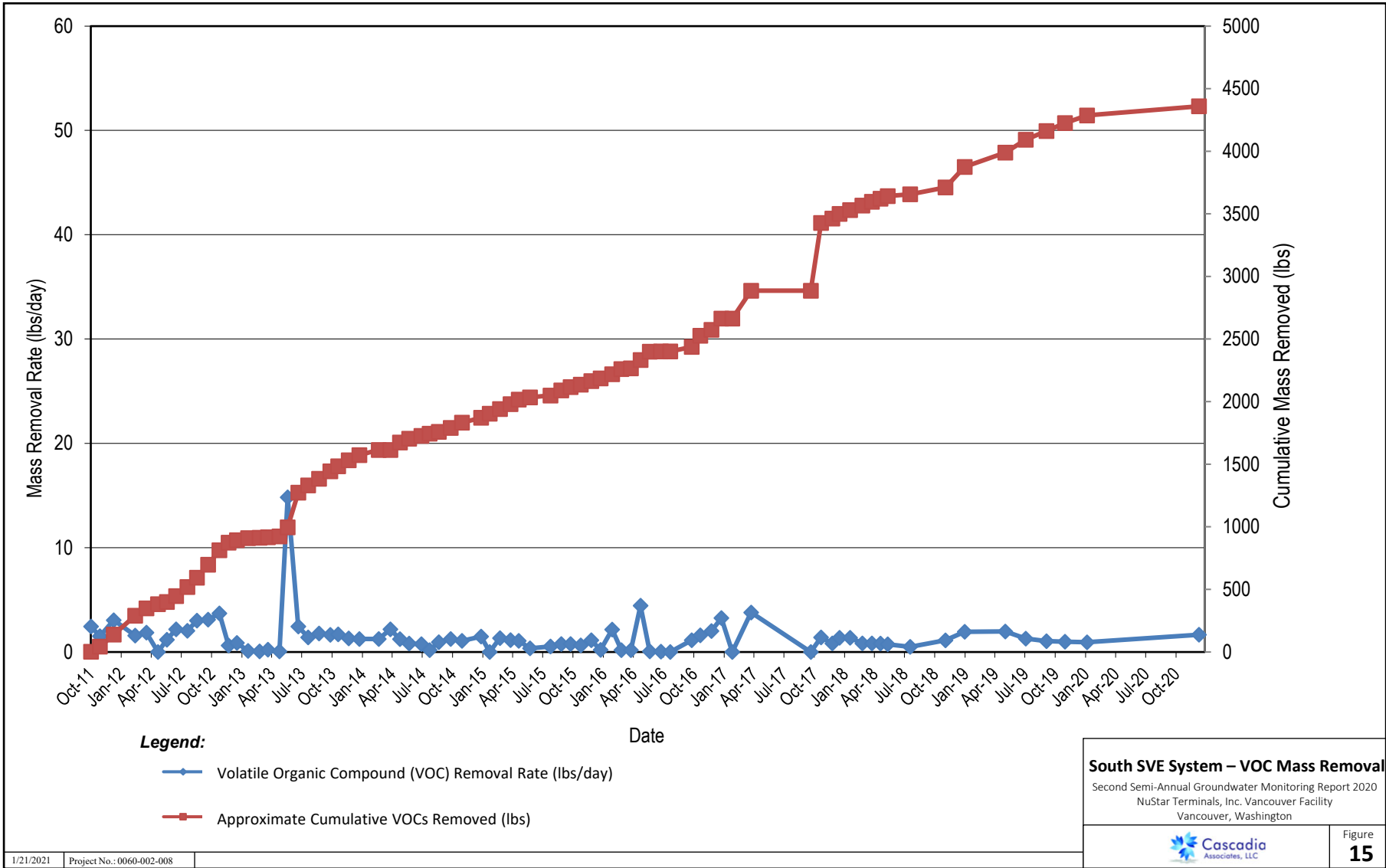
- ◆ Volatile Organic Compound (VOC) Removal Rate (lbs/day)
- Approximate Cumulative VOCs Removed (lbs)

North SVE System – VOC Mass Removal

Second Semi-Annual Groundwater Monitoring Report 2020
 NuStar Terminals, Inc. Vancouver Facility
 Vancouver, Washington



Figure
14



APPENDIX A
FIELD SAMPLING DATA SHEETS

Project: GWM 25A20
 Client: Nu Star Valve
 Sampler: 4w

Date: 10/5
 Permit:

Well ID:	Time:	DTP:	DTW:	Product Thickness:	Notes:
MGMS2-40	936		28.05		
MGMS2-60	950		26.88		
MGMS2-110	955		28.35		
MGMS2-132	1007		29.10		
MGMS1-43	1012		29.14		
MGMS1-60	1020		28.92		
MGMS1-110	1024		28.99		
MW-24d	1034		28.41		
MW-24i	1043		27.98		
si	1049		29.02		
MW-23i	1056		28.25		
MW-25i	1102		28.91		
MW-22i	1116		29.68		
MW-21i-105	1120		30.09		
MW-21-40	1124		29.32		
MW-32i	1138		30.13		
MW-18i	1144		29.74		
MW-20i	1147		29.85		
MW-19i	1151		28.61		
	1154		29.17		
	1158		28.96		
	1205		29.48		
MW-15	1211		33.81		
MW-240	1219		29.63		
MW-241	1222		29.42		

MW-1
 MW-12
 MW-19
 MW-1
 MW-5
 MW-7
 MW-9
 MW-13
 MW-17
 MW-14
 MW-10
 MW-26
 MW-32s
 MW-32i
 MW-25i
 MW-22i
 MW-21i
 MW-21i-105
 MW-21-40
 MW-32i
 MW-18i
 MW-20i
 MW-19i
 MW-16
 MW-18i
 MW-20i
 MW-19i

Project:
 Client:
 Sampler:

Date: 10-5
 Permit: 12397

MW-
 23i
 MW-8
 MW-F
 MW-2
 MW-6
 MW-3
 EW
 81
 52

Well ID:	Time:	DTP:	DTW:	Product Thickness:	Notes:
MGMS2-40	1231		29.74		
MGMS2-60	1242		28.29		
MGMS2-110	1249		29.98		
MGMS2-132	1302		29.68		
MGMS1-43	1310		27.94		
MGMS1-60	1317		29.78		
MGMS1-110	1327		26.90		
MW-24d	1339		28.95		
MW-24f	1341		29.53		
S-1	1406		28.47		MGMSB-48
MW-23f	1411		29.32		MGMSB-60
MW-25f	1415		29.25		MGMSB-132
MW-22f	1424		27.70		MGMS2-40
MW-21f-105	1427		29.46		MGMS2-60
MW-21f-40	1429		29.43		MGMS2-110
MW-32f	1434		29.18		MGMS2-132
MW-18f	1441		28.09		MGMSB-40
MW-20f	1443		28.38		MGMSB-60
MW-19f	1446		28.46		MGMSB-110
	1449		28.41		MGMSB-132

WELL GAGING DATA SHEET



Cascadia
Associates, LLC

Job Number:

Client: Nustar - Vancouver

Date: 12/7

Project: Q12 GWM

Sampler: JW/LW

Weather: Sun 40°

Time In/Out:

WATER LEVEL DATA

Well I.D.	Well Completion Zone	Time	Depth to Free Product (feet)	Depth to Water (feet)	Product Thickness (feet)	Depth to Well Bottom (feet)	Well Diameter (inches)	Notes/Other Remarks
MW-1	Shallow	956		27.74		35	2	
MW-2	Shallow	1024		29.16		40	2	
MW-3	Shallow	1004		27.84		35	2	
MW-5	Shallow	1038		27.97		38	2	
MW-6	Shallow	1019		27.24		35	2	
MW-7	Shallow	1137		28.01		40	4	
MW-8	Shallow	1002		28.02		40	4	
MW-9	Shallow	1142		28.12		40	4	
MW-10	Shallow	953		28.30		40	4	
MW-12	Shallow	951		26.72		40	4	
MW-13	Shallow	944		27.35		40	4	
MW-14	Shallow	944		28.22		40	4	
MW-15	Shallow	1014		33.38		40	4	
MW-16	Shallow	1007		28.11		40	4	
MW-17	Shallow	940		27.49		40	4	
MW-18i	Lower Intermediate	1049		28.28		79	2	
MW-19	Shallow	934		28.09		45	2	
MW-19i	Upper Intermediate	1030		28.61		60.5	2	
MW-20i	Upper Intermediate	1046		28.09		55.5	2	
MW-21i-40	Upper Intermediate	1059		28.99		50	2	
MW-21i-105	Lower Intermediate	1102		28.92		115.5	2	
MW-22i	Upper Intermediate	1110		29.25		55.5	2	
MW-23i	Upper Intermediate	1117		28.53		65.5	2	
MW-24i	Intermediate	1231		28.16		64.5	2	
MW-24d	Deep Zone (Troutdale)	1128		28.80		230	2	
MW-25i	Intermediate	1114		28.42		60	2	
MW-26	Shallow	956		28.09		42	2	
EW-1	Shallow	1010		26.18		32	2	
S-1	Upper Intermediate	1120		27.55		74	2	
S-2	Shallow	947		28.46		50	2	
MW-18i	Lower Intermediate					79	2	
MW-30i	Lower Intermediate					85	2	Abandoned

MP-1

1149

28.22

WELL GAGING DATA SHEET

MW-31i	Lower Intermediate				85	2	Abandoned
MW-32s	Shallow	1128		29.01	33	2	
MW-32i	Upper Intermediate	1105		29.34	70	2	
MW-E	Shallow				35	2	
MW-F	Shallow	1023		Dry	36.59	2	* Dedicated pump
MW-G	Shallow				37	2	
MGMS1-43	Shallow	1104		28.02	116	2	
MGMS1-60	Upper Intermediate	1102		27.75	116	2	
MGMS1-110	Deep	1059		27.81	116	2	
MGMS2-40	Shallow	1046		27.62	140	2	
MGMS2-60	Upper Intermediate	1054		27.94	140	2	
MGMS2-110	Deep	1051		27.86	140	2	
MGMS2-132	Deep	1049		28.00	140	2	
MGMS3-40	Shallow	1119		26.69	140	2	
MGMS3-60	Upper Intermediate	1115		26.94	140	2	
MGMS3-101	Deep	1113		26.68	140	2	
MGMS3-132	Deep	1110		26.95	140	2	

WELL MONITORING DATA SHEET

Cascadia Associates, LLC <i>New Year Name</i>	Well ID: <u>MW-3</u>	Job Number:
	Client: NuStar	Date: <u>12/8</u>
	Project: <u>Portland Terminal 25A 2020 GWM 400</u>	Sampler:
	Weather: <u>PT Cloud 40</u>	Time In/Out: <u>740 830</u>

WELL DATA

Monument Type:	Flush-mount/Stick-up <i>(circled)</i>	Well Diameter:	Depth to Free Product:	
	Other:	Well Depth: <u>-</u>	Free Product Thickness:	<u>-</u>
Monument Condition:	<u>Good</u>	Depth to Water: <u>28.86</u>	Water Column Length:	
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Screened Interval:	Purge Volume:	<u>-</u>

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):
 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		<u>BP</u>			Pump Intake Depth:		<u>MS</u>		NEW / DEDICATED	
Sampling Method:		<u>Remiflow</u>			Tubing Material & Type:		<u>SB</u>			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
752			28.86	.2	7.8	7.74	662	70.4	1	1
755					6.97	9.61	391	16.62		
758						11.3	39	12.11	69.2	
801					6.47	19.4	348	8.4	81.8	
804					4.4	11.97	345	8.51	85.7	
807					6.43	12	3	0	91.8	
810					6.4	12.4	1	8.2	9.3	

PURGING DATA

Sample ID:	<u>MW 810</u>	Sampling Flow Rate:	<u>28.86</u>	Analytical Laboratory:	<u>Apex NL</u>
Sample Time:		Final Depth to Water:		Did Well Dewater:	
No. of Containers/Typ	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
<u>3x4</u>	<u>HCL</u>	<u>VOC</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>1x250</u>	<u>H2S</u>	<u>NO2/3</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>1x250</u>	<u>-</u>	<u>NH3</u>	<u>-</u>	<u>-</u>	<u>-</u>

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID: <u>MW-1</u>	Job Number: <u>7</u>
	Client: <u>NuStar</u>	Date: <u>12/8</u>
	Project: <u>Vancouver Terminal 400 2020 GWM</u>	Sampler: <u>965</u>
	Weather: <u>PT Sun</u>	Time In/Out: <u>84 915</u>

WELL DATA

Monument Type: <u>Flush-mount/Stick-up</u>	Well Diameter: <u>2"</u>	Depth to Free Product: <u>-</u>
Other: <u>9800</u>	Well Depth: <u>-</u>	Free Product Thickness: <u>-</u>
Monument Condition: <u>9800</u>	Depth to Water: <u>792</u>	Water Column Length: <u>-</u>
Well Cap Lock Present: <u>Yes</u> No	Screened Interval: <u>-</u>	Purge Volume: <u>-</u>

Comments: _____

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method: <u>BP</u>				Pump Intake Depth: <u>Mid Screen</u>						
Sampling Method: <u>long flow</u>				Tubing Material & Type: <u>SB</u>				NEW / <u>DEDICATED</u>		
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
849			27.92	.25	7.34	11.42	1743	21.94	151.2	clear
852			28.15		7.62	13.14	1180	15		
855			28.24		7.64	14.26	30	5.76	0	
858			28.30		7.62	14.4	3245	1	17	
901			28.34		7.61	14.4	1	21		
904			28.39		7.59	14.54	31	4.10	149.0	

PURGING DATA

Sample ID: <u>MW-1</u>	Sampling Flow Rate: <u>28</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>904</u>	Final Depth to Water: <u>792</u>	Did Well Dewater: <u>No</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VO	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x250	—	NO3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID: <u>MW-12</u>	Job Number:
	Client: NuStar	Date: <u>12/8</u>
	Project: <u>Portland Terminal 40</u> 2020 GWM	Sampler: <u>4w</u>
	Weather: <u>Cloudy 40°</u>	Time In/Out: <u>9:20-10:10</u>

WELL DATA

Monument Type: <u>Flush-mount/Stick-up</u> Other: _____	Well Diameter: <u>4"</u>	Depth to Free Product: <u>-</u>
Monument Condition: <u>good</u>	Well Depth: <u>-</u>	Free Product Thickness: <u>-</u>
Well Cap Lock Present: <u>Yes</u> No	Depth to Water: <u>26.76</u>	Water Column Length: <u>-</u>
Screened Interval: _____	Purge Volume: <u>-</u>	

Comments: _____

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method: <u>BP</u>		Pump Intake Depth: <u>Mid screen</u>								
Sampling Method: <u>downflow</u>		Tubing Material & Type: <u>SB</u>								
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
927			26.76	.25	7.54	12.73	2710	11.27	128.0	clear
930			↓	↓	6.99	13.20	1781	5.36	128.6	↓
933			↓	↓	6.42	14.10	1160	4.02	129.4	↓
936			↓	↓	6.10	14.66	857	2.91	124.2	↓
939			↓	↓	6.07	14.75	840	2.46	121.3	↓
942			↓	↓	6.05	14.76	829	2.34	120.9	↓


PURGING DATA

Sample ID: <u>MW-12</u>	Sampling Flow Rate: <u>.25</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: _____	Final Depth to Water: <u>26.76</u>	Did Well Dewater: <u>No</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	—	—	—	—
2x40	HCl	RS6	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x250	—	NH3	—	—	—	—
3x40	HCl	VOC	—	—	—	MW-12 Dup
2x40	HCl	RS6	—	—	—	—

NOTES/ADDITIONAL COMMENTS

1x250	H2SO4	NO2/3	—	—	—	↓
1x250	—	NH3	—	—	—	↓

WELL MONITORING DATA SHEET

	Well ID: <u>MW-19</u>	Job Number:
	Client: NuStar	Date: <u>12/8</u>
	Project: <u>Portland Terminal 2020 GWM</u>	Sampler: <u>fw</u>
	Weather: <u>1st Cloudy 45</u>	Time In/Out: <u>1010-1050</u>

WELL DATA

Monument Type: <u>Flush-mount/Stick-up</u> Other: _____	Well Diameter: <u>2"</u>	Depth to Free Product: <u>—</u>
Monument Condition: <u>good</u>	Well Depth: <u>—</u>	Free Product Thickness: <u>—</u>
Well Cap Lock Present: <u>Yes</u> No	Depth to Water: <u>28.12</u>	Water Column Length: <u>—</u>
Comments: _____	Screened Interval: <u>—</u>	Purge Volume: <u>—</u>

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):
 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:		<u>SP</u>		Pump Intake Depth:		<u>MS</u>		NEW		<u>DEDICATED</u>
Sampling Method:		<u>low flow</u>		Tubing Material & Type:		<u>5/8</u>				
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1015			<u>28.12</u>	<u>.25</u>	<u>6.32</u>	<u>11.88</u>	<u>915</u>	<u>6.58</u>	<u>117.0</u>	<u>clear</u>
1018					<u>6.50</u>	<u>12.25</u>	<u>1004</u>	<u>5.42</u>	<u>113.6</u>	
1021					<u>6.82</u>	<u>13.39</u>	<u>2062</u>	<u>4.33</u>	<u>106.8</u>	
1024					<u>6.82</u>	<u>13.75</u>	<u>2183</u>	<u>3.82</u>	<u>104.0</u>	
1027					<u>6.82</u>	<u>13.88</u>	<u>2237</u>	<u>2.51</u>	<u>105.4</u>	
1030					<u>6.83</u>	<u>13.93</u>	<u>2249</u>	<u>2.40</u>	<u>106.0</u>	
1033					<u>6.83</u>	<u>13.96</u>	<u>2256</u>	<u>2.36</u>	<u>106.3</u>	<u>↓</u>


PURGING DATA

Sample ID: <u>MW-19</u>	Sampling Flow Rate: <u>.25</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1033</u>	Final Depth to Water: <u>28.12</u>	Did Well Dewater: <u>No</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<u>3x40</u>	<u>HCL</u>	<u>VOC</u>	—	—	—	—
<u>2x40</u>	<u>HCL</u>	<u>Rsk</u>	—	—	—	—
<u>1x250</u>	<u>H2SO4</u>	<u>NO2/3</u>	—	—	—	—
<u>1x250</u>	—	<u>NH3</u>	—	—	—	—
<u>3x40</u>	<u>HCL</u>	<u>VOC</u>	—	—	—	<u>MW-19 Dup</u>
<u>2x40</u>	<u>HCL</u>	<u>Rsk</u>	—	—	—	—

NOTES/ADDITIONAL COMMENTS

<u>1x250</u>	<u>H2SO4</u>	<u>NO2/3</u>	—	—	—	—
<u>1x250</u>	—	<u>NH3</u>	—	—	—	—

WELL MONITORING DATA SHEET

 <p>Cascadia Associates, LLC</p>	Well ID: <u>MW-13</u>	Job Number:
	Client: NuStar	Date: <u>12/8</u>
	Project: Portland Terminal <u>2020 GWM</u>	Sampler: <u>AGS</u>
	Weather: <u>PT Sun 50°</u>	Time In/Out: <u>1100 - 1145</u>

WELL DATA

Monument Type:	Flush-mount/Stick-up <i>Other:</i>	Well Diameter: <u>4"</u>	Depth to Free Product: <u>-</u>
Monument Condition:	<u>good</u>	Well Depth: <u>-</u>	Free Product Thickness: <u>-</u>
Well Cap Lock Present:	<u>Yes</u> No	Depth to Water: <u>27.82</u>	Water Column Length: <u>-</u>
Comments:		Screened Interval: <u>-</u>	Purge Volume: <u>-</u>

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		<u>BP low flow</u>			Pump Intake Depth:		<u>M5 SB</u>		NEW / <u>DEDICATED</u>	
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
<u>1112</u>			<u>27.82</u>	<u>.25</u>	<u>6.87</u>	<u>11.62</u>	<u>2000</u>	<u>7.62</u>	<u>107.1</u>	<u>cloudy</u>
<u>1115</u>					<u>6.92</u>	<u>11.91</u>	<u>1591</u>	<u>5.25</u>	<u>70.3</u>	<u>clear</u>
<u>1118</u>					<u>6.82</u>	<u>12.64</u>	<u>1285</u>	<u>4.63</u>	<u>1.6</u>	
<u>1121</u>					<u>6.68</u>	<u>14.03</u>	<u>1090</u>	<u>3.06</u>	<u>-72.4</u>	
<u>1124</u>					<u>6.65</u>	<u>14.52</u>	<u>1069</u>	<u>2.47</u>	<u>-87.5</u>	
<u>1127</u>					<u>6.64</u>	<u>14.64</u>	<u>1056</u>	<u>2.25</u>	<u>-94.3</u>	
<u>1130</u>					<u>6.62</u>	<u>14.70</u>	<u>1035</u>	<u>2.11</u>	<u>-100.5</u>	

PURGING DATA

Sample ID: <u>MW-13</u>	Sampling Flow Rate: <u>.25</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1130</u>	Final Depth to Water: <u>27.82</u>	Did Well Dewater: <u>No</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<u>3x40</u>	<u>HCl</u>	<u>VOC</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>2x40</u>	<u>HCl</u>	<u>RS&</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>1x250</u>	<u>H2SO4</u>	<u>NO2/3</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>1x250</u>	<u>-</u>	<u>NHS</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

 Cascadia Associates, LLC <i>Vanc</i>	Well ID: <u>MW-17</u>	Job Number: <u> </u>
	Client: <u>NuStar</u>	Date: <u>12/8</u>
	Project: <u>Portland Terminal 40 2020 GWM</u>	Sampler: <u>403</u>
	Weather: <u>Pt Sun 50°</u>	Time In/Out: <u>1150-3</u>

WELL DATA

Monument Type:	Flush-mount/Stick-up <i>Other:</i>	Well Diameter: <u>4"</u>	Depth to Free Product: <u> </u>
Monument Condition:	<u>good</u>	Well Depth: <u> </u>	Free Product Thickness: <u> </u>
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth to Water: <u>27.38</u>	Water Column Length: <u> </u>
		Screened Interval: <u> </u>	Purge Volume: <u> </u>

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method: <u>BP</u>		Pump Intake Depth: <u> </u>								
Sampling Method: <u>downflow</u>		Tubing Material & Type: <u>MS SB</u>								
		NEW / <u>DEDICATED</u>								
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
<u>1200</u>			<u>27.38</u>	<u>.25</u>	<u>5.82</u>	<u>14.72</u>	<u>969</u>	<u>5.07</u>	<u>-385</u>	<u>clear</u>
<u>1203</u>			<u>27.45</u>		<u>5.69</u>	<u>14.29</u>	<u>928</u>	<u>3.66</u>	<u>-3.4</u>	
<u>1206</u>			↓	↓	<u>5.79</u>	<u>14.10</u>	<u>827</u>	<u>2.85</u>	<u>21.3</u>	
<u>1209</u>			↓	↓	<u>5.81</u>	<u>14.02</u>	<u>803</u>	<u>2.23</u>	<u>37.0</u>	
<u>1212</u>			↓	↓	<u>5.83</u>	<u>14.07</u>	<u>780</u>	<u>1.90</u>	<u>57.6</u>	
<u>1215</u>			↓	↓	<u>5.84</u>	<u>14.04</u>	<u>762</u>	<u>1.81</u>	<u>61.3</u>	

PURGING DATA

Sample ID: <u>MW-17</u>	Sampling Flow Rate: <u>.25</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1215</u>	Final Depth to Water: <u>7.45</u>	Did Well Dewater: <u>No</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<u>3x40</u>	<u>HCl</u>	<u>VOC</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u>1x250</u>	<u>H2SO4</u>	<u>NO2/3</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u>1x250</u>	<u> </u>	<u>NH3</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	5-1	Job Number:	
Client:	NuStar	Date:	12/8
Project:	Portland Terminal 40 2020 GWM	Sampler:	JD
Weather:	Sun 50°	Time In/Out:	1235-1330

WELL DATA

Monument Type:	Flush-mount/stick-up Other:	Well Diameter:	2"	Depth to Free Product:	—
Monument Condition:	gove	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No	Depth to Water:	27.11	Water Column Length:	—
Comments:		Screened Interval:	—	Purge Volume:	—

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA

Purge Method:	BP				Pump Intake Depth:	MS				
Sampling Method:	low flow				Tubing Material & Type:	SB		NEW / <u>DEDICATED</u>		
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1247			27.11	.2	6.51	12.24	60	5.49	69.0	cl cur
1250					6.54	11.54	544	3.81	3.	
1257					6.60	11.16	407	5.67	7	
1300					6.71	12.03	208	6.69	84.1	
1303					6.72	12.31	168	5.12	83.4	
1306					6.73	12.46	156	4.90	85.1	
1309					6.72	12.57	147	4.34	87.1	
1312					6.71	12.65	142	4.21	87.5	

PURGING DATA

Sample ID:	5-1	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1312	Final Depth to Water:	27.15	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x250	—	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

comp
adj -

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	<u>S-2</u>	Job Number:	
Client:	NuStar	Date:	<u>12/8</u>
Project:	<u>Van Portland Terminal #10</u> 2020 GWM	Sampler:	<u>120</u>
Weather:	<u>Sun 50°</u>	Time In/Out:	<u>1330 1415</u>

WELL DATA

Monument Type:	<u>Flush-mount/Stick-up</u> Other:	Well Diameter:	<u>2"</u>	Depth to Free Product:	<u>-</u>
Monument Condition:	<u>good</u>	Well Depth:	<u>-</u>	Free Product Thickness:	<u>-</u>
Well Cap Lock Present:	<u>Yes</u> No	Depth to Water:	<u>27.79</u>	Water Column Length:	<u>-</u>
Comments:		Screened Interval:	<u>-</u>	Purge Volume:	<u>-</u>

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA


Purge Method:		<u>BP</u>			Pump Intake Depth:		<u>ms</u>			
Sampling Method:		<u>low flow</u>			Tubing Material & Type:		<u>SB</u>		NEW // <u>DEDICATED</u>	
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
<u>1335</u>			<u>27.79</u>	<u>.25</u>	<u>6.56</u>	<u>13.26</u>	<u>556</u>	<u>11.61</u>	<u>113.3</u>	<u>cloudy</u>
<u>1338</u>			<u>27.86</u>		<u>6.67</u>	<u>13.07</u>	<u>958</u>	<u>7.31</u>	<u>113.4</u>	
<u>1341</u>			<u>27.89</u>		<u>6.50</u>	<u>13.14</u>	<u>1487</u>	<u>4.92</u>	<u>82.0</u>	
<u>1344</u>			<u>27.95</u>		<u>6.52</u>	<u>13.21</u>	<u>1545</u>	<u>2.44</u>	<u>66.9</u>	
<u>1347</u>			<u>28.00</u>		<u>6.53</u>	<u>13.21</u>	<u>1556</u>	<u>2.19</u>	<u>59.6</u>	
<u>1350</u>			<u>28.04</u>		<u>6.53</u>	<u>13.18</u>	<u>1562</u>	<u>2.07</u>	<u>55.2</u>	

PURGING DATA

Sample ID:	<u>S-2</u>	Sampling Flow Rate:	<u>.25</u>	Analytical Laboratory:	<u>Apex</u>	
Sample Time:	<u>1350</u>	Final Depth to Water:	<u>28.11</u>	Did Well Dewater:	<u>No</u>	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<u>3x40</u>	<u>HCl</u>	<u>VOC</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
<u>1x250</u>	<u>H2SO4</u>	<u>NO2/3</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
<u>1x250</u>	<u>---</u>	<u>NH3</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID: <u>MW-9</u>	Job Number:
	Client: <u>NuStar</u>	Date: <u>12/9</u>
	Project: <u>Portland Terminal 482 2020 GWM</u>	Sampler: <u>1W</u>
	Weather: <u>Cloudy 40°</u>	Time In/Out: <u>7:40</u>

WELL DATA

Monument Type:	<input checked="" type="radio"/> Flush-mount/Stick-up	Well Diameter:	<u>4"</u>	Depth to Free Product:	—
	<input type="radio"/> Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	<u>Good</u>	Depth to Water:	<u>28.23</u>	Water Column Length:	—
Well Cap Lock Present:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method: <u>BP</u>			Pump Intake Depth:			MS		NEW / <u>DEDICATED</u>		
Sampling Method: <u>low flow</u>			Tubing Material & Type:			SB				
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
<u>751</u>			<u>28.23</u>	<u>.2</u>	<u>7.16</u>	<u>10.67</u>	<u>1645</u>	<u>27.54</u>	<u>162.1</u>	<u>clear</u>
<u>754</u>			↓	↓	<u>6.64</u>	<u>11.74</u>	<u>1972</u>	<u>9.21</u>	<u>160.8</u>	
<u>757</u>			↓	↓	<u>6.82</u>	<u>12.7</u>	<u>2187</u>	<u>4.52</u>	<u>157.4</u>	↓
<u>800</u>			↓	↓	<u>6.27</u>	<u>12.70</u>	<u>2273</u>	<u>2.37</u>	<u>154.1</u>	
<u>803</u>			↓	↓	<u>6.21</u>	<u>12.81</u>	<u>2246</u>	<u>2.16</u>	<u>151.7</u>	
<u>806</u>			↓	↓	<u>6.16</u>	<u>12.84</u>	<u>2167</u>	<u>2.08</u>	<u>149.8</u>	↓

PURGING DATA

Sample ID: <u>MW-9</u>	Sampling Flow Rate: <u>.2</u>	Analytical Laboratory: <u>Ap</u>				
Sample Time: <u>806</u>	Final Depth to Water: <u>28.23</u>	Did Well Dewater: <u>No</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<u>3x40</u>	<u>Hce</u>	<u>VOC</u>	—	—	—	—
<u>1x250</u>	<u>H2504</u>	<u>NO2/3</u>	—	—	—	—
<u>1x250</u>	—	<u>NH3</u>	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

 Cascadia Associates, LLC <i>Name</i>	Well ID:	MW-7	Job Number:	
	Client:	NuStar	Date:	12/9
	Project:	Portland Terminal 40 2020 GWM	Sampler:	4W
	Weather:	Cloudy 45	Time In/Out:	820

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	4"	Depth to Free Product:	
	Other:	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	good	Depth to Water:	28.08	Water Column Length:	-
Well Cap Lock Present:	Yes No	Screened Interval:	-	Purge Volume:	

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:		low flow		Pump Intake Depth:		NEW / DEDICATED				
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
830			28.08	.25	6.22	11.56	1855	13.26	137.3	clear
833			28.15		6.54	11.41	1650	4.78	137.3	
836			28.21		6.68	11.59	1411	3.17	39.4	
839			28.24		6.68	12.31	1426	.8	140.1	
842					6.7	12.99	1414	2.71	140.0	
845					6.67	13.02	1413	2.62	139.7	
848					6.67	13.05	1413		139.5	

PURGING DATA

Sample ID:	MW-7	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	848	Final Depth to Water:	28.27	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x 40	HCl	VO	---	---	---	---
2x 40	HCl	RSh	---	---	---	---
1x 250	H2SO4	NH3	---	---	---	---
1x 250	-	NH3	---	---	---	---
3x 40	HCl	VO	---	---	---	MW-7 Deep
2x 40	HCl	RSh	---	---	---	---

NOTES/ADDITIONAL COMMENTS

1x 250	H2SO4	NH3	---	---	---	---
1x 250	-	NH3	---	---	---	---

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Name

Well ID:	MW-6	Job Number:	
Client:	NuStar	Date:	12/9
Project:	Portland Terminal 400 2020 GWM	Sampler:	4/23
Weather:	Cloudy 50°	Time In/Out:	1925-1020

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	27.39	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	27.39	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:		Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:	BP low flow				Pump Intake Depth:	MS				
Sampling Method:					Tubing Material & Type:	SB		NEW (DEDICATED)		
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
934			27.39	.2	6.56	11.96	625	8.24	-3.9	clear
937					6.07	12.36	561	5.87	-25.2	
940					4.11	12.56	444	4.96	-28.9	
950					6.37	12.73	439	6.91	-22.9	
953					6.26	13.11	430	5.35	-21.8	
956					6.22	13.39	417	3.09	-23.1	
959					6.22	13.45	410	2.76	-24.6	
1002					6.21	13.47	401	2.64	-25.1	

rump transfer

PURGING DATA

Sample ID:	MW-6	Sampling Flow Rate:	.2	Analytical Laboratory:	Apco	
Sample Time:	1002	Final Depth to Water:	27.35	Did Well Dewater:	N	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	NO ₂	—	—	—	—
1x250	H ₂ SO ₄	NO ₃ /3	—	—	—	—
1x250	—	NH ₃	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

June

Well ID:	<i>MW-11</i>	Job Number:	
Client:	NuStar	Date:	<i>12/9</i>
Project:	<i>Portland Terminal 2020 GWM</i>	Sampler:	
Weather:	<i>Cloudy</i>	Time In/Out:	<i>1025 113</i>

WELL DATA

Monument Type:	<input checked="" type="radio"/> Flush-mount/Stick-up <input type="radio"/> Other:	Well Diameter:	<i>2"</i>	Depth to Free Product:	<i>✓</i>
Monument Condition:	<i>good</i>	Well Depth:	<i>—</i>	Free Product Thickness:	<i>—</i>
Well Cap Lock Present:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Depth to Water:	<i>2' 27"</i>	Water Column Length:	<i>—</i>
Comments:		Screened Interval:	<i>—</i>	Purge Volume:	<i>—</i>

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA

Purge Method:	<i>BP low flow</i>				Pump Intake Depth:						
Sampling Method:					Tubing Material & Type:	<i>SB</i>		<i>MS</i>			<input checked="" type="radio"/> NEW / <input type="radio"/> DEDICATED
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color	Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV		
<i>1037</i>			<i>29.27</i>	<i>.15</i>	<i>6.40</i>	<i>12.49</i>	<i>352</i>	<i>4.34</i>	<i>-20.9</i>		
<i>1040</i>			<i> </i>	<i> </i>	<i>6.42</i>	<i>12.35</i>	<i>360</i>	<i>3.70</i>	<i>-21.0</i>		
<i>1043</i>			<i> </i>	<i> </i>	<i>6.47</i>	<i>12.39</i>	<i>365</i>	<i>3.04</i>	<i>-19.7</i>		
<i>1046</i>			<i> </i>	<i> </i>	<i>6.51</i>	<i>12.50</i>	<i>367</i>	<i>2.79</i>	<i>-19.6</i>		
<i>1049</i>			<i> </i>	<i> </i>	<i>6.54</i>	<i>12.52</i>	<i>368</i>	<i>2.65</i>	<i>-19.4</i>		
<i>1052</i>			<i> </i>	<i> </i>	<i>6.56</i>	<i>12.53</i>	<i>371</i>	<i>2.59</i>	<i>-20.1</i>		<i>cloudy</i>


PURGING DATA

Sample ID:	<i>MW-21i-105</i>	Sampling Flow Rate:	<i>15</i>	Analytical Laboratory:	<i>Apex</i>	
Sample Time:	<i>1052</i>	Final Depth to Water:	<i>29 7</i>	Did Well Dewater:	<i>NO</i>	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<i>3x 40</i>	<i>HCl</i>	<i>VOC</i>	<i>—</i>	<i>—</i>	<i>—</i>	<i>—</i>
<i>1x 250</i>	<i>H2SO4</i>	<i>NO2/3</i>				
<i>1x 250</i>	<i>—</i>	<i>NH3</i>				

NOTES/ADDITIONAL COMMENTS

Sediment in sample

WELL MONITORING DATA SHEET

 Cascadia Associates, LLC	Well ID: <u>MW-22i</u>	Job Number:		
	Client: NuStar	Date: <u>12/9</u>		
	Project: Portland Terminal 2020 GWM	Sampler: <u>AL</u>		
	Weather: <u>cloudy</u>	Time In/Out: <u>1730 - 1205</u>		

WELL DATA

Monument Type: <u>Flush-mount/Stick-up</u> <small>Other:</small>	Well Diameter: <u>2"</u>	Depth to Free Product: <u>—</u>
Monument Condition: <u>good</u>	Well Depth: <u>—</u>	Free Product Thickness: <u>—</u>
Well Cap Lock Present: <u>Yes</u> No	Depth to Water: <u>29.14</u>	Water Column Length: <u>—</u>
	Screened Interval: <u>—</u>	Purge Volume: <u>—</u>

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		<u>BP</u>			Pump Intake Depth:		<u>MS</u>		NEW / <u>DEDICATED</u>	
Sampling Method:		<u>low flow</u>			Tubing Material & Type:		<u>SB</u>			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1136			29.14	.25	5.40	12.74	312	8.16	60.4	clear
1139			↓	↓	5.81	13.16	296	4.26	70.2	↓
1142			↓	↓	5.95	13.58	302	2.61	76.7	↓
1145			↓	↓	5.86	13.72	336	1.90	82.1	↓
1148			↓	↓	5.94	13.76	342	1.81	83.0	↓
1151			↓	↓	5.94	13.79	345	1.61	83.5	↓

PURGING DATA

Sample ID: <u>MW-22i</u>	Sampling Flow Rate: <u>.25</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1151</u>	Final Depth to Water: <u>29.14</u>	Did Well Dewater: <u>No</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<u>3 x 40</u>	<u>HCl</u>	<u>VOC</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
<u>1 x 250</u>	<u>H2SO4</u>	<u>NO2/3</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
<u>1 x 250</u>	<u>—</u>	<u>NH3</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID: <u>MW-10</u>	Job Number:
	Client: <u>NuStar</u>	Date: <u>12/9</u>
	Project: <u>Vul Portland Terminal #4 2020 GWM</u>	Sampler: <u>AW</u>
	Weather: <u>Pt Rain</u>	Time In/Out: <u>1205-</u>

WELL DATA

Monument Type: <u>Flush-mount/Stick-up</u> <u>Other:</u>	Well Diameter: <u>4"</u>	Depth to Free Product: <u>-</u>
Monument Condition: <u>Good</u>	Well Depth: <u>-</u>	Free Product Thickness: <u>-</u>
Well Cap Lock Present: <u>Yes</u> <input checked="" type="checkbox"/> <u>No</u> <input type="checkbox"/>	Depth to Water: <u>28.42</u>	Water Column Length: <u>-</u>
Comments:	Screened Interval: <u>-</u>	Purge Volume: <u>-</u>

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		<u>BP</u>		Pump Intake Depth:		<u>M5</u>		Sampling Method:		<u>long flow</u>		Tubing Material & Type:		<u>3B</u>		NEW		<u>DEDICATED</u>	
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color		Other Remarks							
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV										
1213			28.42	.25	4.11	13.05	1850	4.49	44.1	clear									
1216			28.58	.2	5.96	13.54	2797	3.36	58.3										
1219			28.65		6.10	13.74	3060	2.76	68.0										
1222			28.91		6.14	13.91	3245	2.01	77.6										
1225			29.05		6.16	13.83	3346	1.35	84.5										
1228			29.10		6.17	13.70	3361	1.21	89.8										
1231			29.16		6.18	13.67	3370	1.16	91.5										

PURGING DATA

Sample ID: <u>MW-10</u>	Sampling Flow Rate: <u>2</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1231</u>	Final Depth to Water: <u>29.79</u>	Did Well Dewater: <u>NO</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<u>3x40</u>	<u>HCl</u>	<u>VOC</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>1x250</u>	<u>H2SO4</u>	<u>NO2/3</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>1x250</u>	<u>-</u>	<u>NH3</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID: <u>MW-14</u>	Job Number: _____
	Client: <u>NuStar</u>	Date: <u>12/19</u>
	Project: <u>Portland Terminal 2SA2020 GWM</u>	Sampler: <u>463</u>
	Weather: <u>Rain</u>	Time In/Out: <u>12:45</u>

WELL DATA

Monument Type: <u>Flush-mount/Stick-up</u>	Well Diameter: <u>4"</u>	Depth to Free Product: _____
Other: _____	Well Depth: _____	Free Product Thickness: _____
Monument Condition: <u>good</u>	Depth to Water: <u>28.23</u>	Water Column Length: _____
Well Cap Lock Present: <u>Yes</u> No	Screened Interval: _____	Purge Volume: _____

Comments: _____

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method: <u>BT</u>				Pump Intake Depth: _____		Tubing Material & Type: <u>MS SB</u>		NEW <u>DEDICATED</u>		
Sampling Method: <u>low flow</u>										
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1253			28.23	.1	6.52	13.14	3156	3.40	107.9	clear
1256			28.23	.25	6.74	13.04	2891	2.43	106.5	
1259					6.60	13.43	2592	2.23	100.4	
1302					6.51	13.92	2413	1.96	97.4	
1305					6.55	14.35	2320	1.30	96.1	
1308					6.54	14.40	2295	1.18	94.9	
1311					6.55	14.43	2280	1.05	94.4	

PURGING DATA

Sample ID: <u>MW-14</u>	Sampling Flow Rate: <u>.25</u>	Analytical Laboratory: <u>Kyber</u>				
Sample Time: <u>1311</u>	Final Depth to Water: _____	Did Well Dewater: <u>No</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<u>3x40</u>	<u>VOC</u>	<u>HCL</u>	_____	_____	_____	_____
<u>2x40</u>	<u>RSL</u>	<u>HCL</u>	_____	_____	_____	_____
<u>1x250</u>	<u>H2SO4</u>	<u>NO2/3</u>	_____	_____	_____	_____
<u>1x250</u>	_____	<u>M+3</u>	_____	_____	_____	_____

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MW-2	Job Number:	
Client:	NuStar	Date:	12/9
Project:	Portland Terminal 2SA2020 GWM	Sampler:	AW
Weather:	H Rain	Time In/Out:	1330 - 1410

WELL DATA

Monument Type:	Flush-mount/Stick-up Other:	Well Diameter:	2"	Depth to Free Product:	—
Monument Condition:	good	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No	Depth to Water:	28.53	Water Column Length:	—
Comments:		Screened Interval:	—	Purge Volume:	—

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:		Sampling Method:			Pump Intake Depth:	Tubing Material & Type:				
BP low flow						MS SB				
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1336			28.53	25	6.67	12.89	1632	2.59	73.3	clear
1339			↓	↓	6.70	12.87	1051	2.47	-3.9	↓
1342			↓	↓	6.69	12.82	882	2.04	-49.6	↓
1345			↓	↓	6.65	12.94	702	1.44	-92.4	↓
1348			↓	↓	6.65	12.98	697	1.32	-97.4	↓
1351					6.65	13.01	695	1.24	-99.5	↓

PURGING DATA

Sample ID:	MW-2	Sampling Flow Rate:	25	Analytical Laboratory:	Apex	
Sample Time:	1351	Final Depth to Water:	28.53	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x250	—	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MP-1	Job Number:	
Client:	Nustaw Van	Date:	12/9
Project:	GNDM 4Q20	Sampler:	4w
Weather:	Pt Sun	Time In/Out:	1410 - 1500

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	-
	Other:	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	GOOD	Depth to Water:	28.33	Water Column Length:	-
Well Cap Lock Present:	Yes No	Screened Interval:	-	Purge Volume:	-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:		BP		Pump Intake Depth:		MS				
Sampling Method:		low flow		Tubing Material & Type:		SB		NEW /		DEDICATED
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1416			28.33	.25	6.69	11.93	788	5.56	-94.7	clear
1419			28.40	.2	6.74	12.39	840	5.29	-83.4	
1422					6.80	13.02	896	3.60	-68.4	
1425					6.84	13.33	923	1.83	-50.0	
1428					6.85	13.47	934	1.59	-35.9	
1431					6.86	13.49	936	1.50	-30.7	

PURGING DATA

Sample ID: MP-1	MP-1	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time: 1431		Final Depth to Water:	28.40	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x 40	HCl	VOC				
2x 40	HCl	RSI				
1x 250	H2SO4	NO2/3				
1x 250	-	NH3				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MW-15	Job Number:	
Client:	New Star Van	Date:	12/19
Project:	Guam 4020	Sampler:	JS
Weather:	Cloudy 45	Time In/Out:	8:45 - 9:45

WELL DATA

Monument Type:	Flush-mount/ <u>Stick-up</u>	Well Diameter:	4"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	Good	Depth to Water:	33.43	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA

Purge Method:				Pump Intake Depth:						
Sampling Method:				Tubing Material & Type:					NEW / DEDICATED	
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
900			33.43	.25	6.94	9.60	251	5.49	59.9	Clear
903			NM	↓	6.59	10.63	366	3.17	66.3	↓
906			NM	↓	6.40	11.70	501	2.66	70.4	↓
909			NM	↓	6.86	12.21	513	2.20	71.1	↓
912			↓	↓	6.34	12.27	520	2.02	69.2	↓
915			↓	↓	6.35	12.30	526	1.90	68.2	↓

PURGING DATA

Sample ID:	MW-15	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	915	Final Depth to Water:	34.60	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x250	—	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MW-19i	Job Number:	
Client:	Nu Star Van	Date:	12/10
Project:	GWMD 4020	Sampler:	905
Weather:	Cloudy 40°	Time In/Out:	750-840

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	27.51	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA


Purge Method:	BP low flow				Pump Intake Depth:	MS SB				
Sampling Method:					Tubing Material & Type:	NEW / DEDICATED				
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
806			27.51	.25	7.82	9.65	105	21.27	113.3	clear
809			27.80		7.00	11.03	186	11.51	101.8	
812			27.97		6.92	12.70	203	5.94	94.2	
815			28.09		6.92	12.75	206	4.31	88.1	
818			28.18		6.91	12.77	207	2.51	80.0	
821			28.24		6.91	12.78	207	2.27	77.1	
824			28.32		6.90	12.78	207	2.17	75.5	

PURGING DATA

Sample ID:	MW-19i	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	824	Final Depth to Water:	28.60	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x250	—	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID:	MW-8	Job Number:	
	Client:	Nuster Van	Date:	12/10
	Project:	GUSM 4020	Sampler:	AW
	Weather:	Cloudy 45°	Time In/Out:	955-1040

WELL DATA

Monument Type:	Flush-mount/Stick-up Other:	Well Diameter:	4"	Depth to Free Product:	—
Monument Condition:	good	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	28.25	Water Column Length:	—
Comments:		Screened Interval:	—	Purge Volume:	—

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):
 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:	BT long flow	Pump Intake Depth:	MS
Sampling Method:		Tubing Material & Type:	SB NEW DEDICATED

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1002			28.25	2	6.34	9.37	986	13.31	98.1	clear
1005			↓	↓	6.13	12.84	1528	6.94	101.3	
1008			↓	↓	6.10	13.77	1634	3.38	100.1	
1011			↓	↓	6.08	14.06	1756	2.01	98.0	
1014			↓	↓	6.07	14.10	1790	1.65	98.6	
1017			↓	↓	6.07	14.13	1807	1.54	99.8	

PURGING DATA

Sample ID:	MW-8	Sampling Flow Rate:	2	Analytical Laboratory:	Apex	
Sample Time:	1017	Final Depth to Water:	28.25	Did Well Dewater:	Yes	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x250	—	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Well ID:	MW-5	Job Number:	
Client:	Nu Star Van	Date:	12/10
Project:	GasM4Q20	Sampler:	gws
Weather:	Fram 45	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount / Stick-up Other:	Well Diameter:	2"	Depth to Free Product:	-
Monument Condition:	good	Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	Yes No	Depth to Water:	28.21	Water Column Length:	-
Screened Interval:		Purge Volume:			

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:	BP	Pump Intake Depth:	
Sampling Method:	low flow	Tubing Material & Type:	MS SB

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1113			28.21	.25	6.67	9.01	1304	11.62	100.4	clean
1116			↓	↓	6.54	13.31	721	5.01	75.6	↓
1119			↓	↓	6.51	13.41	675	3.84	65.5	↓
1121			↓	↓	6.42	15.00	501	1.91	50.4	↓
1124			↓	↓	6.41	15.19	483	1.70	44.2	↓
1127			↓	↓	6.41	15.27	474	1.50	42.6	↓

PURGING DATA

Sample ID:	MW-5	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex No	
Sample Time:	1127	Final Depth to Water:	28.21	Did Well Dewater:		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3 x 40	HCl	VOC	-	-	-	-
1 x 250	H2SO4	NO2/3	-	-	-	-
1 x 250	-	NH3	-	-	-	-

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MGM3-110	Job Number:	
Client:	Nr Star Vane	Date:	12/10
Project:	GW 4920	Sampler:	90
Weather:	Cloudy 40°	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	—	Depth to Free Product:	—
	Other: Vault	Well Depth:	—	Free Product Thickness:	—
Monument Condition:		Depth to Water:	26.62	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA

Purge Method:				Pump Intake Depth:			MS			
Sampling Method:				Tubing Material & Type:			LDPE			
							NEW / DEDICATED			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1323			26.62	.2	7.15	12.78	166	8.06	29.7	clear
1326			↓	↓	7.16	13.04	160	5.24	32.6	↓
1329			↓	↓	7.16	13.10	154	3.02	35.6	↓
1332			↓	↓	7.16	13.13	158	2.90	34.5	↓
1335			↓	↓	7.10	13.13	159	2.81	34.1	↓

PURGING DATA

Sample ID:	MGM3-110	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1335	Final Depth to Water:	26.62	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3 x 40	HCl	Voc	—	—	—	—
1 x 250	H2SO4	NO2/3	—	—	—	—
1 x 250	—	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MGM53-132	Job Number:	
Client:	De Star Van	Date:	12/19
Project:	GWM 4020	Sampler:	RL
Weather:	Rain	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	—	Depth to Free Product:	—
	Other: <i>MGM53</i>	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	<i>Water</i>	Depth to Water:	26.02	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA

Purge Method:		Sampling Method:			Pump Intake Depth:		Tubing Material & Type:			
		<i>per low flow</i>					<i>MS LDPE</i>			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1253			26.02	.2	6.52	11.70	328	10.79	28.2	clear
1256					6.84	12.75	201	5.23	19.4	
1259					7.01	13.27	212	3.78	16.2	
1302					7.09	13.51	200	3.01	12.5	
1305					7.10	13.54	195	1.96	11.7	
1308					7.10	13.54	196	1.77	11.7	
1311					7.10	13.56	196	1.65	11.4	

PURGING DATA

Sample ID:	MGM53-132	Sampling Flow Rate:	2	Analytical Laboratory:	Apex	
Sample Time:	1311	Final Depth to Water:	25.98	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCL	VOC	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x25	—	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

*Vnac
4R*

Well ID:	<i>MGM53-60</i>	Job Number:	
Client:	NuStar	Date:	<i>12/10</i>
Project:	<i>Portland Terminal 25A 2020 GWM</i>	Sampler:	<i>AW</i>
Weather:	<i>MGM53-60</i>	Time In/Out:	<i>6</i>

WELL DATA

cloudy

Monument Type:	Flush-mount/Stick-up	Well Diameter:	<i>-</i>	Depth to Free Product:	<i>-</i>
	Other: <i>MAMS Vault</i>	Well Depth:	<i>-</i>	Free Product Thickness:	<i>-</i>
Monument Condition:		Depth to Water:	<i>26.55</i>	Water Column Length:	<i>-</i>
Well Cap Lock Present:	Yes No	Screened Interval:	<i>-</i>	Purge Volume:	<i>-</i>

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:		<i>P2V1 Lumpflow</i>			Pump Intake Depth:		<i>M3 LDPE</i>				NEW / <u>DEDICATED</u>
Sampling Method:					Tubing Material & Type:						
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks	
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV		
<i>1348</i>			<i>26.55</i>	<i>.2</i>	<i>7.14</i>	<i>12.76</i>	<i>149</i>	<i>10.25</i>	<i>46.2</i>	<i>clear</i>	
<i>1357</i>			<i>↓</i>	<i>↓</i>	<i>6.99</i>	<i>13.07</i>	<i>143</i>	<i>3.62</i>	<i>46.6</i>	<i>↓</i>	
<i>1354</i>			<i>↓</i>	<i>↓</i>	<i>6.99</i>	<i>13.15</i>	<i>141</i>	<i>3.14</i>	<i>47.6</i>	<i>↓</i>	
<i>1357</i>			<i>↓</i>	<i>↓</i>	<i>7.03</i>	<i>13.17</i>	<i>140</i>	<i>3.19</i>	<i>50.4</i>	<i>↓</i>	
<i>1400</i>			<i>↓</i>	<i>↓</i>	<i>7.02</i>	<i>13.16</i>	<i>138</i>	<i>2.75</i>	<i>51.0</i>	<i>↓</i>	
<i>1403</i>			<i>↓</i>	<i>↓</i>	<i>7.02</i>	<i>13.15</i>	<i>138</i>	<i>2.51</i>	<i>51.5</i>	<i>↓</i>	
<i>1406</i>			<i>↓</i>	<i>↓</i>	<i>7.02</i>	<i>13.15</i>	<i>138</i>	<i>2.39</i>	<i>51.6</i>	<i>↓</i>	

PURGING DATA

Sample ID:	<i>MGM3-110</i>	Sampling Flow Rate:	<i>.2</i>	Analytical Laboratory:	<i>Apek</i>	
Sample Time:	<i>1400</i>	Final Depth to Water:	<i>26.55</i>	Did Well Dewater:	<i>NO</i>	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<i>3x 40</i>	<i>HCl</i>	<i>VOC</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>
<i>1x 250</i>	<i>H2SO4</i>	<i>NO2/3</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>
<i>1x 250</i>	<i>-</i>	<i>NH3</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MGM53-40	Job Number:	
Client:	NuStar	Date:	12/10
Project:	Portland Terminal SA2020 GWM	Sampler:	4/2
Weather:	Cloudy	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Slick-up	Well Diameter:	—	Depth to Free Product:	—
	Other: <i>MGM5 Vault</i>	Well Depth:	—	Free Product Thickness:	—
Monument Condition:		Depth to Water:	27.10	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)				
Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters

PURGING DATA

Purge Method:	<i>Peri</i>	Pump Intake Depth:	<i>MS</i>
Sampling Method:	<i>Low flow</i>	Tubing Material & Type:	<i>LDPE</i>
			NEW / DEDICATED

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1425			27.10	.2	6.68	13.10	336	18.72	31.9	clear
1428			↓	↓	6.69	13.56	434	5.65	-22.8	
1431			↓	↓	6.69	13.75	461	2.54	-60.4	
1434			↓	↓	6.69	13.84	468	1.15	-81.0	
1437			↓	↓	6.69	13.84	470	.99	-90.8	
1440			↓	↓	6.69	13.85	470	.70	-93.0	↓

PURGING DATA

Sample ID:	MGM53-40	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1440	Final Depth to Water:	27.10	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	—	—	—	—
2x40	HCl	Rsk	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x250	—	NH3	—	—	—	—
3x40	HCl	VOC	—	—	—	MGM53-40 Dup
2x40	HCl	Rsk	—	—	—	—

NOTES/ADDITIONAL COMMENTS

1x250	H2SO4	NO2/3	—	—
1x250	—	NH3	—	—

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	EW-1	Job Number:	
Client:	NuStar JAW 3020	Date:	10/7/2020
Project:	Portland Terminal 25A2020 GWM	Sampler:	LW
Weather:	pt. sunny	Time In/Out:	

WELL DATA

Monument Type:	Flush mount/Stick-up	Well Diameter:	24	Depth to Free Product:	-
	Other:	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	Good	Depth to Water:	27.26	Water Column Length:	-
Well Cap Lock Present:	No	Screened Interval:	-	Purge Volume:	-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		ISF			Pump Intake Depth:		MS		NEW / DEDICATED	
Sampling Method:		LF			Tubing Material & Type:		SB			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1407			27.26	0.25	7.50	19.17	406	12.89	84.3	clear
1410			27.30	↓	7.54	17.66	292	7.56	87.9	↓
1413			27.41	↓	7.44	16.52	243	7.99	93.1	↓
1416			27.51	↓	7.57	16.29	240	8.29	92.9	↓
1419			27.58	↓	7.46	16.32	240	8.62	94.8	↓
1422			27.32	0.2	7.46	16.88	245	4.84	90.7	↓
1425			↓	↓	7.48	16.82	244	4.41	89.9	↓
1428			↓	↓	7.49	16.73	244	4.20	89.2	↓
1431			↓	↓	7.49	16.72	244	4.04	88.7	↓

PURGING DATA

Sample ID:	EW-1	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex
Sample Time:	1420	Final Depth to Water:	27.32	Did Well Dewater:	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x40	HCl	HVOCs			
1x250	H2SO4	NH3			
1x250	-	NO2/NO3			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID:	MW-16	Job Number:	
	Client:	NuStar VAN 3020	Date:	10/7/2020
	Project:	Portland Terminal 25A2020 GWM	Sampler:	
	Weather:	pt. cloudy	Time In/Out:	1320/

WELL DATA

Monument Type:	Flush-mount	Stick-up	Well Diameter:	44	Depth to Free Product:	—
	Other:		Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good		Depth to Water:	29.48	Water Column Length:	—
Well Cap Lock Present:	Yes	No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		BP			Pump Intake Depth:		MS			
Sampling Method:		LF			Tubing Material & Type:		SB			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1329			29.48	0.2	7.84	18.71	397	9.00	81.5	clear
1332			29.31	↓	7.72	18.42	428	4.66	82.5	↓
1335			29.36	↓	7.71	16.94	448	3.04	81.7	↓
1338			29.39	↓	7.74	16.68	446	2.61	81.7	↓
1341			29.41	↓	7.73	16.60	444	2.16	81.3	↓
1344			29.42	↓	7.71	16.62	443	2.11	81.2	↓
1347										

PURGING DATA

Sample ID:	MW-16	Sampling Flow Rate:	0.2	Analytical Laboratory:	Aplex	
Sample Time:	1340	Final Depth to Water:		Did Well Dewater:		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	H2O	HVOCs	—	—	—	—
1x250	H2SO4	NH3	—	—	—	—
1x250	—	NO2/NO3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

 Cascadia Associates, LLC	Well ID: <u>MW-201</u>	Job Number:
	Client: <u>NuStar VAN 3020</u>	Date: <u>10/7/2020</u>
	Project: <u>Portland Terminal 25A2020 GWM</u>	Sampler: <u>LW</u>
	Weather: <u>pt. cloudy</u>	Time In/Out: <u>1045/1320</u>

WELL DATA

Monument Type:	<input checked="" type="checkbox"/> Flush-mount/stick-up	Well Diameter:	<u>2"</u>	Depth to Free Product:	—
	<input type="checkbox"/> Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	<u>good</u>	Depth to Water:	<u>29.48</u>	Water Column Length:	—
Well Cap Lock Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA


Purge Method: <u>BP</u>		Pump Intake Depth: <u>MS</u>								
Sampling Method: <u>LF</u>		Tubing Material & Type: <u>SB</u>								
		NEW / <u>DEDICATED</u>								
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1248			<u>29.48</u>	<u>0.2</u>	<u>7.84</u>	<u>17.84</u>	<u>267</u>	<u>8.89</u>	<u>101.2</u>	<u>clear</u>
1251			↓	↓	<u>7.91</u>	<u>17.75</u>	<u>240</u>	<u>7.52</u>	<u>97.4</u>	↓
1254			↓	↓	<u>7.86</u>	<u>16.58</u>	<u>196</u>	<u>6.22</u>	<u>95.6</u>	↓
1257			↓	↓	<u>7.87</u>	<u>16.20</u>	<u>185</u>	<u>4.90</u>	<u>92.8</u>	↓
1300			↓	↓	<u>7.85</u>	<u>15.98</u>	<u>186</u>	<u>4.71</u>	<u>91.3</u>	↓
1303			↓	↓	<u>7.80</u>	<u>15.90</u>	<u>195</u>	<u>4.48</u>	<u>91.5</u>	↓
1306			↓	↓	<u>7.86</u>	<u>15.86</u>	<u>202</u>	<u>4.25</u>	<u>90.3</u>	↓

PURGING DATA

Sample ID: <u>MW-201</u>	Sampling Flow Rate: <u>0.2</u>	Analytical Laboratory: <u>Apex</u>
Sample Time: <u>1310</u>	Final Depth to Water: <u>29.48</u>	Did Well Dewater: <u>no</u>
No. of Containers/Type	Preservative	Analysis/Method
<u>3x40</u>	<u>HCl</u>	<u>HVOCs</u>
<u>1x250</u>	—	<u>NO2/NO3</u>
<u>1x250</u>	<u>H2804</u>	<u>NIT3</u>

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

 Cascadia Associates, LLC	Well ID: MW-21i-40	Job Number:
	Client: NuStar VAN 3020	Date: 10/7/2020
	Project: Portland Terminal 2SA2020 GWM	Sampler: LW
	Weather: pt - Sun	Time In/Out: 1210 / 1245

WELL DATA

Monument Type:	<input checked="" type="radio"/> Flush-mount/Stick-up Other:	Well Diameter:	2"	Depth to Free Product:	-
Monument Condition:	<input checked="" type="radio"/> ok (ball stuck)	Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Depth to Water:	30.30	Water Column Length:	-
Comments:		Screened Interval:	-	Purge Volume:	-

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):
 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		BP			Pump Intake Depth:		MS				
Sampling Method:		LF			Tubing Material & Type:		SB				
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks	
						±0.1	±0.5 °C	±5%	±0.5 ppm	±20 mV	
1217			30.30	0.2	7.92	17.67	254	10.99	87.6	clear	
1220			30.30	0.2	7.87	16.77	269	5.22	86.8	↓	
1223			↓	↓	7.87	15.85	281	1.60	87.6		
1226			↓	↓	7.83	15.71	283	1.14	86.8		
1229			↓	↓	7.83	15.69	284	0.93	86.7		
1232			↓	↓	7.82	15.62	284	0.79	86.3		

PURGING DATA

Sample ID:	MW-21i-40	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex	
Sample Time:	1230	Final Depth to Water:	30.30	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	HVOCS				
1x250	H2SO4	NH3				
1x250	-	NH2/NH3				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID:	MW-25i	Job Number:	
	Client:	NuStar VAN 3020	Date:	10/7/2020
	Project:	Portland Terminal 25A2020 GWM	Sampler:	LU
	Weather:		Time In/Out:	1125 / 1205

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	24	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	Sand	Depth to Water:	29.68	Water Column Length:	—
Well Cap Lock Present:	<input checked="" type="radio"/> No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		BIP			Pump Intake Depth:		MS		NEW / DEDICATED	
Sampling Method:		CF			Tubing Material & Type:		5 B		NEW / DEDICATED	
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1127			29.68	0.2	8.13	16.13	208	7.79	78.2	clear
1130			29.68	↓	8.10	16.34	216	5.46	78.1	↓
1133			↓	↓	8.04	16.36	217	5.21	79.9	↓
1136			↓	↓	8.01	16.39	222	4.86	81.2	↓
1139			↓	↓	8.07	16.33	226	4.40	81.8	↓
1142			↓	↓	8.08	16.27	227	3.90	82.0	↓
1145					8.15	16.30	231	3.82	81.8	
1148					8.09	16.24	231	3.75	81.8	

PURGING DATA

Sample ID:	MW-25i	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex
Sample Time:	1140	Final Depth to Water:	29.68	Did Well Dewater:	NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD
3x40	HCl	HVOCs			
1x250	—	NO2/NO3			
1x250	H2SO4	NH3			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID:	MW-19i	Job Number:	
	Client:	NuStar VAN 3020	Date:	10/7/20
	Project:	Portland Terminal 25A2020 GMM	Sampler:	LW
	Weather:	overcast/Fog	Time In/Out:	1025/

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	Good	Depth to Water:	29.58	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		BP LC			Pump Intake Depth:		MS		NEW / <u>DEDICATED</u>	
Sampling Method:		LC			Tubing Material & Type:		SB			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1032			29.55	0.2	8.12	15.42	172	8.50	93.9	clear
1035			29.53	↓	8.10	15.45	181	8.30	91.3	↓
1038			↓	↓	8.00	14.93	196	2.87	92.3	↓
1041			↓	↓	8.00	14.86	201	2.21	91.3	↓
1044			↓	↓	8.00	14.84	204	1.84	90.9	↓
1047			↓	↓	7.99	14.81	206	1.65	91.2	↓
1050			↓	↓	7.99	14.79	210	1.52	91.1	↓

PURGING DATA

Sample ID:	MW-19i	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex
Sample Time:	1050	Final Depth to Water:	29.53	Did Well Dewater:	✓
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x40	HCl	HVOCs	—	—	—
1x250	—	NH2/NH3	—	—	—
1x250	H2SO4	NH3	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID:	Mw-18i	Job Number:	
	Client:	NuStar VAN 3020	Date:	10/7/20
	Project:	Portland Terminal 2SA2020 GWM	Sampler:	LW
	Weather:	Fog / overcast	Time In/Out:	9:50 / 10:20

WELL DATA

Monument Type:	<input checked="" type="checkbox"/> Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	<input type="checkbox"/> Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	29.31	Water Column Length:	—
Well Cap Lock Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		BP			Pump Intake Depth:		MS			
Sampling Method:		LC			Tubing Material & Type:		SB		NEW / DEDICATED	
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
9:57			29.31	0.2	8.07	16.14	158	9.28	92.2	clear
1:00			29.31	↓	8.06	15.59	155	9.08	89.7	
1:00:3			29.31	↓	8.00	15.14	151	7.09	91.8	↓
1:00:6			↓	↓	7.92	14.96	150	6.50	95.0	↓
1:00:9			↓	↓	7.91	14.89	149	6.43	95.3	↓
1:01:2					7.90	14.81	149	6.20	95.9	

PURGING DATA

Sample ID:	Mw-18i	Sampling Flow Rate:	0.2	Analytical Laboratory:	ArcX	
Sample Time:	10:10	Final Depth to Water:	29.31	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	HVOCs				
1x250	H2SO4	NH3				
1x250	—	NO2/NO3				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID:	MW-23i	Job Number:	
	Client:	NuStar VAN 3020	Date:	10/7/2020
	Project:	Portland Terminal 25A 2020 GWM	Sampler:	LW
	Weather:	Fog / overcast	Time In/Out:	9:10 / 9:45

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	29.72	Water Column Length:	—
Well Cap Lock Present:	Yes <input type="radio"/> No <input checked="" type="radio"/>	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		BP LF			Pump Intake Depth:		MS SB		NEW / PEDICATED	
Sampling Method:					Tubing Material & Type:					
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
919			29.82	0.2	7.74	16.87	159	10.29	110.7	clear
922			29.80		8.10	16.58	200	10.86	88.4	
925			29.78		8.02	16.28	171	10.21	86.1	
928			29.76		7.96	16.12	152	9.50	85.1	
931			29.74	↓	7.95	16.07	149	9.17	84.8	↓
934			29.72	↓	7.94	16.05	151	9.01	85.3	↓

PURGING DATA

Sample ID:	MW-23i	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex	
Sample Time:	9:30	Final Depth to Water:	29.70	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	HVOCs	—	—	—	—
1x250	—	NO2/NO3	—	—	—	—
1x250	H2SO4	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID:	MW-26	Job Number:	
	Client:	NuStar Vancouver 3020	Date:	10/7/20
	Project:	Portland Terminal 25A2020 GWM	Sampler:	LW
	Weather:	Fog / overcast	Time In/Out:	745 / 905

WELL DATA

Monument Type:	<input checked="" type="radio"/> Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	-
	Other:	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	good	Depth to Water:	28.98	Water Column Length:	-
Well Cap Lock Present:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Screened Interval:	-	Purge Volume:	-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:		BSF LF		Pump Intake Depth:		MS		NEW / DEDICATED		
Sampling Method:				Tubing Material & Type:		SB				
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
808			28.98	0.3	7.63	15.74	4146	9.53	98.0	clear
811			28.98	0.4	7.61	15.17	103	7.97	125.1	↓
828			28.99	0.2	7.65	15.21	3333	9.63	108.3	
837			↓	0.2	7.64	15.12	3164	9.73	108.6	
834			↓	↓	7.72	15.34	3130	9.67	108.8	
837			↓	↓	7.71	15.34	3128	9.70	109.3	
840			↓	↓	7.72	15.36	3132	9.73	109.3	
843										

PURGING DATA

Sample ID:	MW-26	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex	
Sample Time:	840	Final Depth to Water:	28.97	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	HVOCs				
2x40	HCl	RSK 175				
1x250		Nitrate/ite				
1x250	#2504	Ammonia				

NOTES/ADDITIONAL COMMENTS

Adjusting controller/compressor settings on bladder pump from 8/2 - 8/28 to get correct flow

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-17	Job Number:	
Client:	New Star Valve	Date:	10/7
Project:	GWTM 3020	Sampler:	AW
Weather:	Mist 40°	Time In/Out:	74 830

WELL DATA

Monument Type:	Flush-mount Stick-up	Well Diameter:	4"	Depth to Free Product:	
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	28.23	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2 inch 0.162	4 inch	1 gal
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PURGING DATA

Purge Method:	Perforated BP low flow			Pump Intake Depth:	815 MS			NEW	DEDICATED
Sampling Method:				Tubing Material & Type:					
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	m	
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV
803			28.23	.25	7.55	14.65	1254	12.61	108.6
806			↓	↓	6.99	13.91	1274	5.19	111.2
809			↓	↓	6.63	13.39	1271	1.54	106.8
812			↓	↓	6.60	13.34	1270	1.39	105.3
815			↓	↓	6.56	13.32	1268	1.28	99.5

PURGING DATA

Sample ID:	MW-17	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	815	Final Depth to Water:	28.23	Did Well Dewater:	Yes	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplic
3x40	HCl	VOL	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x250	—	NI-3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Well ID:	MW-1	Job Number:	
Client:	New Star Vene	Date:	10/7
Project:	GSMS 3020	Sampler:	AW
Weather:	Mist 60°	Time In/Out:	840-920

WELL DATA

Monument Type:	Flush-mount/Sticky up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:		Free Product Thickness:	
Monument Condition:	good	Depth to Water:	28.6'	Water Column Length:	
Well Cap Lock Present:	Yes	Screened Interval:	—	Purge Volume:	

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:	BP low flow				Pump Intake Depth:	MS SB				
Sampling Method:					Tubing Material & Type:	NEW DEDICATED				
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
847			28.6'	2.5	6.58	13.92	1297	4.22	45.6	clear
850					6.91	14.69	3017	2.35	61.9	
853					7.20	14.54	3503	1.94	75.2	
856					7.22	14.52	3515	1.76	75.3	
859					7.24	14.46	3496	1.56	74.7	

PURGING DATA

Sample ID:	MW-1	Sampling Flow Rate:	0.25	Analytical Laboratory:	Aperx	
Sample Time:	859	Final Depth to Water:	28.57	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x 40	HCl	VOC				
1x 250	H2SO4	NO2/3				
1x 250		NH3				

NOTES/ADDITIONAL COMMENTS

Notes/Additional Comments area with multiple empty rows for text entry.

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MW-3	Job Number:	
Client:	Nu Star Van	Date:	10/7
Project:	Quam 3Q20		465
Weather:	Mist 65	Time In/Out:	9 5 650

WELL DATA

Monument Type:	Flush-mount / Stick-up Other:	Well Diameter:	2"	Depth to Free Product:	—
Monument Condition:	good	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No	Depth to Water:	29.81	Water Column Length:	—
		Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2 inch 162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA

Purge Method:	BP low flow				Pump Intake Depth:	MS				
Sampling Method:					Tubing Material & Type:	SB		NEW	DEDICATED	
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)		Clarity/Color Other Remarks	
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm		
930			29.81	.25	7.30	14.58	2985	.91	57.7	1
933			↓	↓	7.02	14.15	1735	2.24	38.8	1
936			↓	↓	6.83	13.46	1125	1.0	4	1
939			↓	↓	6.57	12.92	496	1.16		
942			↓	↓	6.53	12.84	470	1.20	4	
945			↓	↓	6.50	12.77	462	1.23	53.8	

PURGING DATA

Sample ID:	MW-3	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	945	Final Depth to Water:	29.81	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x 40	HCl	VOC	—	—	—	—
1x 250	H2SO4	NO2/3	—	—	—	—
1x 250	—	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Well ID:	MW-12	Date:	10/4/05
Client:	Nu Star Valve	Sampler:	1005 1 3
Project:	GWM 302		
Weather:	Mist 6		

WELL DATA

Monument Type:	Flush-mount/stick-up Other:	Well Diameter:	4"	Depth to Free Product:	
Monument Condition:	Good	Well Depth:	-	Free Product Thickness:	
Well Cap Lock Present:	Yes No	Depth to Water:	27.38	Water Column Length:	
Comments:		Screened Interval:	-	Purge Volume:	

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162

PURGING DATA

Purge Method:		BP Confluent			Pump Intake Depth:		MS B			W
Sampling Method:					Tubing Material & Type:					
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rat (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)		
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1012			27.38	.3	6.22	14.52	735	3.86	11.1	clear
1015					6.31	15.16	1610	5.13	-93.3	
1018					6.45	14.84	2040	4.39	-136.6	
1021					6.52	14.71	2122	2.71	-151.1	
1024					6.55	14.78	2121	2.61	-154.9	
1027					6.56	14.82	2110	2.11	-156.9	

PURGING DATA

Sample ID:	MW-12	Sampling Flow Rate:	27.3	Apex No
Sample Time:	1027	Final Depth to Water:	27.38	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size
3x 40	HCl	HCl		
2x 40	HCl	HCl		
1x 250	H2SO4	NO3		
1x 250	-	NH3		
3x 40	HCl	HCl		
2x 40	HCl	HCl		

NOTES/ADDITIONAL COMMENTS

1x 250	H2SO4	NO2/3		
1x 250	-	NH3		

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-19	Job Number:	
Client:	Nu Star Vanc	Date:	10/7
Project:	GWM 3Q20	Sampler:	1/25
Weather:	Cloudy 65	Time In/Out:	1:50

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	-
	Other:	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	good	Depth to Water:	27.22	Water Column Length:	-
Well Cap Lock Present:	Yes No	Screened Interval:	-	Purge Volume:	-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2 inch = 0.162 4 inch

PURGING DATA

Purge Method:	BP	Pump Intake Depth:	MS
Sampling Method:	long stems	Tubing Material & Type:	3B NEW DEDICATED

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)			
					+/-0.1	+/-0.5°C	+/-5%	+/-0.5 ppm	+/-20 mV	
1106			27.22	.2	6.66	16.06	1835	3.98	-125.7	clear
1109			}	}	6.64	15.91	1883	3.60	-117.7	}
1112		6.64			15.33	2144	2.00	-105.6		
1115		6.69			15.29	2194	1.40	-100.6		
1118		6.67			15.32	2210	1.25	-97.0		
1121		6.65			15.36	2254	1.10	-83.5		

PURGING DATA

Sample ID:	MW-19	Sampling Flow Rate:	.2	Analytical Laboratory:	Ap
Sample Time:	1121	Final Depth to Water:	27.22	Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x 40	HCl	VOC			
2x 40	HCl	RSK			
1x 250	H2SO4	NO2/3			
1x 250	-	NH3			
3x 40	HCl	VOC			MW-19 Dup
2x 40	HCl	RSK			

NOTES/ADDITIONAL COMMENTS

1x 250	H2SO4	NO2/3			
1x 250	-	NH3			

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MW-13	Job Number:	
Client:	Ny Star Vane	Date:	10/5
Project:	GUM 3020	Sampler:	1/2
Weather:	Pt Sun 75°		11 5 1245

WELL DATA

Monument Type:	Flush-mount/Stick-up Other:	Well Diameter:	4"	Depth to Free Product:	
Monument Condition:		Well Depth:	-	Free Product Thickness:	
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No	Depth to Water:	20.5		
		Screened Interval:		Purge Volume:	-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2 inch = 0.162	4-inch = 0.653
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PURGING DATA

Purge Method:	BP			Pump Intake Depth:	MS				
Sampling Method:	low flow			Tubing Material & Type:	5B		NEW / DEDICATED		
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV
1203			28.52	.2	6.69	16.35	2595	.40	-47.9
1206			↓	↓	6.69	16.96	2242	1.52	-65.0
1209		6.71			16.54	2064	1.48	-85.2	
1212		6.70			15.69	1703	.97	-105.4	
1215		6.70			15.54	1625	.46	-110.9	
1218		6.69			15.41	1601	.30	-119.2	
1221		6.69			15.38	1593	.26	-126.4	

PURGING DATA

Sample ID:	MW-13	Sampling Flow Rate:	.2	Apex No		
Sample Time:	1221	Final Depth to Water:	28.52	Did Well Dewater:		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC				
2x40	HCl	RSn				
1x250	H2SO4	NO2/3				
1x250	-	NH3				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	SI	Job Number:	
Client:	NuStar Name	Date:	10/7
Project:	GLM 3Q20		40
Weather:	Sun 75°		1250-1340

WELL DATA

Monument Type:	Flush-mount/Stick-up Other	Well Diameter:	2"	Free Product Thickness:	-
Monument Condition:	good	Well Depth:	-	Water Column Length:	-
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No	Depth to Water:	29.18	Screened Interval:	-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162

PURGING DATA

Purge Method:	BP	Pump Intake Depth:	MS
Sampling Method:	low flow	Tubing Material & Type:	SB

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	Clarity/Color	Other Remarks	
					+/-0.1	+/-0.5 °C	+/-0.5 ppm	+/-20 mV		
1302			29.18	.25	6.77	18.97	129	2.65	13.6	clear
1305					6.86	17.84	891	2.44	-131.6	
1308					7.02	15.50	574	3.05	-117.0	
1311					7.09	14.32	289	3.33	-100.2	
1314					7.09	14.03	224	3.28	-89.0	
1317					7.09	13.87	204	3.32	7.6	
1320					7.08	13.82	200	3.30	-78.7	

PURGING DATA

Sample ID:	SI	Sampling Flow Rate:	.25	Did Well Dewater:	Open	
Sample Time:	1320	Final Depth to Water:	29.18		No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3 x 40	HCl	VOC				
1 x 250	H2SO4	NO2/3				
1 x 250	-	NHS				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	S-2	Job Number:	
Client:	NuStar Vance	Date:	10/7
Project:	GLWM 3Q20	Sampler:	AW
Weather:	Sun 80	Time In/Out:	1340 425

WELL DATA

Monument Type:	Push-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	
	Other:	Well Depth:		Free Product Thickness:	
Monument Condition:	good	Depth to Water:	30.27	Water Column Length:	
Well Cap Lock Present:	Yes No	Screened Interval:		Purge Volume:	

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch =

PURGING DATA

Purge Method:		Pump Intake Depth:	
Sampling Method:	BP low flow	Tubing Material & Type:	MS SB NEW DEDICATED

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)		t/c
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1344			30.27	2	6.80	21.20	986	7.72	-32.7	Pink/Cloud
1347					6.49	18.71	1604	6.04	-24.3	
1350					6.48	15.50	1719	1.79	30.0	
1353					6.51	14.96	1704	.78	-35.1	
1356					6.52	14.94	1701	.61	-37.7	
1359					6.52	14.90	1699	.49	-39.0	


PURGING DATA

Sample ID:	S-2	Sampling Flow Rate:	2	Analytical Laboratory:	Apex
Sample Time:	1359	Final Depth to Water:	30.27	Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID

3x40	HCl	VOC			
1x250	H2SO4	NO2/3			
1x250		NH3			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA

	Well ID:	MGMS1-43	Date:	10/6
	Project:	New Star V 2	Sampler:	fw
	Weather:	un 6		735 8

Monument T	pick-up	-	Depth to Free Product:	-
	Other: Vault	-		-
Monument Condition:		2 3	Depth to Water:	
Well Cap Lock Present:		-	Water Column Length:	
			Screened Interval:	

Comments:

Purge Volume (Water Height) X (Mult)

Water height multipliers (gal): 2-inch = 0.162 1 gal = 3.785 liters

Purge Method:		Peri flow		Pump Intake Depth:		MS LDPE		NEW / DEDICATED	
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)				Cond (µS/cm)			
				+/-0.1		+/-5%	+/-0.5 ppm	+/-20 mV	
746		20.31	.2	6.54	16.63	238	4.97	109.9	
749				6.39	16.37	239	2	117.9	
752				6	16.28	4	1.85	120.6	
755				6.3	16.11	24	1.36	1	
758				6.28	1	244	1.19	125.3	
801				6.27	1	244	1.07	127.5	

Sample ID:	MGMS1-43	Sampling Flow Rate:	.2	Did Well Dewater:	Apex N
Sample Time:	801		30		
No. of Containers/Type		Filter Size		MS/MSD	Duplicate ID
3x40	HCE	VOC			
2x40	HCE	RS			
1x250		NO			
1x250	H204	NO2/NO			

NOTES/ADDITIONAL COM

WELL MONITORING DATA SHEET



Well ID:	M6MS1-60	Date:	1/6
Project:	N far Vane GWSM 02		819 845
Weather:	6°		

Monument Type:	Flush-mount/stick-up Other: Vault	Well Diameter:		Depth to Free Product:	-
Monument Condition:		Well Depth:	2.0'		-
Well Cap Lock Present:	Yes No	Screened Interval:			-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653

PURGING DATA

Purge Method:		Sampling Method:			Pump Intake Depth:		Tubing Material & Type:			Clarity/Color Other Remarks
per low flow		MS DEDICATED			MS		LDPE			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	+/-0.1	+/-0.5 °C	Cond (µS/cm)			
817			28.85	.2	6.24	15.97		7.85		clear
820					6.28	15.63	301	3.19	101.3	
823					6.29	15.31	67	2.9	91.1	
824					6.8		381	2.95	89.2	
829					6.20	15.0	387	2.90	86.5	

PURGING DATA

Sample ID:	M6MS1-60	Sampling Flow Rate:	2	Did Well Dewater:	Apex No	
Sample Time:	829	Final Depth to Water:	28.85			
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x 40	HCl	VOC				
1x 250	H2SO4	NO2/NO3				
1x 250	—	NO3				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Well ID:	M6MS2-60 N V C	Job Number:	
Project:	GWM Q O Sun 70	Sampler:	10/6
		Time In/Out:	855 930

Monument Type:	Flush-mount/Str ner Vault	Well Depth:	6m5 2860	Depth to Free Product:	—
Monument Condition:				Free Product Thickness:	—
Well Cap Lock Present:	Yes No			Column Length:	—
Comments:					

Purge Volume (Water Height) X (Multiplier) X (# Casing Volumes)			
Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653 6-inch = 1.785 liters

PURGING DATA

Purge Method:		Peri lowflow		Pump Intake Depth:		MS LDPE		NEW / GENERATED	
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rat (L/min)	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color/Other Remarks
					+/-0.5 °C	+/-5%			
902			28.60	2	6.21	1560	249	8	1
905					6.24	1664	2	6.55	77
908					6.38	17.02	1	1	
911					6.8	17.10	19	6	4
914					6.39	17.13	184	42	
917					6.9	17.13	1	39	6

PURGING DATA

Sample ID:	M6MS2-60	Sampling Flow Rate:	.2						
Sample Time:	917	Final Depth to Water:	28.6						App N
No. of Containers/Type	Preservative	Analysis/Method	Field Filter						
3 x 40	HCl	VOC							
1 x 250	—	NH3							
1 x 250	H2SO4	NO2/NO3							

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Well ID:	MGMS2-40	Date:	1/16
Client:	Nix Star Van		
Project:	GWSM 30		
Weather:	Sun 70		930-1000

WELL DATA

Monument Type:	Flush-mount/stick-up Other: Vault	Well Diameter:	M ₂₀	Free Product Thickness:	-
Monument Condition:		Well Depth:	-		-
Well Cap Lock Present:	Yes No	Depth to Water:	28.54		-
Screened Interval:					

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162

PURGING DATA

Purge Method:	Peri low flow	Pump Intake Depth:	M	NEW	DEDICATED					
Sampling Method:		Tubing Material & Type:	LDPE							
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rat (L/min)	pH	Temp (°C)	Cond (µS/cm)			
					+/-0.1	+/-0.5 °C	+/-5			
931			28.54	.2	6.43	17.26	275	4	75.1	cle
934			↓	↓	6.40	17.50	857	1.70	77.6	
937			↓	↓	6.51	17.51	980	1.36	1.4	
940			↓	↓	6.54	17.49	1012	1.25	36	
943			↓	↓	6.55	17.49	1072	1.17	28.8	↓


MGMS2-40

PURGING DATA

Sample ID:	943	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex
Sample Time:	943	Final Depth to Water:	28.54	Did Well Dewater:	N
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
2x40	HCl	ROK			
3x40	HCl	VOC			
1x250	H2SO4	NO2/NO3			
1x250		NH3			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

		MGMS3 - Nun Star Van	
	Project:	GLWM3	10/6 1000-1030
	Weather:	Sun 7	

WELL DATA

Monument Type:	Flush-mount/Stick-up Other: Vault	Well Diameter:	MGMS3	—
Monument Condition:		Well Dept:	—	Free Product Thickness: —
Well Cap Lock Present:	Yes No	Screened Interval:		—
Comments:				

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162

PURGING DATA


Purge Method:		Sampling Method:			Pump Intake Depth:		Tubing Material & Type			
Peri low flow		MS			LDPE		EW DEDICATED			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rat (L/min)	pH	Temp (°C)	µS			
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1010			27.42	2	6.60	18.55	1291	4	-1.3	clear
1013					6.54	17.71	945	1.84		
1016					6.50	16.20	269	1.96	19.4	
1019					6.48	16.14	242	1.84	25.9	
1022					6.47	16.11	236	1.77	33	

PURGING DATA

Sample ID:	MGMS3-60	Sampling Flow Rate:	2	Analytical Laboratory:	Apea	
Sample Time:	1022	Final Depth to Water:	27.48	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	—	—	—	—
1x250	H2SO4	NO2/NO3	—	—	—	—
1x250	—	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID:	MGMS3-40	
	Project:	GWM 02	Sampler:
	Weather:	Sunny 75°	Time In/Out:

Monument Type:	Flush-mount/Stick-up	Well Diameter:	MGMS
	Other: Vault		
Monument Condition:		Depth to Water:	16
Well Cap Lock Present:	Yes No	Water Column Length:	

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653

PURGING DATA

Purge Method:		Peri low flow			Pump Intake Depth:		MS			NEW / Clarity/C
Sampling Method:					Tubing Material & Type:					
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)			Cond (µS/cm)	+/-0.5 ppm	+/-20 mV	
1036			26.46	2	6.26	16.75	186	9.21		clear
1039			↓	↓	6.49	16.25	379	2.99	-69.2	↓
1042			↓	↓	6.60	16.26	419	.94	-74.2	↓
1045			↓	↓	6.61	16.26	430	.70	9	↓
1048			↓	↓	6.63	16.24	444	.56	-84.6	↓

PURGING DATA

Sample ID:	MGMS3 40	Sampling Flow Rate:	.2	Analytical Laboratory:	Area No
Sample Time:	1048 1048	Final Depth to Water:	26.52		
No. of Containers/Type	Preservative	Analysis/Method	Filter Size	MS/MSD	
3x 40	HCl	VOC			
2x 40	HCl	2			
1x 250	H2SO4	NO2/3			
1x 250	—	NH3			
3x 40	HCl				MGMS3-40 Dup
2x 40	HCl	RSL			

NOTES/ADDITIONAL COMMENTS

1x 250	H2SO4	NO2/3			
1x 250	—	NH3			

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MW-8	Job Number:	
Client:	Nx Star Vanc		1/6
Project:	GUM 3020	Sampler:	4LS
Weather:	Sun 75°		1130 1120

WELL DATA

Monument Type:	Flush-mount/Stick-up Other:	Well Diameter:	4"	Depth to Free Product:	=
Monument Condition:	good	Well Depth:			
Well Cap Lock Present:	Yes No	Depth to Water:	28.42		
Comments:		Screened Interval:	-	Purge Volume:	

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)			
Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	1 gal = 3.785 liters

PURGING DATA

Purge Method:		Pump Intake Depth:							
Sampling Method:	Peri flow	Tubing Material & Type:	MS 5B						
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)		
					+/-0.1	+/-0.5 °C	+/-5%		
1140			28.42	.25	6.23	20.15	1734	9.13	86
1143					6.12	17.62	1815	5.	8
1146			↓	↓	6.04	16.49	2191	3.49	414
1149			↓	↓	6.03	16.07	2208	2.31	504
1152			↓	↓	6.03	16.06	2221	2.19	65.9
1155			↓	↓	6.03	16.04	2207	2. -	72.3

PURGING DATA

Sample ID:	MW-8	Sampling Flow Rate:	25	
Sample Time:	1155	Final Depth to Water:	28.42	Apex N
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter S
3x40	HCl	VOC		
1x250	H2SO4	NO2/3		
1x250	-	NH3		

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Well ID:	MW-5	Job Number:	
Client:	NuStar Vene	Date:	10/6
Project:	GWM 3020	Sampler:	AS
Weather:	Sun 79°	Time In/Out:	1345-1440

WELL DATA

Monument Type:	Flush-mount/Stick-up Other:	Well Diameter:	2"	Depth to Free Product:	—
Monument Condition:	Good	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	29.19	Water Column Length:	—
Comments:		Screened Interval:	—	Purge Volume:	—

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA

Purge Method:	Peri low flow				Pump Intake Depth:	MS				
Sampling Method:					Tubing Material & Type:	JB		NEW / DEDICATED		
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					±0.1	±0.5 °C	±5%	±0.5 ppm	±20 mV	
1356			29.19	.25	6.58	21.31	1484	6.08	11.4	clear
1359			↓		6.70	20.64	1250	4.10	-46.1	↓
1402			↓		6.74	20.54	1127	3.79	-76.2	↓
1405			↓		6.75	20.57	1077	2.57	-89.6	↓
1408			↓		6.74	20.58	1070	2.70	-97.3	↓
1411			↓		6.71	20.55	1064	2.64	-101.6	↓

PURGING DATA

Sample ID:	MW-5	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:		Final Depth to Water:	29.19	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3 x 40	HCl	VOC	—	—	—	—
1 x 250	H2SO4	NO2/NO3	—	—	—	—
1 x 250	—	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-6		
Client:	Nu Star Vanc		10/3
Project:	GWM 3Q20	Sampler:	425
Weather:			750 BS

WELL DATA

Monument Type:	Flush-mount / Stick-up Other:	Well Diameter:	2"	Free Product Thickness:	
Monument Condition:	good	Well Depth:	28.22	Water Column Length:	
Well Cap Lock Present:	Yes No			Purge Volume:	
Comments:					
Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)					
Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653					

PURGING DATA

Purge Method:	BP lowflow				Pump Intake Depth:	MS SB				
Sampling Method:					Tubing Material & Type:	NEW / DEDICATED				
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)			Cond (µS/cm)			
					+/-0.1		+/-5%	+/-0.5 ppm	+/-20 mV	
803			28.22	2	7.52	14.60	402	1.42	217	w
806					7.07	3.52	430	3.30		
809					6.67	13.04	390	1.36	-44.1	
812					6.62	12.99	359	1.29	5	
815					6.0	93	346	1.25	8	
818					6.6	12.91	342	1.22	-57.0	

PURGING DATA

Sample ID:	MW-6	Sampling Flow Rate:	2				Apex N
Sample Time:	818	Final Depth to Water:	28.22				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x10	HCL	VOC	_____	_____	_____	_____	
1x20	P12504	NO2/3	_____	_____	_____	_____	
1x50	_____	NH3	_____	_____	_____	_____	

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID: MW-21i-105	Job Number:
Client: Nu Star	Date: 10/8
Project: GWM3020	Sampler: 403
Weather: Cloudy 65	Time In/Out: 9:15 -

WELL DATA

Monument Type: Flush-mount/Stick-up	Well Diameter: 2"	Depth to Free Product: -
Other: <u>good</u>	Well Depth: -	Free Product Thickness: -
Monument Condition: <u>good</u>	Depth to Water: 30.15	Water Column Length: -
Well Cap Lock Present: Yes No	Screened Interval: -	Purge Volume: -

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 1 gal = 3.785 liters

PURGING DATA


Purge Method:		BP low flows		Pump Intake Depth:		MS SB		NEW DEDICATED	
Sampling Method:				Tubing Material & Type:					
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)		Clarity/Color Other Remarks
					+/-0.1	+/-0.5°C	+/-5%	+/-0.5 ppm	+/-20 mV
920			30.15	2	6.91	13.88	574	3.02	-116.4
923			↓	↓	6.90	14.34	521	4.54	-110.1
926			↓	↓	6.94	14.87	480	4.90	-104.9
929			↓	↓	7.17	14.02	464	2.59	-111.6
932			↓	↓	7.21	14.03	470	2.41	-113.9
935			↓	↓	7.23	13.99	473	2.36	-119.1

PURGING DATA

Sample ID: MW-21i-105	Sampling Flow Rate: 2	Analytical Laboratory: Apex				
Sample Time: 9:35	Final Depth to Water: 30.15	Did Well Dewater: No				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x 40	Hoe	VOC				
1x 250	H2SO4	NO7/3				
1x 250	-	NH3				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID:	MW-22i	Job Number:	
	Client:	Nx Star Vanc	Date:	1/18
	Project:	9usm 3Q20	Sampler:	405 1000-
	Weather:	Cloudy 65°		

WELL DATA

Monument Type:	Flush-mount Stick-up Other:	Well Diameter:	2"	
Monument Condition:	good	Well Depth:	-	-
Well Cap Lock Present:	Yes No	Depth to Water:	30.50	Water Column Length: -
		Screened Interval:	-	-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 1 gal = 3.785 liters

PURGING DATA

Purge Method:		BP low flow		Pump Intake Depth:		MS SB		NEW / DEDICATED		Clarity/Color Other Remarks
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	+/-0.5 ppm	+/- 20 mV	
1002			30.50	.25	7.52	14.87	443	2.48	-105.9	cl
1005					7.44	15.04	383	6.46	-96.7	
1008					7.30	14.69	337	4.50	-71.6	
1011					6.97	14.04	350	3.61	-67.0	
1014					6.91	13.95	355	2.71	-70.1	
1017					6.90	13.98	360	2.60	-74.7	
1020					6.90	13.94	358	2.54	-76.0	

PURGING DATA

Sample ID:	MW-22i	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	1020	Final Depth to Water:	30.50	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Siz	MS/MSD	Duplicate ID
3x40	HCl	VOC				
1x250	H2SO4	NO2/3				
1x250		NH3				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-10	Job Num:	
Client:	Nu Star Vunc	Date:	10/8
Project:	GMM 3Q20	Sample:	1W5
Weather:	Cloudy 65°	Time In/Out:	10:40

WELL DATA

Monument Type:	Flush-mount/stick-up Other:	Well Diameter:	4"	Free Product Thickness:	-
Monument Condition:	good	Well Depth:	-	Water Column Length:	-
Well Cap Lock Present:	Yes No	Depth to Water:	28.42	Screened Interval:	-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	162	4-inch = 0.653
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PURGING DATA

Purge Method:		Pump Intake Depth:							
Sampling Method:	BP low flow	Tubing Material & Type:	SB MS NEW DEDICATED						
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	Clarity/Color	Other Remarks
					+/- 0.1	+/- 0.5 °C	+/- 5%	+/- 0.5 ppm	+/- 20 mV
1048			28.42	.25	6.77	14.25	465	-61.9	clear
1051			28.45		6.48	14.79	959	3.72	
1054			28.49		6.01	14.95	2234	5.21	-4.2
1057			28.58		5.76	14.35	2763	3.01	87
1100			28.64		5.74	14.32	2790	2.84	32.9
1103			28.75		5.73	14.29	2804	2.80	38.3

PURGING DATA

Sample ID:	MW-10	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex No	
Sample Time:	1103	Final Depth to Water:	28.90			
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x 40	ACE	VOC	---	---	---	---
1x 250	H2804	NO2/3	---	---	---	---
1x 250	---	NH7	---	---	---	---

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-14	Job Number:	10/8
Client:	Nu Star Vane		
Project:	GWM 3Q19		
Weather:	Cloudy 65°	Time In/Out:	1125

WELL DATA

Monument Type:	Flush-mount Stick-up Other:	Well Diameter:	4"	Free Product Thickness:	-
Monument Condition:	good	Well Depth:	-	Water Column Length:	-
Well Cap Lock Present:	Yes No	Depth to Water:	29.09	Screened Interval:	-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653

PURGING DATA

Purge Method:		BP		Pump Intake Depth:		MS		NEW / DEDICATED	
Sampling Method:		longflow		Tritium Material & Type		SB		/C1	
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	+/-0.5 ppm	+/-20 mV
1129			29.09	.2	6.29	15.12	2544	3.4	13.9
1132			29.21		6.04	15.44	2184	4.51	11.6
1135			29.40		6.53	14.75	2242	1.96	14.7
1138			29.50		6.59	14.58	2253	1.38	15.9
1141			29.62		6.63	14.53	2250	.96	18.1
1144			29.69		6.65	14.52	2259	.82	18.1

PURGING DATA

Sample ID:	MW-14	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1144	Final Depth to Water:	29.8	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x 40	HCl	VOC				
1x 250	H ₂ SO ₄	NO ₂ /3				
1x 250	-	NH ₃				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-9		
Client:	NuStar Vene		
Project:	GWM 3Q25		4w/8
Weather:	Cloudy		1210

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	4"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	29.03	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653
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PURGING DATA

Purge Method:		Pump Intake Depth:	
Sampling Method:	BP low flow	Tubing Material & Type:	MS SB NEW DEDICATED

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)			
					+/-0.1	+/-0.5 °C	+/-5%			
1215			29.03	.25	6.92	15.06	2116	.79	-13.9	low
1218			29.05		6.80	14.96	1914	1.7	-10.8	
1221					6.64	14.01	1290	1.52	0.4	
1224					6.40	13.21	1004	.85	6.38	
1227					6.37	13.05	928	.53	19.7	
1230					6.32	12.99	915	.50	21.4	
1233					6.29	12.95	910	.45	23.9	


PURGING DATA

Sample ID:	MW-9	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex
Sample Time:	1233	Final Depth to Water:	29.05	Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID

3x40	HCl	VOC				
1x250	H2SO4	NO2/NO3				
1x250	—	NH3				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID:	MW-7	Job Number:	
	Client:	New Star Vanc	Date:	10/4/20
	Project:	925M3Q20	Sampler:	
	Weather:	Cloudy	Time In/Out:	1245 1345

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	4"	Free Product Thickness:	-
	Other:	Well Depth:	-	Water Column Length:	-
Monument Condition:	good	Depth to Water:	29.03	Purge Volume:	
Well Cap Lock Present:	Yes No	Screened Interval:			

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2 inch - 0.162

PURGING DATA

Purge Method:		BP low flow		Pump Intake Depth:				NEW / DEDICATED	
Sampling Method:				Tubing Material & Type					
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rat (L/min)	pH	Temp (°C)	Cond (µS/cm)		
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV
1300			29.03	2	6.02	13.92	935	1.52	3.1
1303			29.17		6.30	14.40	831	2.61	30.0
1306			29.24		6.52	14.11	646	1.5	25.7
1309			29.30		6.61	13.85	575	1.64	23.9
1312			29.35		6.67	13.83	575	1.53	20.9
1315			29.41		6.64	13.83	576	1.65	18

PURGING DATA

Sample ID:	MW-7	Sampling Flow Rate:	2	Analytical Laboratory:	Apex
Sample Time:	1315	Final Depth to Water:	29.65	Did Well Dewater:	N
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	
3x40	HCl	VOC			
2x40	HCl	RSE			
1x250	H2SO4	NO2/3			
1x250	-	NH3			
3x40	HCl	VOC			MW 7 Dup
2x40	HCl	RSE			

NOTES/ADDITIONAL COMMENTS

1x250	H2SO4	NO2/3			
1x250	-	RSE			

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MP-1	Job Number:	
Client:	Nu Star Vanc		10/8
Project:	GLM, 3020	Sampler:	AW
Weather:	Cloudy	Time In/Out:	1400

WELL DATA

Monument Type:	Flush-mount Stick-up <i>Other:</i>	Well Diameter:	2"	Depth to Free Product:	-
Monument Condition:	good	Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	Yes No	Depth to Water:	29.17	Water Column Length:	-
		Screened Interval:	-	Purge Volume:	-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2 inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA

Purge Method:	BP	Pump Intake Depth:	MS
Sampling Method:	lowflow	Tubing Material & Type:	SB NEW / D

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	
					+/-0.1	+/-0.5 °C	+/-5%		+/-20 mV
1414			29.17	.25	7.30	16.29	903	10.32	2.4
1417			29.25	↓	7.29	15.37	948	5.30	1.4
1420			29.51	↓	7.22	14.49	939	2.25	2.0
1423			29.37	↓	7.18	14.22	929	1.9	1.8
1426			29.42	↓	7.17	14.18	927	1.70	1.6
1429			29.46		7.17	14.17	930	1.80	1.6

PURGING DATA

Sample ID:	MP-1	Sampling Flow Rate:	29.54	Analytical Laboratory:	
Sample Time:	1429	Final Depth to Water:	29.59	Did Well Dewater:	
No. of Containers/Type	Preservative	Analysis/Method		Field Filtered	Filter Size

3x 40					
2x 40					
1x 250					
1x 25					

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-24D	Job Number:	
Client:	New Star Vanc	Date:	10/9
Project:	GWM 3Q20	Sampler:	4w
Weather:	Pt Sun	Time In/Out:	7:45

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	31.22	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA

Purge Method:	BP low flow			Pump Intake Depth:	MS					
Sampling Method:				Tubing Material & Type:	SB		NEW / DEDICATED			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
806			31.22	.25	9.04	13.81	265	6.72	-85.0	clear
809					8.96	12.77	271	2.45	-103.7	
812					8.79	12.28	277	1.36	-121.1	
815					8.77	12.16	280	1.27	-129.8	
818					8.78	12.13	280	1.32	+134.6	minus 4w
821					8.87	12.11	281	1.20	-136.4	
824					8.87	12.12	280	1.17	-137.7	

PURGING DATA

Sample ID:	MW-24D	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	824	Final Depth to Water:	31.22	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x 40	HCL	VOC	—	—	—	—
1x 250	H2SO4	NO2/3	—	—	—	—
1x 250	—	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MW-24i	Job Number:	
Client:	Nu Star Vene	Date:	10/9
Project:	GUM 3Q 20	Sampler:	965
Weather:	Pt Sun 65	Time In/Out:	8:45

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	30.12	Water Column Length:	—
Well Cap Lock Present:	Yes	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA

Purge Method:		Pump Intake Depth:								
Sampling Method:	BP low flow	Tubing Material & Type:	MS SB							
			NEW / DEDICATED							
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
850			30.12	.25	8.80	13.0	248	3.40	-129.5	clear
853					8.69	13.65	178	6.77	-112.4	
856					8.51	13.72	123	6.34	-91.3	
859					8.09	13.63	110	4.54	-67.8	
902					7.90	13.62	108	4.09	-66.1	
905					7.47	13.62	111	3.77	-65.0	
908					7.41	13.63	110	3.64	-63.8	
911					7.38	13.63	110	3.60	-63.2	

PURGING DATA

Sample ID:	MW-24i	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	9/1	Final Depth to Water:	30.12	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCL	VOC	—	—	—	—
2x40	HCL	RSK	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x250	—	NH3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-325	Job Number:	
Client:	NuStar Vene	Date:	1/19
Project:	GLWM 3020	Sampler:	425 945
Weather:	Sun 65°		

WELL DATA

Monument Type:	Flush-mount/Stick-up Other:	Well Diameter:	2"	
Monument Condition:	good	Well Depth:		
Depth to Water:	29.64	Water Column Length:		
Well Cap Lock Present:	No	Screened Interval:		Purge Volume:

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 162 4-inch = 0.653

PURGING DATA

Purge Method:	Dedicated low flow				Pump Intake Depth:	MS				
Sampling Method:					Tubing Material & Type:	LDPE		NEW / DEDICATED		
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)			
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
951			29.64	.25	7.71	15.04	146	7.80	-16.4	cle
954			29.65	0.1	7.31	15.07	383	3.19	-22.1	
957			↓	↓	7.20	15.02	450	1.72	-26.2	
1000			↓	↓	7.17	15.03	470	1.25	-31.0	
1003			↓	↓	7.15	15.10	483	.93	37.4	
1007			↓	↓	7.15	15.09	485	.79	-39.9	

PURGING DATA

Sample ID:	MW-325	Sampling Flow Rate:	25 0.1	Analytical Laboratory:	Apex No	
Sample Time:	1007	Final Depth to Water:	29.65	Did Well Dewater:		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC				
1x250	H2SO4	NO2/3				
1x250		NH3				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Well ID:	MW-14	Job Number:	
Client:	NuStar Venice	Date:	10/4/10
Project:	GWSM 3020		
Weather:	Sun	Time In/Out:	1000

WELL DATA

Monument Type:	Flush mount/Struck-up	Well Diameter:	4"	Depth to Free Product:	-
	Other:	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	good	Depth to Water:	83.5'	Water Column Length:	
Well Cap Lock Present:	Yes No	Screened Interval:		Purge Volume:	-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 162

PURGING DATA


Purge Method:	BP low flow				Pump Intake Depth:	MS				
Sampling Method:					Tubing Material & Type:	B		NEW		
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)		
					+/-0.1	+/-0.5 °C		+/-0.5 ppm		
1038			28.35	25	7.86	16.54	1581	1.2	-65.7	clear
1039					7.81	16.24	1796	1.4	-65.4	
1042					5.98	16.08	1864		6.6	
1045					6.02	16.12	1906	.97	-67.9	
1048					6.04	16.15	1918	.90	-70.7	

PURGING DATA

Sample ID:	MW-14	Sampling Flow Rate:	.25	Analytical Laboratory:	Ayco
Sample Time:	1048	Final Depth to Water:	28.35	Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	Duplicate ID
2 x 40	HCl	RSh			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID: <u>MGMS2-40</u>	Job Number: _____
	Client: <u>NuStar VANCOUVER</u>	Date: <u>12/8/2020</u>
	Project: <u>VAN Terminal 2 GWM 4020</u>	Sampler: <u>W</u>
	Weather: <u>Sunny</u>	Time In/Out: <u>800/835</u>

WELL DATA

Monument Type:	Flush-mount/Stick-up <u>Other: Vanit (MGMS)</u>	Well Diameter: <u>—</u>	Depth to Free Product: <u>—</u>
Monument Condition:		Well Depth: <u>—</u>	Free Product Thickness: <u>—</u>
Well Cap Lock Present:	Yes No <u>N/A</u>	Depth to Water: <u>27.78</u>	Water Column Length: <u>—</u>
		Screened Interval: <u>—</u>	Purge Volume: <u>—</u>

Comments: _____

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):
 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:		<u>Puri pump</u>			Pump Intake Depth:		<u>Apex Screen</u>			
Sampling Method:		<u>WV Flow</u>			Tubing Material & Type:		<u>LDP</u>			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
813			27.78	0.2	7.37	13.48	1803	10.16	23.7	clear
816			27.80	↓	7.31	14.04	1789	2.71	12.5	↓
819			27.83	↓	7.32	14.10	1782	1.82	1.6	↓
822			27.86	↓	7.35	14.01	1764	1.45	-14.5	↓
825			27.89	↓	7.35	14.09	1771	1.20	-17.1	↓
828			27.92	↓	7.35	14.14	1772	1.07	-19.5	↓

PURGING DATA

Sample ID: <u>MGMS2-40</u>	Sampling Flow Rate: <u>0.2</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>825</u>	Final Depth to Water: <u>27.96</u>	Did Well Dewater: <u>NO</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<u>3x40</u>	<u>HCl</u>	<u>VOCS</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
<u>1x250</u>	<u>H2SO4</u>	<u>NH3</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
<u>1x250</u>	<u>—</u>	<u>NO2/NO3</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
<u>2x40</u>	<u>H2I</u>	<u>TOC/RSK175</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MGMMS1-43	Job Number:	
Client:	NuStar VAN COUVER	Date:	12/10/2020
Project:	Portland Terminal 25A 2020 GWM	Sampler:	LW
Weather:	Pt. sunny	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Stick-up Other: Vault	Well Diameter:	7	Depth to Free Product:	-
Monument Condition:		Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	Yes No N/A	Depth to Water:	27.85	Water Column Length:	-
Screened Interval:		Purge Volume:			

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:		per. / BP		Pump Intake Depth:		ms		NEW / DEDICATED			
Sampling Method:		LF		Tubing Material & Type:		LDPE					
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color	Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV		
1124			27.85	0.2	6.23	11.99	194	20.01	186.5	clear	
1127			↓	↓	6.65	12.36	2054	3.86	145.5	↓	
1130			↓	↓	6.74	12.56	2140	2.95	132.7	↓	
1133			↓	↓	6.79	12.71	2168	2.60	123.0	↓	
1136			↓	↓	6.85	13.25	2226	1.92	109.1	↓	
1139			↓	↓	6.87	13.87	2260	1.78	103.2	↓	
1142			↓	↓	6.89	14.31	2321	1.46	98.1	↓	
1145			↓	↓	6.89	14.28	2329	1.26	95.2	↓	

PURGING DATA

Sample ID:	MGMMS1-43	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex	
Sample Time:	1140	Final Depth to Water:	27.85	Did Well Dewater:	no	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	H21	VOL5				
1x150	H2504	NH3				
1x250		NO2/NO3				
2x40	H21	TOL/RSK-175				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

 Cascadia Associates, LLC	Well ID: <u>MW-26</u>	Job Number:	Date: <u>12/9/2020</u>
	Client: NuStar <u>VANCONVERT</u>	Sampler: <u>LW</u>	
	Project: Portland <u>4020</u>	Time In/Out:	
	Weather: <u>overcast</u>		

WELL DATA

Monument Type:	Flush-mount <input checked="" type="radio"/> Stick-up	Well Diameter: <u>2"</u>	Depth to Free Product: <u>—</u>
	Other:	Well Depth: <u>—</u>	Free Product Thickness: <u>—</u>
Monument Condition:	<u>good</u>	Depth to Water: <u>28.20</u>	Water Column Length: <u>—</u>
Well Cap Lock Present:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Screened Interval: <u>—</u>	Purge Volume: <u>—</u>

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method: <u>BF</u>	Pump Intake Depth: <u>MS</u>
Sampling Method: <u>LF</u>	Tubing Material & Type: <u>SB</u> NEW / <input checked="" type="radio"/> DEDICATED


Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1006			28.20	0.15	5.59	11.34	2047	10.15	197	clear ↓
1009			28.16		5.64	13.77	3916	7.12	174	
1012			↓	↓	6.00	14.27	4178	5.33	143	
1015			↓	↓	6.11	14.47	4074	4.55	129	
1018			↓	↓	6.15	14.61	3757	4.09	120.3	
1021			↓	↓	6.16	14.63	3699	4.06	119.9	
1024			↓	↓	6.16	14.64	3670	3.99	119.1	
1027										

PURGING DATA

Sample ID: <u>MW-26</u>	Sampling Flow Rate: <u>0.15</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1020</u>	Final Depth to Water: <u>28.16</u>	Did Well Dewater: <u>No</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<u>3x40</u>	<u>HCl</u>	<u>VOCS</u>				
<u>1x750</u>		<u>NO2/NO3</u>				
<u>1x750</u>	<u>H7504</u>	<u>NH3</u>				
<u>2x40</u>	<u>HCl</u>	<u>TOL, RSK-175</u>				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID:	MW-24i	Job Number:	
	Client:	NuStar VANCOUVER	Date:	12/10/20 12/10
	Project:	24th Street 4020	Sampler:	LW
	Weather:	Overcast	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2i	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	Good	Depth to Water:	29.40	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		BP		Pump Intake Depth:		MS		NEW / DEDICATED		
Sampling Method:		LF		Tubing Material & Type:		SB				
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
915			29.45	0.2	7.23	10.81	138	19.33	98.5	clear
918					7.07	12.93	208	11.58	98.5	
921					7.02	13.00	217	11.30	95.1	
924					6.97	13.12	232	10.95	91.2	
927					6.99	13.13	234	10.67	88.6	
930					7.00	13.19	234	10.10	83.6	
933					6.96	13.21	235	10.01	81.1	
936					6.98	13.28	236	9.52	78.8	
939					6.98	13.19	236	9.31	77.5	
942					6.98	13.19	235	9.37	77.2	
945										

PURGING DATA

Sample ID:	MW-24i	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apix
Sample Time:	930	Final Depth to Water:	29.40	Did Well Dewater:	NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x40	HCl	VOCS			
1x250	—	NO2/NO3			
1x250	H2SO4	NH3			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

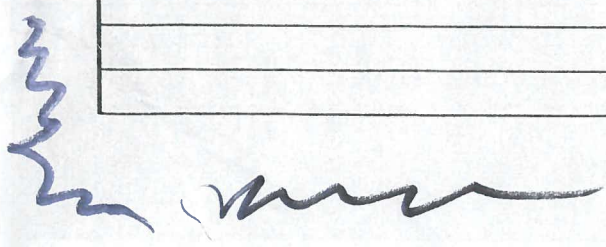
	Well ID: <u>EW-1</u>	Job Number:	
	Client: <u>NuStar VANCOUVER</u>	Date: <u>12/9/2020</u>	
	Project: <u>Portland Terminal 12512020 GWM 4020</u>	Sampler: <u>LW</u>	
	Weather: <u>Sunny</u>	Time In/Out:	

WELL DATA			
Monument Type:	Flush-mount/Stick-up <u>(circled)</u> Other:	Well Diameter: <u>2"</u>	Depth to Free Product: <u>-</u>
Monument Condition:	<u>good</u>	Well Depth: <u>28.2</u>	Free Product Thickness: <u>-</u>
Well Cap Lock Present:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth to Water: <u>26.8</u>	Water Column Length: <u>-</u>
Comments:	<u>Recently repaired downed well</u>		
Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)			
Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA										
Purge Method:		<u>BP LF</u>			Pump Intake Depth:		<u>MS</u>			
Sampling Method:					Tubing Material & Type:		<u>SB</u>		NEW	<u>DEDICATED</u> (circled)
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
1419			<u>26.2</u>	<u>0.2</u>	<u>7.08</u>	<u>14.24</u>	<u>266</u>	<u>19.74</u>	<u>66.8</u>	<u>clear</u>
1422			↓	↓	<u>6.76</u>	<u>14.83</u>	<u>247</u>	<u>6.48</u>	<u>73.8</u>	↓
1425			↓	↓	<u>6.72</u>	<u>15.10</u>	<u>236</u>	<u>6.25</u>	<u>78.7</u>	↓
1428			↓	↓	<u>6.71</u>	<u>15.25</u>	<u>230</u>	<u>6.23</u>	<u>81.6</u>	↓
1431			↓	↓	<u>6.71</u>	<u>15.24</u>	<u>230</u>	<u>6.17</u>	<u>82.6</u>	↓
1434			↓	↓	<u>6.71</u>	<u>15.11</u>	<u>230</u>	<u>6.24</u>	<u>83.4</u>	↓
1437										
1440										

PURGING DATA							
Sample ID:	<u>EW-1</u>	Sampling Flow Rate:	<u>0.2</u>	Analytical Laboratory:	<u>paper</u>		
Sample Time:	<u>1440</u>	Final Depth to Water:	<u>26.2</u>	Did Well Dewater:	<u>no</u>		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
<u>3x40</u>	<u>HA</u>	<u>VOLS</u>					
<u>1x200</u>	<u>-</u>	<u>NO2/NOS</u>					
<u>1x200</u>	<u>MSD4</u>	<u>NHS</u>					

NOTES/ADDITIONAL COMMENTS



WELL MONITORING DATA SHEET



Well ID:	MW-21-40	Job Number:	
Client:	NuStar VANCOUVER	Date:	12/9/2020
Project:	Portland Terminal #22020 GWM 4020	Sampler:	LW
Weather:	Clear	Time In/Out:	

WELL DATA

Monument Type:	Flush mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	28.5'	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA

Purge Method:	BP			Pump Intake Depth:	MS					
Sampling Method:	L			Tubing Material & Type:	SB			NEW / DEDICATED		
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1321			28.5'	0.2	6.79	13.12	417	20.38	89.0	Clear
1324					6.72	13.65	334	6.60	83.0	
1327					6.76	13.98	328	5.01	79.1	
1330					6.80	14.14	287	4.74	75.4	
1333					6.82	14.20	278	3.76	71.9	
1336					6.85	14.11	275	3.41	69.8	
1339					6.82	14.00	273	3.10	69.4	
1342					6.84	14.11	272	2.81	68.4	
1345					6.84	14.21	272	2.56	67.4	
1348					6.84	14.23	273	2.32	66.4	

PURGING DATA

Sample ID:	MW-21-40	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex
Sample Time:	1340	Final Depth to Water:	28.5'	Did Well Dewater:	NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x40	HCl	VOLs			
1x250	H2SO4	NH3			
1x250	—	NO2/NO3			

NOTES/ADDITIONAL COMMENTS

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WELL MONITORING DATA SHEET



Well ID:	MW-26	Job Number:	
Client:	NuStar VANCOUVER	Date:	12/9/2020
Project:	XXXXXXXXXXXXXXXXXXXX 4020	Sampler:	LN
Weather:	overcast / lt. rain	Time In/Out:	

WELL DATA

Monument Type:	Flush mount/Stick-up	Well Diameter:	4"	Depth to Free Product:	-
	Other:	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	good	Depth to Water:	27.39	Water Column Length:	-
Well Cap Lock Present:	Yes No	Screened Interval:	-	Purge Volume:	-

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:	BP			Pump Intake Depth:	MS					
Sampling Method:	LF			Tubing Material & Type:	SB			NEW / <u>DEDICATED</u>		
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1243			27.39	0.2	7.04	12.39	265	8.38	64.5	clear
1246			27.60		6.71	13.37	417	5.99	79.7	
1249					6.67	13.58	449	4.64	81.9	
1252					6.64	13.60	471	4.36	82.2	
1255					6.65	13.54	481	4.10	81.9	
1258					6.64	13.53	486	3.93	81.8	

PURGING DATA

Sample ID:	MW-26	Sampling Flow Rate:	0.2	Analytical Laboratory:	Agco MS
Sample Time:	1300	Final Depth to Water:	27.60	Did Well Dewater:	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD
3x40	H21	NO ₂			
1x20	H2504	NH ₃			
1x250		NO ₂ /NO ₃			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Well ID:	<u>MW-20i</u>	Job Number:	
Client:	NuStar <u>VANCOUVER</u>	Date:	<u>12/19/2020</u>
Project:	Northland Terminal ASBESTOS GWMT <u>402</u>	Sampler:	<u>LW</u>
Weather:	<u>Overcast</u>	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	<u>2"</u>	Depth to Free Product:	<u>—</u>
	Other:	Well Depth:	<u>—</u>	Free Product Thickness:	<u>—</u>
Monument Condition:	<u>good</u>	Depth to Water:	<u>27.74</u>	Water Column Length:	<u>—</u>
Well Cap Lock Present:	<u>es</u> No	Screened Interval:	<u>—</u>	Purge Volume:	<u>—</u>

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		<u>BP</u>			Pump Intake Depth:		<u>MS</u>		NEW / <u>DEDICATED</u>	
Sampling Method:		<u>LF</u>			Tubing Material & Type:		<u>SB</u>			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
<u>1148</u>			<u>27.74</u>	<u>0.2</u>	<u>7.15</u>	<u>12.38</u>	<u>168</u>	<u>8.50</u>	<u>69.1</u>	<u>clear</u>
<u>1151</u>			↓	↓	<u>6.91</u>	<u>12.92</u>	<u>121</u>	<u>7.11</u>	<u>75.4</u>	↓
<u>1154</u>			↓	↓	<u>6.70</u>	<u>13.19</u>	<u>113</u>	<u>4.69</u>	<u>87.6</u>	↓
<u>1157</u>			↓	↓	<u>6.72</u>	<u>13.18</u>	<u>125</u>	<u>3.66</u>	<u>80.1</u>	↓
<u>1200</u>			↓	↓	<u>6.86</u>	<u>13.17</u>	<u>178</u>	<u>1.84</u>	<u>78.8</u>	↓
<u>1203</u>			↓	↓	<u>6.90</u>	<u>13.22</u>	<u>201</u>	<u>1.43</u>	<u>73.7</u>	↓
<u>1206</u>			↓	↓	<u>6.91</u>	<u>13.24</u>	<u>203</u>	<u>1.21</u>	<u>72.3</u>	↓

PURGING DATA

Sample ID:	<u>MW-20i</u>	Sampling Flow Rate:	<u>0.2</u>	Analytical Laboratory:	<u>APCO</u>
Sample Time:	<u>1210</u>	Final Depth to Water:	<u>27.74</u>	Did Well Dewater:	<u>NO</u>
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD
<u>3x40</u>	<u>HU</u>	<u>VOLs</u>	<u>—</u>	<u>—</u>	<u>—</u>
<u>1x250</u>	<u>H2SO4</u>	<u>NH3</u>	<u>—</u>	<u>—</u>	<u>—</u>
<u>1x250</u>	<u>—</u>	<u>N02/N03</u>	<u>—</u>	<u>—</u>	<u>—</u>

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID:	MW-18i	Job Number:	
	Client:	NuStar VANCOUVER	Date:	12/9/2020
	Project:	Portland T... 4020	Sampler:	lw
	Weather:	Sunny	Time In/Out:	

WELL DATA

Monument Type:	Flush Mount/Stick-up	Well Diameter:	24	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	GOOD	Depth to Water:	28.39	Water Column Length:	—
Well Cap Lock Present:	(Yes) No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		Sampling Method:		Pump Intake Depth:		Tubing Material & Type:		NEW / DEDICATED		Clarity/Color Other Remarks
BP		LF		MS		SR				
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1053			28.39	0.2	6.28	12.79	2198	6.40	102.1	clear
1056			↓	↓	6.70	13.75	630	8.76	87.4	↓
1059			↓	↓	7.01	13.56	187	6.58	69.7	↓
1102			↓	↓	7.09	13.49	147	6.11	67.1	↓
1105			↓	↓	7.11	13.47	145	5.99	66.9	↓
1108			↓	↓	7.12	13.45	141	5.85	66.5	↓
1111										

PURGING DATA

Sample ID:	MW-18i	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex	
Sample Time:	1110	Final Depth to Water:	28.39	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3 X 40	HCl	VOCs				
1 X 250	—	MS2/MS3				
1 X 250	H2SO4	NH3				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID: <u>MW-251</u>	Job Number:
	Client: <u>NuStar VANCOUVER</u>	Date: <u>12/9/2020</u>
	Project: <u>2019-2020 CWM 4020</u>	Sampler: <u>LN</u>
	Weather: <u>overcast</u>	Time In/Out:

WELL DATA			
Monument Type:	Flush-mount/Stick-up	Well Diameter: <u>2"</u>	Depth to Free Product: <u>—</u>
	Other:	Well Depth: <u>—</u>	Free Product Thickness: <u>—</u>
Monument Condition:	<u>good</u>	Depth to Water: <u>28.01</u>	Water Column Length: <u>—</u>
Well Cap Lock Present:	<u>Yes</u> No	Screened Interval: <u>—</u>	Purge Volume: <u>—</u>

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)


Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA										
Purge Method:		<u>BP</u>			Pump Intake Depth:		<u>MS</u>			
Sampling Method:		<u>LF</u>			Tubing Material & Type:		<u>SBS</u>			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
852			28.01	0.10	6.95	10.54	122	12.44	84.0	clear
855			28.21		7.30	10.51	188	9.75	63.7	
858			28.42		7.27	10.68	189	9.85	64.4	
901			28.55	0.	7.22	10.78	190	9.95	63.7	
904			28.31		7.14	10.98	193	9.25	67.2	
907			28.01		7.08	11.05	195	8.69	66.9	
910			28.22		6.98	11.00	196	8.40	70.6	
913			28.11		6.97	10.91	197	7.69	70.8	
916			28.00		6.95	10.91	197	6.93	71.0	
919			28.17		6.94	10.92	197	6.55	71.1	
922			28.35		6.97	10.97	198	4.51	69.9	
925			28.20		6.95	11.05	201	4.33	69.1	
928			28.01		6.95	11.06	200	4.01	68.5	

PURGING DATA							
Sample ID:	<u>MW-251</u>	Sampling Flow Rate:	<u>0.1</u>	Analytical Laboratory:	<u>Apex</u>		
Sample Time:	<u>9:10</u>	Final Depth to Water:	<u>28.35</u>	Did Well Dewater:	<u>no</u>		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
<u>3x40</u>	<u>HCl</u>	<u>VLS</u>					
<u>1x250</u>	<u>—</u>	<u>NO2/MO3</u>					
<u>1x250</u>	<u>H2SO4</u>	<u>NO3</u>					

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID: <u>MW-23i</u>	Job Number:
	Client: <u>NuStar VANCOUVER</u>	Date: <u>12/9/2020</u>
	Project: <u>Terminal 2012020 SWM 4020</u>	Sampler: <u>EW</u>
	Weather: <u>overcast 46°F</u>	Time In/Out:

WELL DATA	
Monument Type: <u>Flush-mount/Stick-up</u>	Well Diameter: <u>2"</u>
Other:	Well Depth: <u>29.62</u>
Monument Condition: <u>good</u>	Depth to Water: <u>29.62</u>
Well Cap Lock Present: <u>Yes</u> No	Screened Interval:
Comments:	Purge Volume:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)


Water height multipliers (gal):
 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA										
Purge Method: <u>BP LF</u>				Pump Intake Depth: <u>10'</u>						
Sampling Method: <u>LF</u>				Tubing Material & Type: <u>SB LF</u>				NEW / DEDICATED		
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					±/0.1	±/0.5°C	±/5%	±/0.5 ppm	±/20 mV	
753			29.64	0.1	7.68	11.13	215	16.56	28.4	clear
756			↓	↓	7.56	12.30	211	12.22	39.4	↓
759			↓	↓	7.55	12.57	210	11.37	45.0	↓
802			↓	↓	7.54	12.68	210	11.22	45.7	↓
808			↓	0.2	7.57	13.49	208	10.59	48.0	↓
811			↓	↓	7.29	13.76	209	8.24	55.2	↓
814			↓	↓	7.26	13.61	209	7.49	56.1	↓
817			↓	↓	7.23	13.66	208	6.41	57.5	↓
820			↓	↓	7.22	13.70	207	5.78	57.9	↓
823			↓	↓	7.22	13.76	207	5.53	58.0	↓
826			↓	↓	7.21	13.78	208	5.44	58.2	↓

PURGING DATA							
Sample ID: <u>MW-23i</u>	Sampling Flow Rate: <u>0.2</u>	Analytical Laboratory: <u>APX</u>					
Sample Time: <u>810</u>	Final Depth to Water: <u>29.64</u>	Did Well Dewater: <u>NO</u>					
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
<u>3x40</u>	<u>HCl</u>	<u>VOCS</u>					
<u>1x250</u>	<u>-</u>	<u>MTS</u>					
<u>1x250</u>	<u>H2SO4</u>	<u>MUTUALS</u>					

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID: MAMS1-110	Job Number:	
	Client: NuStar VAN COWPER	Date: 12/8/2020	
	Project: Portland Terminal 25A2020 GWM 4020	Sampler: LW	
	Weather: sun	Time In/Out: 1020	

WELL DATA					
Monument Type:	Flush-mount/Stick-up	Well Diameter:	—	Depth to Free Product:	—
	Other: VAULT	Well Depth:	—	Free Product Thickness:	—
Monument Condition:		Depth to Water:	27.61	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters


PURGING DATA					
Purge Method:	BP / per LF		Pump Intake Depth:	MS	
Sampling Method:			Tubing Material & Type:	LDPE	

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1026			27.61	0.15	6.96	13.54	210	7.32	40.7	clear
1029			↓	↓	6.98	13.62	213	1.71	42.4	↓
1032			↓	↓	7.09	13.56	221	0.97	39.1	↓
1035			↓	↓	7.13	13.53	222	0.90	37.8	↓
1038			↓	↓	7.17	13.53	223	0.71	36.1	↓

PURGING DATA					
Sample ID:	MAMS1-110	Sampling Flow Rate:	0.15	Analytical Laboratory:	Apex
Sample Time:	1040	Final Depth to Water:	27.61	Did Well Dewater:	NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x40	H2O	VOL			
1x250	—	NO2/NO3			
1x250	H2SO4	NH3			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID: MGM52-132	Job Number:	
	Client: NuStar VMS	Date: 12/8/2020	
	Project: Portland Terminal 15A/170 GWM 492	Sampler: LU	
	Weather: Sun	Time In/Out: 9:30 / 10:15	

WELL DATA

Monument Type:	Flush-mount/Stick-up Other: VAULT (MGMS)	Well Diameter:	-	Depth to Free Product:	-
Monument Condition:		Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	Yes NO N/A	Depth to Water:	28104	Water Column Length:	-
		Screened Interval:	-	Purge Volume:	

Comments:

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal): 1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA


Purge Method:		Pre IBP		Pump Intake Depth:		MS		NEW / DEDICATED		
Sampling Method:		LF		Tubing Material & Type:		LDPE				
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
936			28.04	0.15	6.97	13.37	225	2.77	15.9	clear
939			↓	↓	6.98	13.46	232	1.73	5.5	
942			↓	↓	7.24	13.39	238	1.14	5.8	
945			↓	↓	7.37	13.26	239	0.95	-18.8	
948			↓	↓	7.55	13.40	242	0.76	-38.9	
951			↓	↓	7.60	13.44	244	0.74	-46.4	
954					7.62	13.44	243	0.75	-49.6	

PURGING DATA

Sample ID:	MGM52-132	Sampling Flow Rate:	0.15	Analytical Laboratory:	Apex	
Sample Time:	950	Final Depth to Water:	28104	Did Well Dewater:	N	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3X40	H2O	VOLs				
1X250	H2SO4	NH3				
1X250	-	N12/NP3				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

	Well ID: MGM12-110	Job Number:	
	Client: NuStar VANCOUVER	Date: 12/8/2020	
	Project: PERMIT 12020 GWM 442	Sampler: LW	
	Weather: sun	Time In/Out: 9:00/9:30	

WELL DATA			
Monument Type:	Flush-mount/Stick-up <u>Other: VANLI (MGMS)</u>	Well Diameter:	—
Monument Condition:	—	Well Depth:	—
Well Cap Lock Present:	Yes No N/A	Depth to Water:	28.19
Comments:		Screened Interval:	—
		Depth to Free Product:	—
		Free Product Thickness:	—
		Water Column Length:	—
		Purge Volume:	—

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)	
Water height multipliers (gal):	1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA			
Purge Method:	puri / BP	Pump Intake Depth:	MS
Sampling Method:	Low Flow	Tubing Material & Type:	LIPPE
			NEW / DEDICATED

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
9:06			28.19	0.19	6.70	13.09	191	10.70	56.2	clear
9:09					6.65	13.46	195	4.09	59.1	
9:12					6.88	13.79	200	2.27	49.9	
9:15					7.14	13.98	203	2.29	36.6	
9:18					7.26	14.09	204	2.25	31.8	
9:21					7.31	14.12	204	2.30	31.8	
9:24					7.30	14.16	204	2.31	31.2	
9:27										

PURGING DATA			
Sample ID:	MGM12-110	Sampling Flow Rate:	0.25
Sample Time:	9:20	Final Depth to Water:	28.19
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered Filter Size
3x40	H2O	VOLs	
1x250	—	NO2/NO3	
1x250	H2SO4	NO3	

NOTES/ADDITIONAL COMMENTS	

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	MGM52-60	Job Number:	
Client:	NuStar VANCOUVER	Date:	12/8/20
Project:	Terminal 25/2020 CWM 4/02	Sampler:	
Weather:	Sunny	Time In/Out:	835/900

WELL DATA

Monument Type:	Flush-mount/Stick-up <i>Other: VAULT (MGM)</i>	Well Diameter:	—	Depth to Free Product:	—
Monument Condition:		Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> N/A	Depth to Water:	28.48	Water Column Length:	—
Comments:		Screened Interval:	—	Purge Volume:	—

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)

Water height multipliers (gal):	1-inch well = 0.041	2-inch = 0.162	4-inch = 0.653	1 gal = 3.785 liters
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PURGING DATA

Purge Method:	<i>PERI</i>	Pump Intake Depth:	<i>MS</i>
Sampling Method:	<i>IF</i>	Tubing Material & Type:	<i>LDPE</i>

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	NEW / DEDICATED
										<input checked="" type="checkbox"/>
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
838			28.48	0.2	7.31	13.59	1077	1.68	-10.1	clear
841			↓	↓	7.26	13.85	433	1.60	5.1	↓
844			↓	↓	7.22	13.79	277	1.60	18.1	
847			↓	↓	7.14	13.85	230	1.42	27.5	
850			↓	↓	7.13	13.86	220	1.41	29.2	
853			↓	↓	7.12	13.89	212	1.41	31.1	

PURGING DATA

Sample ID:	MGM52-60	Sampling Flow Rate:	<i>0.2</i>	Analytical Laboratory:	<i>Apex</i>
Sample Time:	850	Final Depth to Water:	28.48	Did Well Dewater:	<i>NO</i>
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD
3x40	H2O	VOL			
1x250	—	NO2/NO3			
1x250	H2SO4	NO3			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET



Cascadia
Associates, LLC

Well ID:	M4ms1-60	Job Number:	
Client:	NuStar VANCOUVER	Date:	12/01/2020
Project:	Retrofit Treatment 2SA/020-0001A	Sampler:	EW
Weather:	Sunny	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Stick-up Other: UTM (MCM)	Well Diameter:	—	Depth to Free Product:	—
Monument Condition:		Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes No VIA	Depth to Water:	—	Water Column Length:	—
Comments:		Screened Interval:	—	Purge Volume:	—

Purge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)	
Water height multipliers (gal):	1-inch well = 0.041 2-inch = 0.162 4-inch = 0.653 1 gal = 3.785 liters

PURGING DATA

Purge Method:	Peri pump / BDF				Pump Intake Depth:	MS				
Sampling Method:	LF				Tubing Material & Type:	LDPE				
										NEW / DEDICATED
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1206			27.89	0.2	7.09	13.19	416	2.81	69.8	Clear
1209			↓	↓	7.08	14.00	233	1.71	66.9	
1212			↓	↓	7.17	14.46	197	1.21	62.6	
1215			↓	↓	7.16	14.50	189	1.16	60.2	
1218			↓	↓	7.14	14.61	183	1.11	59.6	

PURGING DATA

Sample ID:	M4ms1-60	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex	
Sample Time:	1220	Final Depth to Water:	2289	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3040	H2O	HVCLs				
1x250	—	NO2/NO3				
1x750	A2504	NH3				

NOTES/ADDITIONAL COMMENTS

12/14/2020 NuStar Vancouver - OAM

0650 - LW onsite, signed in to terminal
 0700 - H+S meeting at terminal. (but staff due to covid). Issued work permit
 0730 - Took measurements for SVE system
 System on when arrived, turned on after Tellure repaired system (12/7/20)

	PID	Pressure
pre blower	0.6	-18
post blower	52.9	30
post Carbon 1	25.2	17
post Carbon 2	21.9	6

0750 - Began sampling - SVE

SVE - South - Post Carbon - 12/4/20

$P_i = -30$ $P_f = -5$ $T_i = 815$ $T_f = 825$
 6L1201; #N0074; Flow: 1922

SVE - South - Pre Carbon - 12/4/20

$P_i = -29.5$ $P_f = -6$ $T_i = 835$ $T_f = 838$
 #N2525

Flow controller 1910



12/14/2020 NUTREX VAN SUB O+M (cont.) 29

845 - Emptied knockout drum of
blue water (~1 gal).

0900 - Transferred blue water to drum
in waste storage area.

APPENDIX B

HISTORICAL GROUNDWATER ANALYTICAL DATA

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-1	11/17/1993	--	500	--	--	<250	<250	--	14,000	--	--	750	<250	--	1,400	<500
	9/1/1995	<250	<500	<250	<250	<250	<250	<250	13,000	<250	<250	620	<250	--	890	610
	9/24/1996	<5	<20	<2	<2	54	<2	8.4	11,000	83	17	2,600	68	--	1,800	420
	12/2/1996	0.8	<0.50	<0.50	<0.20	6.7	<0.50	0.3	1,500	4.4	<0.20	1,200	7.3	--	310	1.6
	11/12/1997	<125	<250	<125	<125	<125	<125	<125	11,600	<125	<125	6,330	<125	--	2,880	<250
	8/11/1999	<50	<250	<25	<250	43.1	<25	<25	8,590	86	<25	2,520	52.5	--	1,210	408
	11/16/1999	<50	<125	<25	<50	38	<25	<25	6,250	47.5	<25	2,400	28	--	829	148
	2/29/2000	<100	<500	<50	<50	<50	<50	<50	6,720	60.9	<50	1,370	<100	--	590	438
	6/27/2000	<100	<500	<50	<50	<50	<50	<50	6,480	65.1	<50	1,780	<100	--	795	284
	8/31/2000	<100	<500	<50	<50	<50	<50	<50	5,160	<50	<50	1,960	<100	--	720	<50
	11/30/2000	<20	<100	<10	<10	15	<10	<10	1,550	12.7	<10	660	<20	--	234	<10
	2/27/2001	<100	<100	<50	<50	<50	<50	<50	4,990	<50	<50	1,140	<100	--	440	190
	5/29/2001	<50	<250	<25	<25	<25	<25	<25	4,050	<25	<25	1,040	<50	--	407	91
	9/25/2001	<50	<50	<50	<50	<50	<50	<50	5,000	<50	<50	890	<50	--	440	240
	12/17/2001	<2	<10	<1	<1	<1	<1	<1	109	1.26	<1	164	<2	--	42.9	<1
	3/19/2002	<50	<25	<25	<50	35	<25	<25	4,120	35	<25	710	<25	--	349	170
	5/30/2002	<10	<5	<5	<10	10.8	<5	<5	1,140	6.6	<5	307	<5	--	101	22.3
	11/8/2002	<20	<10	<10	<20	22.8	<10	<10	1,980	20.2	<10	367	<10	--	174	14.4
	5/30/2003	<20	<10	<10	<20	21.2	<10	<10	2,180	<10	<10	1,200	14.2	--	340	22.6
	11/2/2004	<20	<10	<10	<20	22.4	<10	<10	2,130	23.6	<10	335	<10	--	169	22.8
	11/16/2004	<12	<12	<12	<12	15	<12	<12	1,300	<12	<12	310	<12	--	130	<12
	5/18/2005	<5	<2.5	<2.5	<5	12	<2.5	<2.5	773	14.1	<2.5	193	<2.5	--	87.6	3.8
	5/23/2007	<10	<10	<10	<10	15.5	<10	<10	1,110	<10	<10	58.5	<10	--	45.4	11.7
	9/11/2007	<50	<25	<25	<50	<25	<25	<25	916	<25	<25	34	<25	--	34	62.5
	12/13/2007	<10	<5	<5	<10	9.7	<5	<5	526	5	<5	81.9	<5	--	45.4	8.8
	3/5/2008	<1	<0.500	<0.500	<1	16.1	<0.500	1.66	826	9.18	2.3	49.7	0.88	<0.500	45.6	58.8
	9/19/2008	<20	<10	<10	<20	20.4	<10	<10	633	<10	<10	108	<10	<10	74.8	<10
	12/10/2008	<2.5	<2.5	<2.5	<2.5	15	<2.5	<2.5	570	6.2	<2.5	28	<2.5	<2.5	25	48
	3/27/2009	<2.5	<2.5	<2.5	<2.5	17	<0.50	<2.5	580	5.7	<2.5	39	<2.5	<2.5	42	4.4
	6/17/2009	<0.90	<0.90	<0.90	<0.90	6.3	<0.90	<0.90	310	3.6	0.99	21	<0.90	<0.90	14	9.7
	9/18/2009	<0.80	<0.80	<0.80	<0.80	19	<0.80	<0.80	590	4.2	1.9	29	<0.80		27	8.1
	12/17/2009	<0.50	<0.50	<0.50	<0.50	4.8	<0.50	<0.50	170	0.72	0.67	53	0.53	<0.50	26	<0.50

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-1	3/19/2010	<0.50	<0.50	<0.50	<0.50	9.3	<0.50	0.61	300	3.6	1.4	22	<0.50	<0.50	21	26
(continued)	6/15/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	9.6	<0.50	<0.50	22	<0.50	<0.50	6.6	<0.50
	9/23/2010	<0.90	<0.90	<0.90	<0.90	12	<0.90	<0.90	380	3.4	1.6	25	<0.90	<0.90	27	7.1
	12/9/2010	<1.5	<1.5	<1.5	<1.5	7.1	1.5	<1.5	250	2.2	<1.5	25	<1.5	<1.5	17	8
	3/10/2011	<1.5	<1.5	<1.5	<1.5	7.5	<1.5	<1.5	250	3	<1.5	16	<1.5	<1.5	16	18
	6/9/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.4	<0.5	<0.5	11	<0.5	<0.5	3.4	<0.5
	9/19/2011	<1.5	<1.5	<1.5	<1.5	12	<1.5	<1.5	300	3.2	<1.5	5.2	<1.5	<1.5	13	30
	12/9/2011	<1.5	<1.5	<1.5	<1.5	11	<1.5	<1.5	260	2.9	<1.5	6.2	<1.5	<1.5	8.4	40
	3/9/2012	<0.50	<0.50	<0.50	<0.50	7.8	<0.50	<0.50	200	2.4	1	3.1	<0.50	<0.50	9.5	19
	6/22/2012	<0.5	<0.5	<0.5	<0.5	4.8	<0.5	<0.5	140	1.7	0.53	17	<0.5	<0.5	13	14
	9/13/2012	<1.5	<1.5	<1.5	<1.5	10	<1.5	<1.5	260	2.4	<1.5	<1.5	<1.5	<1.5	7	25
	12/13/2012	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	47	0.64	<0.50	26	<0.50	<0.50	14	<0.50
	3/15/2013	<0.50	<0.50	<0.50	<0.50	5.8	<0.50	<0.50	140	1.6	0.8	0.83	<0.50	<0.50	6	0.98
	6/13/2013	<0.50	<0.50	<0.50	<0.50	7.2	<0.50	<0.50	130	1.9	0.63	1.1	<0.50	<0.50	2.4	28
	9/19/2013	<0.50	<0.50	<0.50	<0.50	11	<0.50	<0.50	180	1.6	1	3.2	<0.50	<0.50	5.6	0.92
	12/16/2013	<0.50	<0.50	<0.50	<0.50	7.8	<0.50	<0.50	110	1.8	<0.50	8.5	<0.50	<0.50	5.9	13
	3/21/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	9.1	<0.50	<0.50	10	<0.50	<0.50	4.3	<0.50
	6/25/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.6	45	1	<0.50	<0.50	<0.50	<0.50	0.65	5.9
	9/30/2014	<0.50	<0.50	<0.50	<0.50	11	<0.50	<0.50	170	1.3	0.83	12	<0.50	<0.50	9.7	3.3
	12/11/2014	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	30	<0.50	<0.50	17	<0.50	<0.50	9.4	<0.50
	3/19/2015	<0.50	<0.50	<0.50	<0.50	6.2	<0.50	<0.50	47.4	0.67	<0.50	1.1	<0.50	<0.50	1.9	<5
	6/17/2015	<0.50	<0.50	<0.50	<0.50	9.5	<0.50	<0.50	75	0.8	<0.50	4.3	<0.50	<0.50	4.6	4.9
	9/24/2015	<0.50	<0.50	<0.50	<0.50	8.4	<0.50	<0.50	39.1	0.65	<0.50	2.8	<0.50	<0.50	2.4	32.7
	12/8/2015	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	25.2	<0.50	<0.50	18	<0.50	<0.50	8.9	<0.50
	3/7/2016	<0.50	<2	<5	<0.50	4.4	<0.50	<0.50	51.9	<0.50	<0.50	18	<0.50	<0.50	10.3	0.57
	6/15/2016	<0.50	<2	<0.50	<0.50	3.7	<0.50	<0.50	13.1	<0.50	<0.50	0.67	<0.50	<0.50	1.2	5.3
	9/27/2016	<0.50	<2	<0.50	<0.50	8.6	<0.50	<0.50	25.2	<0.50	<0.50	2.3	<0.50	<0.50	3.1	23.9
	12/16/2016	<0.50	<2	<0.50	<0.50	3.4	<0.50	<0.50	22.5	<0.50	<0.50	8	<0.50	<0.50	5.8	0.86
	3/30/2017	<0.50	<2	<0.50	<0.50	<0.5	<0.5	<0.50	1.6	<0.50	<0.50	4.6	<0.50	<0.50	1.6	<0.50
	6/12/2017	<2.0	<2.0	<0.50	<0.50	2.1	<1.0	<0.50	9.9	<0.50	<0.50	4.4	<0.50	<0.50	3.1	<0.50
	9/26/2017	<2.0	<2.0	<0.50	<0.50	6.8	<1.0	<0.50	6.7	<0.50	<0.50	1.5	<0.50	<0.50	1.6	22.6
	11/9/2017	<2.0	<2.0	<0.50	<0.50	5.00	<0.50	<0.50	22.80	<0.50	<0.50	9.50	<0.50	<0.50	6.50	1.1

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-1 (continued)	3/20/2018	<0.500	<2.50	<0.500	<0.500	4.84	<0.500	<0.500	6.13	<0.500	0.322 J	2.49	<0.500	<0.500	2.06	<0.500
	7/1/2018	<0.500	<2.50	<0.500	<0.500	6.70	<0.500	0.204 J	16.1	0.303 J	0.427 J	0.530	<0.500	<0.500	1.63	10.5
	9/25/2018	<1.00	<5.00	<1.00	<1.00	7.33	<0.400	0.740	44.9	0.610	0.510	4.24	<0.400	<0.500	8.09	3.19
	12/4/2018	<1.00	<5.00	<1.00	<1.00	4.73	<0.400	<0.400	22.7	<0.400	<0.500	15.700	<0.400	<0.500	9.04	2.57
	3/21/2019	<1.00	<5.00	<1.00	<1.00	4.37	<0.400	0.780	28.5	0.530	<0.500	2.78	<0.400	<0.500	6.65	0.400
	6/5/2019	<1.00	<5.00	<1.00	<1.00	2.54	<0.400	<0.400	27.6	0.481	<0.500	12.9	<0.400	<0.500	8.43	<0.400
	9/27/2019	<1.00	<5.00	<1.00	<1.00	8.66	<0.400	0.57	106	1.78	0.703	19.1	0.45	<0.500	18.4	2.97
	12/4/2019	<1.00	<5.00	<1.00	<1.00	3.22	<0.400	<0.400	26.6	0.494	<0.500	10.6	<0.400	<0.500	7.39	0.67
	3/10/2020	<1.00	<5.00	<1.00	<1.00	4.45	<0.400	<0.400	13.4	<0.400	<0.500	5.96	<0.400	<0.500	5.22	<0.400
	6/17/2020	<1.00	<5.00	<1.00	<1.00	2.95	<0.400	0.42	23.5	0.520	<0.500	12.1	<0.400	<0.500	7.75	0.46
	10/7/2020	<1.00	<5.00	<1.00	<1.00	6.45	<0.400	<0.400	104	1.41	<0.500	26.4	<0.400	<0.500	22.2	1.80
12/8/2020	<2.00	<5.00	<1.00	<1.00	5.47	<0.400	0.512	62.6	0.968	<0.500	19.0	<0.400	<0.500	12.3	1.42	
MW-2	11/17/1993	--	51	--	--	12	<0.50	--	10	--	--	<0.50	<0.50	--	<0.50	<0.10
	9/1/1995	<0.50	16	<0.50	<0.20	8.2	<0.50	<0.50	2.5	<0.50	<0.50	<0.50	<0.50	--	<0.50	2.2
	9/24/1996	<0.50	19	<0.20	<0.20	9.6	0.5	<0.20	9.4	<0.20	<0.20	<0.20	<0.50	--	0.3	5.1
	12/2/1996	<0.50	8.8	<0.50	<0.20	6.9	0.6	<0.20	11	<1	<0.20	<0.50	<1	--	<0.30	7.2
	11/13/1997	<0.50	<1	<0.50	<0.50	5.32	0.571	<0.50	7.9	<0.50	<0.50	<0.50	<0.50	--	<0.50	<1
	8/11/1999	<1	18.3	<0.50	<0.50	6.38	<0.50	<0.50	20	<0.50	<0.50	<0.50	<1	--	10.4	1.64
	2/29/2000	<1	16	<0.50	<0.50	5.68	<0.50	<0.50	23.5	<0.50	<0.50	<0.50	<1	--	4.52	1.21
	6/27/2000	<1	18.3	<0.50	<0.50	5.34	<0.50	1.27	23.4	<0.50	<0.50	12.8	<1	--	16.6	<0.50
	5/30/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1	--	<0.50	<0.50
	5/30/2002	<1	1.68	<0.50	<1	2.65	<0.50	<0.50	0.51	<0.50	<0.50	0.61	<0.50	--	<0.50	<0.50
	11/8/2002	<1	10.4	<0.50	<1	3.13	<0.50	<0.50	1.84	<0.50	<0.50	1.05	<0.50	--	0.98	<0.50
	5/30/2003	<1	3.64	<0.50	<1	1.95	<0.50	<0.50	0.59	<0.50	<0.50	6.6	<0.50	--	1.13	<0.50
	9/12/2007	<1	5.9	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	3/7/2008	<1	7.86	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.5	<0.500	<0.500	<0.500	<0.500
	9/18/2008	<1	5.93	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	3/24/2009	<0.50	4.8	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/16/2009	<0.50	5.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	0.85	<0.50
	3/19/2010	<0.50	5.7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/23/2010	<0.5	3.8	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	3/9/2011	<0.50	4.8	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
9/16/2011	<0.50	4.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
3/9/2012	<0.50	4.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
9/13/2012	<0.50	3.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
3/14/2013	<0.50	3.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
9/19/2013	<0.50	2.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-2 (continued)	3/21/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/30/2014	<0.50	2.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/19/2015	<0.50	0.96	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/23/2015	<0.50	2.7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/7/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/29/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/28/2017	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/25/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	11/6/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	7/2/2018	<0.500	3.0	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	9/25/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/21/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/5/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	9/27/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/5/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/12/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/17/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	10/8/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
12/9/2020					<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400	
MW-3	11/17/1993	--	210	--	--	27	4	--	240	--	--	190	20	--	97	130
	9/1/1995	<50	<100	<50	<50	<50	<50	<50	2,700	<50	<50	1,300	<50	--	140	730
	9/24/1996	<5	<20	7.9	<2	12	<2	<2	1,100	9.5	4	1,800	21	--	330	82
	12/2/1996	<50	<50	<50	<20	<30	<50	<20	650	<100	<20	2,100	<100	--	470	<50
	11/12/1997	<25	<50	<25	<25	<25	<25	<25	464	<25	<25	2,000	<25	--	241	<50
	8/11/1999	<20	<100	<10	<10	<10	<10	<10	500	<10	<10	1,760	25.4	--	247	<10
	11/16/1999	<20	<50	<10	<20	14	<10	<10	628	15.2	<10	700	<10	--	132	<10
	2/29/2000	<20	<100	<10	<10	<10	<10	<10	473	<10	<10	1,890	25.4	--	356	<10
	6/27/2000	<20	<100	<10	<10	<10	<10	<10	410	<10	10.2	1,460	<20	--	241	<10
	8/31/2000	<20	<100	<10	<10	52.2	<10	<10	2,580	25.5	<10	399	<20	--	100	171
	11/30/2000	<5	<25	<2.5	<2.5	13.3	<2.5	<2.5	374	3.73	<2.5	366	<5	--	80.3	3.1
	2/27/2001	<5	<25	3.64	<2.5	5.78	<2.5	<2.5	153	<2.5	2.5	358	<5	--	76.1	<2.5
	5/29/2001	<5	<25	2.8	<2.5	<2.5	<2.5	<2.5	112	<2.5	<2.5	647	5.12	--	93.3	<2.5
	9/25/2001	<1.3	3.1	2.4	<1.3	10	2	<1.3	210	3	1.7	550	7.2	--	90	4.9
	12/17/2001	<10	<50	<5	<5	<5	<5	<5	164	<5	<5	826	16.9	--	155	<5
	3/19/2002	<5	<2.5	2.75	<5	<2.5	<2.5	<2.5	138	4.1	<2.5	758	9.6	--	107	<2.5
5/30/2002	<10	7.8	<5	<10	27.8	<5	<5	1,380	42.6	6	302	11.5	--	55.1	96.7	
11/8/2002	<5	15	<2.5	<5	29.4	3.55	<2.5	399	9.05	5.7	359	5.8	--	67.1	19.4	
5/30/2003	<5	<2.5	6.45	<5	<2.5	<2.5	<2.5	50.1	3.65	<2.5	706	4.95	--	72.6	<2.5	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-3	11/16/2004	<10	<5	<5	<10	15	<5	<5	440	5.9	<5	270	<5	--	72	<5
(continued)	3/23/2005	<2	2.26	4.16 B	<2	8.92	<1	<1	246	8.4	2.86	329	5.04	--	71.9	3.84
	5/18/2005	<2	<1	3.86	<2	5.74	<1	<1	188	4.72	3.02	304	5.06	--	88.5	<1
	5/23/2007	<2	<2	<2	<2	<2	<2	<2	110	6.3	<2	349	4.54	--	70.6	<2
	9/11/2007	<5	9.95	14.4	<5	43	6.1	<2.50	950	28.2	12	601	31	--	223	6.1
	12/12/2007	<10	<5	<5	<10	<5	<5	<5	95.7	<5	<5	254	<5	--	63.2	<5
	3/6/2008	<1	<0.500	2.10 J	<1	1.32	<0.500	<0.500	127	8.49	2.37	144	5.66	<0.500	94.7	<0.500
	9/19/2008	<5	3.7	2.65 J	<5	10.6	<2.50	<2.50	187	5.85	2.95	283	6.6	<2.50	75	<2.50
	12/10/2008	<0.90	1.5	1.9	<0.90	5.3	1.2	<0.90	120	4.3	1.5	200	3.8	<0.90	54	<0.90
	3/26/2009	<0.50	<0.50	1.4	<0.50	1.6	<0.50	<0.50	83	4.3	1.2	180	3.6	<0.50	46	<0.50
	6/17/2009	<0.50	<0.50	1.1	<0.50	0.89	<0.50	<0.50	76	4.7	0.71	190	3.4	<0.50	49	<0.50
	9/18/2009	<0.50	<0.50	3.3	<0.50	10	<0.50	<0.50	180	6.2	2.2	270	7.3	<0.50	62	1.2
	12/17/2009	<0.90	<0.90	0.96	<0.90	<0.90	<0.90	<0.90	50	3.2	<0.90	180	3.2	<0.90	47	<0.90
	3/19/2010	<0.90	<0.90	1 BE	<0.90	<0.90	<0.90	<0.90	77	5.4	<0.90	280	4.1	<0.90	49	<0.90
	6/16/2010	<0.50	<0.50	2.3	<0.50	1.6	0.9	<0.50	42	1.7	<0.50	180	1.9	<0.50	30	<0.50
	9/23/2010	<0.5	<0.5	2.8 BE	<0.5	0.56	<0.5	<0.5	75	4.4	0.51	220	3	<0.5	39	<0.5
	12/9/2010	<0.5	<0.5	2.7	<0.5	<0.5	<0.5	<0.5	39	3.4	<0.5	210	3	<0.5	35	<0.5
	3/10/2011	<0.50	<0.50	5.4	<0.50	<0.50	<0.50	<0.50	8.9	1.1	<0.50	110	1.6	<0.50	15	<0.50
	6/10/2011	<0.5	<0.5	1.6	<0.5	2.2	0.76	<0.5	36	1.1	0.54	99	1.6	<0.5	30	<0.5
	9/16/2011	<0.50	<0.50	2	<0.50	3	0.59	<0.50	70	1.7	0.91	130	2.4	<0.50	31	<0.50
	12/9/2011	<0.50	<0.50	2.2	<0.50	2.9	0.54	<0.50	62	1.6	0.83	190	2.6	<0.50	45	<0.50
	3/12/2012	<0.50	<0.50	2.4	<0.50	0.83	<0.50	<0.50	52	2.8	1	140	3.1	<0.50	45	<0.50
	6/21/2012	<0.5	<0.5	2.3	<0.5	0.9	<0.5	<0.5	45	2.7	0.56	170	2.7	<0.5	37	<0.5
	9/13/2012	<0.50	<0.50	1.7	<0.50	4.1	<0.50	<0.50	100	2.1	1.4	140	3.3	<0.50	45	<0.50
	12/13/2012	<0.50	<0.50	1.3	<0.50	0.78	<0.50	<0.50	27	1.6	<0.50	170	2	<0.50	36	<0.50
	3/14/2013	<0.50	<0.50	1.8	<0.50	1	<0.50	<0.50	64	2.5	1.4	160	3.2	<0.50	53	<0.50
	6/14/2013	<0.90	<0.90	1.4	<0.90	1.1	<0.90	<0.90	68	3.1	1.3	210	3.3	<0.90	48	<0.90
	9/19/2013	<0.50	<0.50	1.1	<0.50	1.1	<0.50	<0.50	99	1.5	1.4	86	1.7	<0.50	30	<0.50
	12/16/2013	<0.50	<0.50	1.4	<0.50	1.3	<0.50	<0.50	47	2.1	0.81	170	2.4	<0.50	38	<0.50

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-3 (continued)	3/21/2014	<0.50	<0.50	1.3	<0.50	0.64	<0.50	<0.50	27	1.6	<0.50	150	2	<0.50	30	<0.50
	6/24/2014	<0.50	0.86	0.86	<0.50	1.4	<0.50	<0.50	65	3.2	1.3	180	3.2	<0.50	44	<0.50
	9/30/2014	<0.50	<0.50	1	<0.50	6.7	0.7	<0.50	110	2.1	1.3	180	2.8	<0.50	47	<0.50
	12/11/2014	<0.50	<0.50	1.2	<0.50	0.8	<0.50	<0.50	28	1.7	<0.50	150	2.2	<0.50	37	<0.50
	3/19/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/15/2015	<0.50	<0.50	0.86	<0.50	1.1	<0.50	<0.50	49	2	0.88	160	2.8	<0.50	44	<0.50
	12/9/2015	<0.50	<0.50	0.66	<0.50	4.9	<0.50	<0.50	72	1.8	1.1	145	1.8	<0.50	33.6	<0.50
	3/7/2016	<0.50	<2	0.76	<0.50	2.2	<0.50	<0.50	61.8	2.5	1.3	199	3.6	<0.50	45.1	<0.50
	6/16/2016	<0.50	<2	<0.50	<0.50	1.1	<0.50	<0.50	50.2	0.82	<0.50	49.5	0.77	<0.50	17.4	<0.50
	9/30/2016	<0.50	<2	0.67	<0.50	8.2	0.73	<0.50	95.3	1.5	1.6	145	2	<0.50	40.1	<0.50
	12/16/2016	<0.50	<2	0.52	<0.50	1.1	<0.50	<0.50	26.8	0.9	0.57	86.2	1.2	<0.50	23.9	<0.50
	3/29/2017	<0.50	<2	<0.50	<0.50	7.1	1.3	<0.50	77.9	1.2	<0.50	67.6	0.64	<0.50	20.2	2.5
	6/14/2017	<2.0	<2.0	1.0	<0.50	2.1	<1.0	<0.50	39.0	1.5	<0.50	163	1.7	<0.50	30.4	<0.50
	9/25/2017	<2.0	<2.0	<0.50	<0.50	5.6	<1.0	<0.50	73.3	1.3	<0.50	127	1.5	<0.50	29.5	<0.50
	11/8/2017	<2.0	<2.0	<0.50	<0.50	5.0	<0.50	<0.50	59.5	0.6	<0.50	67	0.6	<0.50	16.1	0.7
	3/20/2018	<0.500	<2.50	0.380 J	<0.500	2.0	0.144 J	<0.500	77.8	2.2	1.99	194	3.4	<0.500	48.6	<0.500
	7/2/2018	<0.500	<2.50	0.439 J	<0.500	<0.500	3.2	<0.500	64.5	1.6	1.07	180	2.6	<0.500	43.1	<0.500
	9/26/2018	<1.00	<5.00	<1.00	<1.00	6.41	<0.400	<0.400	75.6	0.73	1.18	145	1.18	<0.500	36.3	<0.400
	12/7/2018	<2.00	<10.0	<2.00	<2.00	3.1	<0.800	<0.800	44.2	1.0	<1.00	96	1.0	<1.00	27.8	<0.800
	3/20/2019	<1.00	<5.00	<1.00	<1.00	0.930	<0.400	<0.400	37.5	1.16	1.03	112	1.55	<0.500	33.2	<0.400
6/7/2019	<1.00	<5.00	1.02	<1.00	1.22	<0.400	<0.400	41.6	1.99	0.708	195	2.62	<0.500	39.8	<0.400	
9/27/2019	<1.00	<5.00	<1.00	<1.00	7.00	0.47	<0.400	72.3	1.25	1.32	130	1.7	<0.500	32.9	<0.400	
12/4/2019	<1.00	<5.00	<1.00	<1.00	1.54	<0.400	<0.400	36.5	1.07	0.634	136	1.33	<0.500	36.4	<0.400	
3/10/2020	<1.00	<5.00	<1.00	<1.00	1.77	<0.400	<0.400	48.9	1.97	1.03	192	2.74	<0.500	50.9	<0.400	
6/17/2020	<2.00	<10.0	<2.00	<2.00	<0.800	<0.400	<0.400	18.6	1.16	<1.00	115	1.38	<1.00	22.8	<0.800	
10/7/2020	<1.00	<5.00	<1.00	<1.00	5.30	<0.400	<0.400	62.9	1.02	1.10	169	1.57	<0.500	32.6	<0.400	
12/8/2020	<10.0	<25.0	<5.00	<5.00	<2.00	<2.00	<2.00	29.7	<2.00	<2.50	145	<2.00	<2.50	36.1	<2.00	
MW-4	11/17/1993	--	850	--	--	12	<50	--	20	--	--	40	<50	--	5.4	<10
	9/1/1995	<5	340	<5	<5	5.2	<50	<5	14	<5	<5	<50	<50	--	<50	30
	9/24/1996	<0.50	300	<0.20	<0.20	7.1	1.4	<0.20	3.2	<0.20	1	0.5	<0.50	--	0.8	4.7
	12/2/1996	<0.50	310	<0.50	0.3	3.8	1	<0.20	19	<1	0.3	<0.50	<1	--	<0.30	39
	11/13/1997	<0.50	252	<0.50	<0.50	4.22	1.23	<0.50	6.91	<0.50	0.688	<0.50	<0.50	--	<0.50	<1

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-4 (continued)	8/11/1999	<2	144	<1	<1	1.21	<1	<1	<1	<1	<1	3.6	<2	--	<1	<1
	11/16/1999	<1	26.3	<0.50	<1	2.3	<0.50	<0.50	4.18	<0.50	<0.50	1.2	<0.50	--	0.88	2.07
	2/29/2000	<2	119	<1	<1	2.84	<1	<1	4.1	<1	<1	<1	<2	--	<1	5.72
	6/28/2000	<5	59.4	<2.5	<2.5	3.89	<2.5	<2.5	2.5	<2.5	<2.5	<2.5	<5	--	<2.5	<2.5
	7/5/2000	Well Abandoned														
MW-5	11/17/1993	--	1,900	--	--	<25	<25	--	100	--	--	1,200	<25	--	52	<50
	9/1/1995	<1	<2	<1	<2	<1	<1	<1	1,300	<1	<1	60,000	<1	--	<1	<2
	9/24/1996	<5	140	<2	<2	35	<2	7.5	2,600	80	5.3	16,000	64	--	670	370
	12/2/1996	71	<50	<50	27	<30	<50	<20	5,600	<100	<20	27,000	110	--	1,700	340
	11/12/1997	<500	<1	<500	<500	<500	<500	<500	<500	<500	<500	28,000	<500	--	1,250	<1
	8/11/1999	<200	<1	<100	<100	<100	<100	<100	1,750	<100	<100	25,100	<200	--	862	238
	2/29/2000	<100	<500	<50	<50	<50	<50	<50	126	<50	<50	5,250	<100	--	135	<50
	8/31/2000	<50	<250	<25	<25	41.4	<25	<25	1,860	<25	<25	5,660	<50	--	347	280
	11/30/2000	<50	<250	<25	<25	27.3	<25	<25	3,850	26.8	<25	6,150	<50	--	511	189
	2/27/2001	<50	<250	<25	<25	<25	<25	<25	1,370	<25	<25	7,350	<50	--	445	127
	5/30/2001	<50	<250	<25	<25	<25	<25	<25	2,410	<25	<25	5,560	<50	--	439	129
	9/25/2001	<25	200	<25	<25	34	<25	<25	1,800	<25	<25	2,200	<25	--	180	180
	12/17/2001	<100	<500	<50	<50	<50	<50	<50	1,480	<50	<50	10,100	<100	--	646	<50
	3/19/2002	<50	<25	<25	<50	<25	<25	<25	360	<25	<25	4,640	<25	--	221	114
	5/29/2002	<50	46	<25	<50	<25	<25	<25	916	<25	<25	4,330	<25	--	238	39.5
	8/29/2002	<50	<25	<25	<50	<25	<25	<25	1,160	<25	<25	4,090	<25	--	288	310
	11/8/2002	<5	178	<2.5	<5	8.3	<2.5	<2.5	385	3.25	<2.5	603	<2.5	--	63.4	66
	1/23/2003	<50	<25	<25	<50	<25	<25	<25	582	<25	<25	4,090	<25	--	349	<25
	5/30/2003	<10	14.1	<5	<10	<5	<5	<5	382	<5	<5	1,450	7.9	--	140	67
	11/10/2003	<1	84.2	<1	<1	1.06	<1	<1	90.7	<1	<1	161	<1	--	30.8	9.42
1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
5/4/2004	<20	<20	<20	<20	<20	<20	<20	432	<20	<20	2,440	<20	--	178	188	
8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
11/16/2004	<50	<50	<50	<50	<50	<50	<50	6,300	<50	<50	1,800	<50	--	370	990	
3/23/2005	<20	<10	<10	<20	26.2	<10	<10	2,350	27.6	<10	511	<10	--	147	604	
5/18/2005	<5	<2.5	<2.5	<5	9.25	<2.5	6.45	817	10.2	<2.5	611	<2.5	--	156	329	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-5	8/18/2005	<5	5.15	<2.50	<5	14.4	<2.50	<2.50	397	4.7	<2.50	169 B	<2.50	--	81.8	278
(continued)	11/15/2005	<20	<10	<10	<20	36.2	<10	<10	2,790	14	<10	408	<10	--	177	615
	2/21/2006	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	72.7	1.06	<0.500	184	0.78	--	31.5	5.05
	6/5/2006	<20	<20	<20	<20	<20	<20	<20	2,800	<20	<20	157	<20	--	75	199
	9/6/2006	<2	10.6	<1	<2	8.3	<1	<1	377	3.66	<1	104	<1	--	45	29.9
	12/6/2006	<2	<1	<1	<2	1.32	<1	1.34	113	1.28	1.52	240	1.6	--	58	43.3
	2/7/2007	<10	<5	<5	<10	<5	<5	<5	1,220	18	<5	124	<5	--	26.9	600
	5/22/2007	<5	<5	<5	<5	<5	<5	<5	634	8.45	<5	102	<5	--	40.8	59.4
	9/12/2007	<1	67.5	<0.50	<1	<0.50	<0.50	<0.50	16.2	<0.50	<0.50	0.89	<0.50	--	1.38	1.86
	12/13/2007	<1	<0.50	<0.50	<1	7.1	<0.50	4.67	2,420	9.22	1.14	180	<0.50	--	179	416
	3/7/2008	<1	<0.500	<0.500	<1	2.18	<0.500	1.33	411	3.21	<0.500	86.4	<0.500	<0.500	26.1	105
	9/18/2008	<1	101	<0.500	<1	0.79	<0.500	<0.500	11.2	<0.500	<0.500	1.14	<0.500	<0.500	1.27	1.74
	12/10/2008	<2	<2	<2	<2	3.7	<2	<2	360	2.3	<2	49	<2	<2	53	150
	3/27/2009	<0.50	4.2	<0.50	<0.50	4	<0.50	<0.50	170	1	<0.50	0.59	<0.50	<0.50	<0.50	64
	6/17/2009	<0.50	<0.50	<0.50	<0.50	4.1	<0.50	0.6	160	2.5	<0.50	11	<0.50	<0.50	12	11
	9/18/2009	<0.50	65 BE	<0.50	<0.50	<0.50	<0.50	<0.50	3.6	<0.50	<0.50	<0.50	<0.50	<0.50	0.5	1.2
	12/17/2009	<0.50	<0.80	<0.50	<0.50	2.1	<0.50	1.4	340	2	<0.50	19	<0.50	<0.50	37	93
	3/19/2010	<0.50	1.4	<0.50	<0.50	4.4	<0.50	<0.50	72	<0.50	<0.50	24	<0.50	<0.50	14	21
	6/16/2010	<0.50	<0.50	<0.50	<0.50	3.6	<0.50	0.83	94	0.65	0.54	4.1	<0.50	<0.50	10	23
	9/23/2010	<0.5	59	<0.5	<0.5	0.84	<0.5	<0.5	9.7	<0.5	<0.5	<0.5	<0.5	<0.5	0.97	1.3
	12/9/2010	<0.5	<0.5	<0.5	<0.5	0.84	<0.5	<0.5	140	0.73	<0.5	5.6	<0.5	<0.5	8.8	15
	3/11/2011	<0.50	<0.50	<0.50	<0.50	0.96	<0.50	<0.50	34	<0.50	<0.50	8.4	<0.50	<0.50	7.6	4.7
	6/10/2011	<0.5	<0.5	<0.5	<0.5	5	<0.5	<0.5	40	<0.5	0.63	2.2	<0.5	<0.5	3.8	26
	9/19/2011	<0.50	2.3	<0.50	<0.50	2.8	<0.50	<0.50	97	<0.50	<0.50	1.3	<0.50	<0.50	11	6.3
	12/9/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	47	<0.50	<0.50	2.7	<0.50	<0.50	7.7	2.8
	3/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.4
	6/22/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	13	<0.5	<0.5	0.54	<0.5	<0.5	2.9	3
	9/14/2012	<0.50	20	<0.50	<0.50	0.75	<0.50	<0.50	26	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.4
	12/13/2012	<0.50	<0.50	<0.50	<0.50	0.72	<0.50	<0.50	67	0.65	<0.50	<0.50	<0.50	<0.50	1.7	6.6
	3/15/2013	<0.50	7.4	<0.50	<0.50	1.5	<0.50	<0.50	48	<0.50	<0.50	<0.50	<0.50	<0.50	1.1	6.6

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-5 (continued)	6/13/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.5	<0.50	<0.50	7.2	<0.50	<0.50	7.2	1.7
	9/19/2013	<0.50	23	<0.50	<0.50	<0.50	<0.50	<0.50	4.6	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	0.61
	12/16/2013	<0.50	<0.50	<0.50	<0.50	0.88	<0.50	<0.50	180	<0.50	<0.50	<0.50	<0.50	<0.50	0.8	71
	3/21/2014	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	39	<0.50	<0.50	<0.50	<0.50	<0.50	3.4	10
	6/25/2014	<0.50	<0.50	<0.50	<0.50	<5	<0.50	<0.50	14	<0.50	<0.50	1.3	<0.50	<0.50	8	2.3
	9/30/2014	<0.50	28	<0.50	<0.50	<5	<0.50	<0.50	20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.6
	12/16/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	33	<0.50	<0.50	<0.50	<0.50	<0.50	2.2	1.9
	3/19/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	26.5	<0.50	<0.50	8.4	<0.50	<0.50	5.8	5.6
	6/17/2015	<0.50	2.2	<0.50	<0.50	<0.50	<0.50	<0.50	3.2	<0.50	<0.50	0.63	<0.50	<0.50	0.64	<0.50
	9/24/2015	<0.50	24.6	<0.50	<0.50	<0.50	<0.50	<0.50	4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.3
	12/8/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.73	199	<0.50	<0.50	29.5	<0.50	<0.50	43.2	32.3
	12/8/2015 DUP	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.68	175	<0.50	<0.50	27.1	<0.50	<0.50	38.5	28.4
	3/8/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	4	<0.50	<0.50	9.9	<0.50	<0.50	3.1	<0.50
	6/17/2016	<0.50	7.5	<0.50	<0.50	<0.50	<0.50	<0.50	23.3	<0.50	<0.50	7.3	<0.50	<0.50	3.2	<0.50
	9/29/2016	<5	<20	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	12/14/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	4.3	<0.50	<0.50	11.5	<0.50	<0.50	2.5	1.1
	3/28/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	8.4	<0.5	<0.5	6.5	<0.5	<0.5	5.8	<0.5
	6/14/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	4.2	<0.50	<0.50	16.3	<0.50	<0.50	6.8	<0.50
	9/27/2017	<2.0	<2.0	<0.50	<0.50	1.60	<1.0	<0.50	15.6	<0.50	<0.50	26.7	<0.50	<0.50	15.6	0.64
	11/7/2017	<2.0	<2.0	<0.50	<0.50	0.99	<0.50	<0.50	35.6	<0.50	<0.50	3.5	<0.50	<0.50	9.7	5.30
	3/21/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	1.9	<0.500	<0.500	10.6	0.199 J	<0.500	2.4	0.260 J
	6/29/2018	<0.500	<2.50	<0.500	<0.500	0.56	<0.500	<0.500	45.5	0.174 J	<0.500	21.3	<0.500	<0.500	11.8	1.17
	9/27/2018	<1.00	26.9	<1.00	<1.00	<0.400	<0.400	<0.400	0.562	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
12/7/2018	<1.00	<5.00	<1.00	<1.00	1.03	<0.400	<0.400	129.0	<0.400	<0.500	4.7	<0.400	<0.500	11.7	4.80	
3/26/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.01	<0.400	<0.500	0.947	<0.400	<0.500	0.977	<0.400	
6/7/2019	<1.00	<5.00	<1.00	<1.00	0.404	<0.400	<0.400	11.1	<0.400	<0.500	20.4	<0.400	<0.500	8.63	<0.400	
9/26/2019	<1.00	<5.00	<1.00	<1.00	<0.4	<0.400	<0.400	10.7	<0.400	<0.500	0.972	<0.400	<0.500	1.35	1.10	
12/4/2019	<1.00	<5.00	<1.00	<1.00	0.817	<0.400	1.60	632	1.11	<0.500	0.925	<0.400	<0.500	9.85	10.70	
3/12/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	14.3	<0.400	<0.500	18.7	<0.400	<0.500	7.11	2.58	
6/18/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	10.4	<0.400	<0.500	17.3	<0.400	<0.500	18.3	0.41	

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Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-6	11/17/1993	--	<1	--	--	<0.50	<0.50	--	1.2	--	--	2.1	<0.50	--	0.54	<1
	9/1/1995	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<1
	9/24/1996	<0.50	<2	<0.20	<0.20	<0.20	<0.20	<0.20	0.3	<0.20	<0.20	<0.20	<0.50	--	<0.20	<1
	12/2/1996	<0.50	<0.50	<0.50	<0.20	<0.20	<0.50	<0.20	<0.20	<1	<0.20	<0.50	<1	--	<0.20	<0.20
	11/12/1997	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.03	<0.50	--	<0.50	<1
	8/11/1999	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1	--	1.37	<0.50
	11/16/1999	<1	<2.5	<0.50	<1	<0.50	<0.50	<0.50	0.51	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	2/29/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.654	<1	--	<0.50	<0.50
	6/27/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1	--	<0.50	<0.50
	5/29/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1	--	<0.50	<0.50
	5/30/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	1.51	<0.50	<0.50	1.31	<0.50	--	<0.50	<0.50
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/8/2002	<1	<0.50	<0.50	<1	0.51	<0.50	<0.50	2.55	<0.50	<0.50	0.97	<0.50	--	0.55	0.52
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2003	<0.50	<0.50	<0.50	<1	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	3.73	<0.50	--	0.99	<0.50
	11/17/2004	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	0.88	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	5/17/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	9/12/2007	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	3/6/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	1.16	<0.500	<0.500	<0.500	<0.500
	9/19/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	3/24/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/19/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/23/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/15/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/5/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/14/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/19/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/21/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	10/2/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-6 (continued)	3/19/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/7/2016	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/28/2016	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/30/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/28/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	11/7/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	7/1/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	9/25/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/22/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/5/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	9/27/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/5/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/12/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/17/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	10/8/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
12/9/2020					<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400	
MW-7	12/2/1996	81	<50	<50	39	<30	<50	110	110	<100	<20	73,000	1,900	--	7,600	<50
	11/12/1997	<500	<1	<500	<500	<500	<500	<500	<500	<500	<500	36,400	<500	--	7,670	<1
	8/11/1999	<1	<5	<500	<500	<500	<500	<500	<500	<500	<500	49,000	1,210	--	4,650	<500
	11/16/1999	<100	<250	<50	<100	<50	<50	92	353	<50	<50	54,800	914	--	5,320	<50
	2/28/2000	<1	<5	<500	<500	<500	<500	<500	<500	<500	<500	52,400	<1	--	4,060	<500
	6/28/2000	<1	<5	<500	<500	<500	<500	<500	<500	<500	<500	54,300	<1	--	3,390	<500
	8/31/2000	<500	<2	<250	<250	<250	<250	<250	<250	<250	<250	50,900	824	--	3,960	<250
	11/30/2000	<500	<2	<250	<250	<250	<250	<250	<250	<250	<250	33,500	520	--	3,560	<250
	2/27/2001	<500	<2	<250	<250	<250	<250	<250	<250	<250	<250	26,700	<500	--	3,290	<250
	5/30/2001	<200	<1,000	<100	<100	<100	<100	<100	374	<100	<100	20,400	214	--	2,820	<100
	9/25/2001	<25	<25	<25	<25	28	<25	35	350	<25	<25	19,000	260	--	2,500	<25
	12/17/2001	<100	<50	<50	<50	84.6	<50	<50	506	<50	<50	10,100	200	--	1,960	<50
	3/18/2002	<50	<25	<25	<50	<25	<25	<25	206	<25	<25	7,250	71	--	1,020	<25
	5/31/2002	<50	<25	<25	<50	<25	<25	<25	42.5	<25	<25	5,500	<25	--	311	<25
	8/29/2002	<50	<25	<25	<50	<25	<25	50.5	93	<25	<25	4,940	44.5	--	634	<25
	11/7/2002	<50	<25	<25	<50	<25	<25	<25	123	<25	<25	5,810	43	--	758	<25
1/23/2003	<20	<10	<10	<20	<10	<10	<10	59.8	<10	<10	2,010	14	--	282	<10	
5/28/2003	<10	<5	<5	<5	6.3	<5	<5	<5	<5	<5	1,080	10.9	--	67.9	<5	
11/11/2003	<20	<20	<20	<20	40.2	<20	<20	246	<20	<20	2,460	62	--	599	<20	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-7	1/27/2004	<20	<10	<10	<20	17	<10	<10	105	<10	<10	3,510	33	--	380	<10
(continued)	5/4/2004	<20	<20	<20	<20	<20	<20	<20	72.4	<20	<20	3,940	22	--	323	<20
	11/16/2004	<50	<50	<50	<50	<50	<50	<50	99	<50	<50	8,000	<50	--	520	<50
	3/24/2005	<50	<25	<25	<50	<25	<25	<25	98.5	<25	<25	3,930	26	--	404	<25
	5/18/2005	<10	<5	<5	<10	<5	<5	<5	72.7	<5	<5	1,310	12.4	--	180	<5
	05/18/2005 DUP	<10	<5	<5	<10	<5	<5	<5	69.4	<5	<5	1,250	12.4	--	179	<5
	8/18/2005	<20	<10	<10	<20	<10	<10	<10	54.8	<10	<10	1,800	<10	--	237	<10
	11/15/2005	<20	<10	<10	<20	15.2	<10	<10	107	<10	<10	1,960	29.6	--	333	<10
	2/21/2006	<20	<10	<10	<20	<10	<10	<10	<10	<10	<10	2,640	<10	--	139	<10
	6/5/2006	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	26,100	<200	--	568	<200
	9/6/2006	<100	<50	<50	<100	<50	<50	<50	56	<50	<50	12,800	<50	--	422	<50
	12/6/2006	<200	<100	<100	<200	<100	<100	<100	<100	<100	<100	24,600	<100	--	408	<100
	2/7/2007	<200	<100	<100	<200	<100	<100	<100	<100	<100	<100	31,500	<100	--	352	<100
	5/22/2007	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	29,100	<200	--	450	<200
	9/12/2007	<200	<100	<100	<200	<100	<100	<100	<100	<100	<100	21,300	<100	--	366	<100
	12/13/2007	<500	<250	<250	<500	<250	<250	<250	345	<250	<250	18,700	<250	--	1,040	280
	03/06/2008 ⁷	<1	<0.500	<0.500	<1	5.06	2.57	3.99	42.3	2.9	<0.500	26,300	38.7	<0.500	430	<0.500
	6/10/2008	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	27,000	<500	<500	575	<500
	9/18/2008	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	23,200	<500	<500	530	<500
	12/11/2008	<50	<50	<50	<50	<50	<50	<50	130	<50	<50	15,000	<50	<50	450	<50
	12/11/2008 DUP	<50	<50	<50	<50	<50	<50	<50	120	<50	<50	14,000	<50	<50	430	<50
	3/23/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	420	<0.50	<0.50	3,330	<0.50	<0.50	270	<0.50
	6/18/2009	<3	<3	<3	<3	3.7	<3	<3	520	<3	<3	890	5.2	<3	350	<3
	06/18/2009 DUP	<2.5	<2.5	<2.5	<2.5	3.8	<2.5	<2.5	520	<2.5	<2.5	910	5.6	<2.5	360	<2.5
	9/18/2009	<3	<3	<3	<3	9.8	<3	5.5	930	<3	<3	2,600	10	<3	250	<3
	09/18/2009 DUP	<3	<3	<3	<3	8.7	<3	4.8	850	<3	<3	2,600	9.3	<3	240	<3
	12/18/2009	<5	<5	<5	<5	6.7	<5	<5	330	<5	<5	1,600	6.7	<5	160	<5
	12/18/2009 DUP	<5	<5	<5	<5	6.6	<5	<5	320	<5	<5	1,500	6.6	<5	160	<5
	3/16/2010	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	180	<2.5	<2.5	510	<2.5	<2.5	52	<2.5
	03/16/2010 DUP	<2	<2	<2	<2	<2	<2	<2	180	<2	<2	560	<2	<2	55	<2
	6/17/2010	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	360	<1.5	<1.5	200	2.7	<1.5	72	<1.5
	06/17/2010 DUP	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	360	<1.5	<1.5	200	2.8	<1.5	72	<1.5

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-7	9/23/2010	<3	<3	<3	<3	3.3	<3	<3	690	<3	<3	750	3.5	<3	110	4.8
(continued)	09/23/2010 DUP	<3	<3	<3	<3	3.1	<3	<3	700	<3	<3	740	3.8	<3	100	4.1
	12/10/2010	<0.9	<0.9	<0.9	<0.9	1.8	<0.9	<0.9	94	<0.9	<0.9	220	1.6	<0.9	36	1.7
	12/10/2010 DUP	<0.9	<0.9	<0.9	<0.9	1.7	<0.9	<0.9	98	<0.9	<0.9	230	1.7	<0.9	36	1.8
	3/11/2011	<0.90	<0.90	<0.90	<0.90	6.6	<0.90	1.6	150	0.91	<0.90	420	5.1	<0.90	82	9.3
	03/11/2011 DUP	<0.90	<0.90	<0.90	<0.90	6.5	<0.90	1.9	150	1.1	<0.90	400	5.2	<0.90	80	9.7
	6/7/2011	<2.5	<2.5	<2.5	<2.5	4.8	<2.5	3.4	1,400	3.3	<2.5	430	4	<2.5	110	7.9
	06/07/2011 DUP	<6	<6	<6	<6	<6	<6	<6	1,400	<6	<6	400	<6	<6	110	7.8
	9/19/2011	<5	<5	<5	<5	<5	<5	<5	1,300	<5	<5	410	<5	<5	84	78
	09/19/2011 DUP	<7	<7	<7	<7	<7	<7	<7	1,300	<7	<7	420	<7	<7	87	81
	12/7/2011	<5	<5	<5	<5	8	<5	6.9	3,400	6.8	<5	200	<5	<5	32	110
	12/07/2011 DUP	<6	<6	<6	<6	7.6	<6	7.8	3,400	6.8	<6	210	<6	<6	32	110
	3/12/2012	<5	<5	<5	<5	9.2	<5	<5	1,600	<5	<5	41	<5	<5	8.6	600
	03/12/2012 DUP	<7	<7	<7	<7	9.5	<7	<7	1,600	<7	<7	42	<7	<7	8.9	660
	06/22/2012	<2	9.2	<2	<2	9.8	<2	<2	540	<2	<2	24	<2	<2	5.1	300
	06/22/2012 DUP	<2	8.1	<2	<2	9	<2	<2	500	<2	<2	25	<2	<2	5.2	290
	9/14/2012	<0.50	6.3	<0.50	<0.50	3.8	<0.50	0.54	180	0.7	<0.50	28	<0.50	0.52	5.2	80
	09/14/2012 DUP	<0.50	5.7	<0.50	<0.50	3.8	<0.50	<0.50	180	0.78	<0.50	28	<0.50	<0.50	5.3	79
	12/14/2012	<0.50	6.3	<0.50	<0.50	1.9	<0.50	<0.50	130	<0.50	<0.50	8.2	<0.50	<0.50	5.3	16
	12/14/2012 DUP	<0.50	5.6	<0.50	<0.50	1.8	<0.50	<0.50	130	<0.50	<0.50	11	<0.50	<0.50	6.8	18
	3/15/2013	<0.50	5.2	<0.50	<0.50	0.68	<0.50	<0.50	110	<0.50	<0.50	1.5	<0.50	<0.50	0.75	11
	03/15/2013 DUP	<0.50	5.4	<0.50	<0.50	0.69	<0.50	<0.50	110	<0.50	<0.50	1.6	<0.50	<0.50	0.78	11
	6/14/2013	<0.50	2	<0.50	<0.50	<0.50	<0.50	<0.50	57	<0.50	<0.50	1.6	<0.50	<0.50	<0.50	15
	06/14/2013 DUP	<0.50	2	<0.50	<0.50	0.51	<0.50	<0.50	58	<0.50	<0.50	1.5	<0.50	<0.50	<0.50	16
	9/20/2013	<0.50	3	<0.50	<0.50	1.5	<0.50	<0.50	56	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10
	09/20/2013 DUP	<0.50	3	<0.50	<0.50	1.5	<0.50	<0.50	56	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10
	12/16/2013	<0.50	2.4	<0.50	<0.50	2.9	<0.50	<0.50	6.9	<0.50	<0.50	0.51	<0.50	<0.50	<0.50	9.1
	12/16/2013 DUP	<0.50	2.4	<0.50	<0.50	2.4	<0.50	<0.50	6.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.9
	3/24/2014	<0.50	0.97	<0.50	<0.50	1.6	<0.50	<0.50	13	<0.50	<0.50	9.8	<0.50	<0.50	2.6	7.6
	3/24/2014 DUP	<0.50	1	<0.50	<0.50	1.6	<0.50	<0.50	13	<0.50	<0.50	9.4	<0.50	<0.50	2.5	7.7

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-7	6/25/2014	<0.50	1.3	<0.50	<0.50	0.17	<0.50	<0.50	0.59	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.3
(continued)	6/25/2014 DUP	<0.50	0.15	<0.50	<0.50	0.19	<0.50	<0.50	0.62	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.4
	9/30/2014	<0.50	1.9	<0.50	<0.50	2.7	<0.50	<0.50	4.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	9.8
	9/30/2014 DUP	<0.50	1.7	<0.50	<0.50	2.6	<0.50	<0.50	4.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.8
	12/15/2014	<0.50	1.2	<0.50	<0.50	3.4	<0.50	<0.50	12	<0.50	<0.50	<0.50	<0.50	<0.50	1	15
	12/15/2014 DUP	<0.50	1.6	<0.50	<0.50	4.5	<0.50	<0.50	16	<0.50	<0.50	0.61	<0.50	<0.50	1.5	21
	3/20/2015	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	8.4	<0.50	<0.50	<0.50	<0.50	<0.50	1.1	1
	3/20/2015 DUP	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	7.7	<0.50	<0.50	0.53	<0.50	<0.50	1	10.4
	6/17/2015	<0.50	0.72	<0.50	<0.50	2.6	<0.50	<0.50	12	<0.50	<0.50	1.2	<0.50	<0.50	1	12.6
	6/17/2015 DUP	<0.50	0.71	<0.50	<0.50	2.6	<0.50	<0.50	12.2	<0.50	<0.50	0.96	<0.50	<0.50	1	12.3
	9/24/2015	<0.50	<0.50	<0.50	<0.50	1.7	<0.50	<0.50	12.4	<0.50	<0.50	4.5	<0.50	<0.50	4.2	4.6
	9/24/2015 DUP	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	12.7	<0.50	<0.50	4.5	<0.50	<0.50	4.2	4.8
	12/8/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.1	<0.50	<0.50	9.4	<0.50	<0.50	1.7	1.9
	6/17/2016	<0.50	<2	<0.50	<0.50	0.6	<0.50	<0.50	10.9	<0.50	<0.50	0.69	<0.50	<0.50	2.1	5.4
	6/17/2016 DUP	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	11	<0.50	<0.50	0.62	<0.50	<0.50	2	5.4
	9/29/2016	<0.50	<2	<0.50	<0.50	1.1	<0.50	<0.50	10.9	<0.50	<0.50	<0.50	<0.50	<0.50	5.5	5.5
	9/29/2016 DUP	<0.50	<2	<0.50	<0.50	1.1	<0.50	<0.50	10.9	<0.50	<0.50	<0.50	<0.50	<0.50	6	5.5
	12/14/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	9.2	<0.50	<0.50	0.65	<0.50	<0.50	<0.50	0.98
	12/14/2016 DUP	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	9.4	<0.50	<0.50	0.78	<0.50	<0.50	<0.50	1
	3/28/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	0.73	<0.5
	3/28/2017 DUP	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	0.69	<0.5
	6/14/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	0.55	2.5
	6/14/2017 DUP	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	2.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.5
	9/27/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	1.7	<0.50	<0.50	2.60	<0.50	<0.50	1.60	1.6
	9/27/2017 DUP	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	1.7	<0.50	<0.50	2.60	<0.50	<0.50	1.60	1.7
	11/7/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	2.6	<0.50	<0.50	6.30	<0.50	<0.50	7.80	1.4
	11/7/2017 DUP	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	2.5	<0.50	<0.50	3.80	<0.50	<0.50	6.40	1.5
	3/21/2018	<0.500	<2.50	<0.500	<0.500	0.495 J	<0.500	<0.500	17.6	<0.500	<0.500	0.228 J	<0.500	<0.500	2.86	4.9
	3/21/2018 DUP	<0.500	<2.50	<0.500	<0.500	0.55	<0.500	<0.500	17.2	<0.500	<0.500	0.284 J	<0.500	<0.500	2.99	4.9
	6/29/2018	<0.500	<2.50	<0.500	<0.500	0.461 J	<0.500	<0.500	5.5	<0.500	<0.500	9.89	<0.500	<0.500	3.53	1.5
	6/29/2018 DUP	<0.500	<2.50	<0.500	<0.500	0.437 J	<0.500	<0.500	5.4	<0.500	<0.500	8.94	<0.500	<0.500	3.48	1.6

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-7 (continued)	9/27/2018	<1.00	<5.00	<1.00	<1.00	1.23	<0.400	<0.400	8.48	<0.400	<0.500	6.50	<0.400	<0.500	10.8	2.08
	12/7/2018	<1.00	<5.00	<1.00	<1.00	3.97	<0.400	0.43	15.4	<0.400	<0.500	30.40	<0.400	<0.500	18.10	1.6
	12/7/2018 DUP	<1.00	<5.00	<1.00	<1.00	3.84	<0.400	0.47	17.7	<0.400	<0.500	26.60	<0.400	<0.500	16.40	1.1
	3/20/2019	<1.00	<5.00	<1.00	<1.00	1.87	<0.400	<0.400	22.2	<0.400	<0.500	22.3	<0.400	<0.500	10.8	0.605
	3/20/2019 DUP	<1.00	<5.00	<1.00	<1.00	1.84	<0.400	<0.400	22.8	<0.400	<0.500	22.8	<0.400	<0.500	10.7	0.553
	6/5/2019	<1.00	<5.00	<1.00	<1.00	2.91	<0.400	0.559	20.2	<0.400	<0.500	28.1	<0.400	<0.500	12.7	1.11
	6/5/2019 DUP	<1.00	<5.00	<1.00	<1.00	2.87	<0.400	0.494	20.2	<0.400	<0.500	28.4	<0.400	<0.500	12.7	1.15
	9/26/2019	<1.00	<5.00	<1.00	<1.00	2.98	<0.400	0.65	20.1	<0.400	<0.500	41.7	<0.400	<0.500	17.9	0.42
	9/26/2019 DUP	<1.00	<5.00	<1.00	<1.00	2.95	<0.400	0.672	21	<0.400	<0.500	39.6	<0.400	<0.500	17.8	<0.400
	12/3/2019	<1.00	<5.00	<1.00	<1.00	4.61	<0.400	0.837	29.4	<0.400	<0.500	65.8	<0.400	<0.500	31	<0.400
	12/3/2019 DUP	<1.00	<5.00	<1.00	<1.00	4.58	<0.400	0.839	29.7	<0.400	<0.500	66.1	<0.400	<0.500	31.8	<0.400
	3/11/2020	<1.00	<5.00	<1.00	<1.00	0.936	<0.400	<0.400	26.5	<0.400	<0.500	45.8	<0.400	<0.500	14.1	0.476
	3/11/2020 DUP	<1.00	<5.00	<1.00	<1.00	0.912	<0.400	<0.400	25.7	<0.400	<0.500	47.4	<0.400	<0.500	14.3	0.44
	6/18/2020	<1.00	<5.00	<1.00	<1.00	0.78	<0.400	<0.400	10.2	<0.400	<0.500	43	<0.400	<0.500	10	<0.400
	6/18/2020 DUP	<1.00	<5.00	<1.00	<1.00	0.85	<0.400	<0.400	11.1	<0.400	<0.500	40.8	<0.400	<0.500	10.1	<0.400
	10/8/2020	<1.00	<5.00	<1.00	<1.00	1.97	<0.400	0.481	23.1	<0.400	<0.500	49.5	<0.400	<0.500	19.7	<0.400
	10/8/2020 DUP	<1.00	<5.00	<1.00	<1.00	1.96	<0.400	0.431	23.6	<0.400	<0.500	50.2	<0.400	<0.500	19.6	<0.400
12/9/2020					7.05	<0.400	1.41	56.3	0.552	<0.500	108	<0.400	<0.500	45.4	<0.400	
12/9/2020 DUP					6.83	<0.400	1.38	55.6	0.519	<0.500	106	<0.400	<0.500	44.5	<0.400	
MW-8	12/2/1996	<0.50	<0.50	<0.50	<0.20	1	<0.50	0.2	6.5	<1	<0.20	2.3	<1	--	12	<0.50
	11/13/1997	<1	<2	<1	<1	1.72	<1	2.44	9.32	<1	<1	52.4	4	--	38.6	<2
	8/11/1999	<1	<5	<0.50	<0.50	0.75	<0.50	<0.50	1.82	<0.50	<0.50	46.2	4.79	--	24.3	<0.50
	11/16/1999	<1	<2.5	<0.50	<1	1.22	<0.50	<0.50	2.11	<0.50	<0.50	39.8	1.55	--	15.5	<0.50
	2/28/2000	<1	<5	<0.50	<0.50	0.929	<0.50	0.721	2.38	<0.50	<0.50	41.8	3.7	--	20.5	<0.50
	6/27/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	1.46	<0.50	<0.50	33.7	2.88	--	17.5	<0.50
	5/30/2001	<100	<5	<0.50	<0.50	0.611	<0.50	<0.50	0.601	<0.50	<0.50	11.8	<1	--	5.46	<0.50
	5/30/2002	<1	<0.50	<0.50	<1	1.09	<0.50	<0.50	2.02	<0.50	<0.50	12.1	<0.50	--	4.47	<0.50
	5/28/2003	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	0.84	<0.50	<0.50	40.4	1.55	--	11.2	<0.50
	11/2/2004	<1	<0.50	<0.50	<1	1.02	<0.50	<0.50	1.99	<0.50	<0.50	8.88	<0.50	--	2.4	<0.50
	11/16/2004	<0.50	<0.50	<0.50	<0.50	0.9	<0.50	<0.50	1.6	<0.50	<0.50	0.6	<0.50	--	3.1	<0.50
	3/23/2005	<1	<0.50	<0.50	<1	0.78	<0.50	<0.50	1.82	<0.50	<0.50	13.5	0.53	--	2.41	<0.50
	5/17/2005	<1	<0.50	<0.50	<1	1.1	<0.50	<0.50	6.45	<0.50	<0.50	13.2	<0.50	--	6.92	<0.50
	05/17/2005 DUP	<1	<0.50	<0.50	<1	1.19	<0.50	<0.50	6.97	<0.50	<0.50	11.4	<0.50	--	6.39	<0.50
	11/16/2005	<1	<0.500	<0.500	<1	0.78	<0.500	<0.500	4.19	<0.500	<0.500	14.8	0.65	--	2.99	<0.500
	6/5/2006	<1	<1	<1	<1	1.26	<1	<1	19.8	<1	<1	20.7	<1	--	11.4	<1
	12/6/2006	<1	<0.50	<0.50	<1	1.11	<0.50	<0.50	14.2	<0.50	<0.50	18.3	<0.50	--	5.08	<0.50
	5/23/2007	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	22.8	<1	--	2.32	<1
	9/12/2007	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	0.52	<0.50	<0.50	12.4	0.6	--	0.65	<0.50
	12/12/2007	<1	<0.50	<0.50	<1	1.03	<0.50	<0.50	13.7	<0.50	<0.50	8.27	<0.50	--	2.71	<0.50
3/6/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	1.64	<0.500	<0.500	19.1 J	<0.500	<0.500	1.4	<0.500	
6/10/2008 ⁷	<1	<1	<1	<1	1.07	<1	<1	10.5	<1	<1	10.8	<1	<1	3.87	<1	
9/18/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	1.58	<0.500	<0.500	13.2	0.5	<0.500	1.21	<0.500	
12/9/2008	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	9.1	<0.50	<0.50	0.57	<0.50	
12/09/2008 DUP	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	9.7	<0.50	<0.50	0.59	<0.50	

Appendix B
 Historical Groundwater Analytical Results
 NuStar Vancouver Facility
 Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride

Please refer to notes at end of table.

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Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-8	3/26/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2	<0.50	<0.50	8	<0.50	<0.50	0.56	<0.50
(continued)	6/17/2009	<0.50	<0.50	<0.50	<0.50	0.77	<0.50	<0.50	12	<0.50	<0.50	4.8	<0.50	<0.50	1.4	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	11	<0.50	<0.50	<0.50	<0.50
	12/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.2	<0.50	<0.50	8.4	<0.50	<0.50	0.51	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2	<0.50	<0.50	11	<0.50	<0.50	<0.50	<0.50
	6/14/2010	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	20	0.52	<0.50	4.2	<0.50	<0.50	1.1	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	8.1	<0.5	<0.5	<0.5	<0.5
	12/8/2010	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	20	1.1	<0.5	2.5	<0.5	<0.5	0.6	<0.5
	3/11/2011	<0.50	<0.50	<0.50	<0.50	0.93	<0.50	<0.50	20	0.58	<0.50	7.9	<0.50	<0.50	0.95	<0.50
	6/8/2011	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5	40	0.82	<0.5	4	<0.5	<0.5	1.1	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	10	<0.50	<0.50	0.54	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.54	<0.50	<0.50	10	<0.50	<0.50	<0.50	<0.50
	3/6/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	7.5	<0.50	<0.50	6.8	<0.50	<0.50	0.56	<0.50
	6/20/2012	<0.5	<0.5	<0.5	<0.5	0.89	<0.5	<0.5	22	<0.5	<0.5	6.1	<0.5	<0.5	1.4	<0.5
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	7	<0.50	<0.50	<0.50	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	36	1	<0.50	4.8	<0.50	<0.50	1	<0.80
	3/13/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.94	<0.50	<0.50	7.2	<0.50	<0.50	<0.50	<0.50
	6/13/2013	<0.50	<0.50	<0.50	<0.50	0.84	<0.50	<0.50	18	0.64	<0.50	6.2	<0.50	<0.50	0.76	<0.50
	9/19/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.6	<0.50	<0.50	4.8	<0.50	<0.50	<0.50	<0.50
	12/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.5	0.54	<0.50	4	<0.50	<0.50	<0.50	<0.50
	3/19/2014	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	21	1.1	<0.50	2.3	<0.50	<0.50	0.85	<0.50
	6/24/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.1	<0.50	<0.50	5.6	<0.50	<0.50	<0.50	<0.50
	9/26/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.8	<0.50	<0.50	6.1	<0.50	<0.50	<0.50	<0.50
	12/10/2014	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	13	0.86	<0.50	2.3	<0.50	<0.50	0.62	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	7.6	<0.50	<0.50	<0.50	<0.50
	6/17/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.9	<0.50	<0.50	<0.50	<0.50
	9/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2	<0.50	<0.50	6.3	<0.50	<0.50	<0.50	<0.50
	12/7/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2	<0.50	<0.50	1.1	<0.50	<0.50	<0.50	<0.50

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-8 (continued)	3/8/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	6.4	<0.50	<0.50	<0.50	<0.50
	6/15/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.1	<0.50	<0.50	<0.50	<0.50
	9/27/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.3	<0.50	<0.50	<0.50	<0.50
	12/14/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	3.1	<0.50	<0.50	3.8	<0.50	<0.50	<0.50	<0.50
	3/30/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	35.7	0.96	<0.5	2.3	<0.5	<0.5	0.57	<0.5
	6/13/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	14.3	<0.50	<0.50	4.3	<0.50	<0.50	0.56	<0.50
	9/25/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	4.3	<0.50	<0.50	<0.50	<0.50
	11/6/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	4.4	<0.50	<0.50	<0.50	<0.50
	3/19/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	0.6	<0.500	<0.500	4.2	<0.500	<0.500	<0.500	<0.500
	6/29/2018	<0.500	<2.50	<0.500	<0.500	0.139 J	<0.500	<0.500	2.6	<0.500	<0.500	5.4	<0.500	<0.500	0.368 J	<0.500
	9/25/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	3.76	<0.400	<0.500	<0.400	<0.400
	12/7/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	3.0	<0.400	<0.500	<0.400	<0.400
	3/22/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	3.83	<0.400	<0.500	<0.400	<0.400
	6/3/2019	<1.00	<5.00	<1.00	<1.00	0.430	<0.400	<0.400	6.57	<0.400	<0.500	2.05	<0.400	<0.500	<0.400	<0.400
	9/26/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	4.2	<0.400	<0.500	<0.400	<0.400
	12/3/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	4.06	<0.400	<0.500	<0.400	<0.400
	3/11/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	3.44	<0.400	<0.500	0.929	<0.400	<0.500	<0.400	<0.400
	6/17/2020	<1.00	<5.00	<1.00	<1.00	0.770	<0.400	<0.400	12.1	0.45	<0.500	3.51	<0.400	<0.500	0.43	<0.400
MW-9	12/2/1996	<50	<50	<50	<20	<30	<50	<20	<20	<100	<20	5,000	200	--	1,600	<50
	11/13/1997	<50	<100	<50	<50	<50	<50	<50	487	<50	<50	2,890	<50	--	1,840	<100
	8/11/1999	<20	<100	<10	<10	<10	<10	<10	54	<10	<10	1,490	43.2	--	517	<10
	11/16/1999	<20	<50	<10	<20	<10	<10	<10	103	<10	<10	1,730	32	--	305	<10
	2/28/2000	<20	<100	<10	<10	<10	<10	<10	<10	<10	<10	2,040	36.4	--	315	<10
	6/27/2000	<50	<250	<25	<25	<25	<25	<25	<25	<25	<25	1,300	<50	--	298	<25
	8/31/2000	<10	<50	<5	<5	<5	<5	<5	<5	<5	<5	1,560	31.3	--	229	<5
	11/30/2000	<10	<50	<5	<5	21.7	<5	10.5	1,330	11.7	<5	823	26.6	--	528	8.15
	9/25/2001	<2.5	<2.5	<2.5	<2.5	3.8	<2.5	<2.5	9.1	<2.5	<2.5	680	16	--	140	<2.5
	12/17/2001	<5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	306	<5	--	74.2	<2.5
	3/18/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	113	<0.50	--	19.1	<0.50
	5/31/2002	<2	<1	<1	<2	<1	<1	<1	1.22	<1	<1	296	1.44	--	44	<1
	8/29/2002	<2	<1	<1	<2	<1	<1	<1	1.88	<1	<1	294	2.12	--	67.4	<1
	11/7/2002	<5	<2.5	<2.5	<5	<2.5	<2.5	<2.5	17.2	<2.5	<2.5	453	4	--	145	<2.5
	1/23/2003	<2	<1	<1	<2	<1	<1	<1	1.66	<1	<1	205	2.74	--	59.5	<1
5/28/2003	<1	<0.50	<0.50	<1	1.81	<0.50	<0.50	0.97	<0.50	<0.50	141	2.85	--	27.4	<0.50	
11/11/2003	<5	<5	<5	<5	<5	<5	<5	23.7	<5	<5	401	6.25	--	91.4	<5	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-9	1/27/2004	<2	<1	<1	<2	<1	<1	<1	2.58	<1	<1	179	2.54	--	58.1	<1
(continued)	5/4/2004	<1	<1	<1	<1	<1	<1	<1	1.09	<1	<1	178	2.56	--	51.9	<1
	11/15/2004	<25	<25	<25	<25	28	<25	<25	1,200	27	<25	1,800	<25	--	1,000	<25
	3/24/2005	<5	<2.5	<2.5	<5	3.3	<2.5	<2.5	54.2	<2.5	<2.5	675	8	--	239	<2.5
	5/18/2005	<2	<1	<1	<2	<1	<1	<1	2.68	<1	<1	2.41	2.08	--	62.4	<1
	8/18/2005	<5	<2.50	<2.50	<5	<2.50	<2.50	<2.50	20.5 B	<2.50	<2.50	551	7.6	--	209	<2.50
	11/15/2005	<10	<5	<5	<10	27.1	<5	6.8	1,020	18.6	<5	1,040	14.1	--	633	21.2
	2/21/2006	<10	<5	<5	<10	<5	<5	<5	16.7	<5	<5	534	<5	--	165	<5
	6/5/2006	<1	<1	<1	<1	<1	<1	<1	1.47	<1	<1	151	2.6	--	57.3	<1
	9/5/2006	<5	<2.50	<2.50	<5	5.5	<2.50	<2.50	117	3.15	<2.50	698	6.8	--	314	<2.50
	12/6/2006	<5	<2.50	<2.50	<5	2.95	<2.50	<2.50	59	<2.50	<2.50	578	5.55	--	237	<2.50
	2/7/2007	<5	<2.50	<2.50	<5	3.15	<2.50	<2.50	72.6	<2.50	<2.50	591	6.1	--	239	2.65
	5/23/2007	<2	<2	<2	<2	<2	<2	<2	6.32	<2	<2	210	3	--	90.4	<2
	9/12/2007	<2	<1	<1	<2	2.34	<1	<1	47.1	1.44	<1	282	5.12	--	184	<1
	12/13/2007	<5	<2.50	<2.50	<5	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	253	4.45	--	78.4	<2.50
	3/6/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	1.92	<0.500	<0.500	138	3.77	<0.500	61.5	<0.500
	6/10/2008	<1	<1	<1	<1	<1	<1	<1	2.73	<1	<1	297	5.16	<1	87.7	<1
	9/18/2008	<5	<2.50	<2.50	<5	7.05	<2.50	<2.50	172	3.8	<0.5000	524	5.35	<0.500	315	4.15
	12/9/2008	<0.90	<0.90	<0.90	<0.90	3.8	<0.90	1.3	130	2.5	<0.90	270	5.1	<0.90	140	2.3
	3/26/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.4	<0.50	<0.50	170	4	<0.50	56	<0.50
	6/17/2009	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	1.1	72	2.8	<0.50	420	4.9	<0.50	180	1.8
	9/17/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.1	<0.50	<0.50	170	4.4	<0.50	60	<0.50
	12/17/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.57	<0.50	<0.50	120	2.5	<0.50	43	<0.50
	3/19/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.8	<0.50	<0.50	160	3	<0.50	48	<0.50
	6/16/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	100	1.4	<0.50	36	<0.50
	9/21/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	140	2.9	<0.5	50	<0.5
	12/10/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	100	1.3	<0.5	330	<0.5
	3/11/2011	<0.50	<0.50	<0.50	<0.50	0.66	<0.50	<0.50	17	0.82	<0.50	190	2.7	<0.50	81	0.52
	03/11/2011 DUP	<0.50	<0.50	<0.50	<0.50	0.67	<0.50	<0.50	17	0.85	<0.50	200	2.8	<0.50	84	0.51

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Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-9	6/10/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	53	1.9	<0.5	31	<0.5
(continued)	9/19/2011	<0.50	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	72	2.3	<0.50	230	3.1	<0.50	120	0.78
	12/9/2011	<0.90	<0.90	<0.90	<0.90	53	<0.90	11	1,800	40	<0.90	600	10	<0.90	590	26
	3/12/2012	<0.50	<0.50	<0.50	<0.50	0.66	<0.50	<0.50	20	0.57	<0.50	140	2	<0.50	56	<0.50
	6/22/2012	<0.5	<0.5	<0.5	<0.5	3.3	<0.5	1.1	140	4.3	<0.5	220	3.3	<0.5	180	2.3
	9/14/2012	<0.90	<0.90	<0.90	<0.90	<0.90	<0.90	<0.90	17	<0.90	<0.90	210	2.4	<0.90	78	<0.90
	12/13/2012	<0.50	<0.50	<0.50	<0.50	0.7	<0.50	<0.50	29	0.96	<0.50	110	1.1	<0.50	49	<0.50
	3/15/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5	<0.50	<0.50	86	1.8	<0.50	34	<0.50
	6/13/2013	<0.50	<0.50	<0.50	<0.50	2.4	<0.50	1	100	3.7	<0.50	240	3.1	<0.50	150	2.2
	9/20/2013	<0.50	<0.50	<0.50	<0.50	2	<0.50	0.51	74	2.2	<0.50	160	2	<0.50	87	0.82
	12/16/2013	<0.50	<0.50	<0.50	<0.50	6.5	<0.50	1.4	230	6.4	<0.50	210	3.5	<0.50	180	2.8
	3/21/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	39	0.57	<0.50	19	<0.50
	6/25/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.68	41	1.6	<0.50	190	2.3	<0.50	91	1.1
	9/30/2014	<0.90	<0.90	<0.90	<0.90	2.3	<0.90	<0.90	77	2.3	<0.90	230	2.9	<0.90	110	1.3
	12/15/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	35	0.64	<0.50	18	<0.50
	3/19/2015	<0.50	<0.50	<0.50	<0.50	0.77	<0.50	<0.50	18.9	0.6	<0.50	155	2	<0.50	59.5	<0.50
	6/17/2015	<0.50	<0.50	<0.50	<0.50	0.93	<0.50	0.54	12.5	0.78	<0.50	160	1.9	<0.50	61.8	1.6
	9/17/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.4	<0.50	<0.50	74.3	2.2	<0.50	31.6	<0.50
	12/8/2015	<0.50	<0.50	<0.50	<0.50	3.5	<0.50	0.85	145	4.2	<0.50	199	2.4	<0.50	113	2
	12/8/2015 DUP	<0.50	<0.50	<0.50	<0.50	3.7	<0.50	0.93	153	4.4	<0.50	198	2.5	<0.50	118	2.1
	3/8/2016	<1	<4	<1	<1	4.1	<1	<1	117	3.8	<1	164	2.3	<1	94.6	3.4
	6/17/2016	<0.50	<2	<0.50	<0.50	1.8	<0.50	0.58	60.7	2.4	<0.50	116	1.7	<0.50	68.3	0.89
	9/29/2016	<0.50	<2	<0.50	<0.50	1.2	<0.50	<0.50	39.3	1.8	<0.50	192	2.5	<0.50	91.9	0.76
	12/14/2016	<0.50	<2	<0.50	<0.50	1.3	<0.50	<0.50	59.7	1.6	<0.50	75.8	1.1	<0.50	44.9	0.52
	3/28/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	0.77	<0.5	<0.5	27.9	0.89	<0.5	12.5	<0.5
	6/14/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	17.5	0.60	<0.50	104	1.3	<0.50	47.2	<0.50
	9/27/2017	<2.0	<2.0	<0.50	<0.50	2.80	<1.0	<0.50	83.1	2.50	<0.50	102	2.4	<0.50	66.7	0.99
	11/7/2017	<2.0	<2.0	<0.50	<0.50	20.30	<0.50	3.30	569.0	15.20	<0.50	205	4.5	<0.50	167.0	7.80
	3/21/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	1.2	<0.500	<0.500	39	1.1	<0.500	14.9	<0.500
	6/29/2018	<0.500	<2.50	<0.500	<0.500	6.86	<0.500	1.63	169.0	8.28	<0.500	332	3.5	<0.500	182.0	2.42 J
	9/27/2018	<1.00	<5.00	<1.00	<1.00	5.69	<0.400	1.59	219	7.54	<0.500	243	3.96	<0.500	168	3.90
	12/7/2018	<1.00	<5.00	<1.00	<1.00	0.75	<0.400	<0.400	20.0	0.80	<0.500	178	3.4	<0.500	66.5	0.55

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-9 (continued)	3/20/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.47	<0.400	<0.500	58.9	1.47	<0.500	20.0	<0.400
	6/7/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.99	<0.400	<0.500	108	1.34	<0.500	49.4	<0.400
	9/26/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	3.34	<0.400	<0.500	81.3	2.34	<0.501	25.4	<0.401
	12/3/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.34	<0.400	<0.500	67.5	1.46	<0.502	24.3	<0.402
	3/11/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	5.21	<0.400	<0.500	55.4	1.41	<0.500	18.1	<0.400
	6/18/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	5.27	<0.400	<0.500	109	1.44	<0.500	45.9	<0.400
	10/8/2020	<1.00	<5.00	<1.00	<1.00	1.78	<0.400	0.817	39.0	1.280	<0.500	191	2.95	<0.500	72.2	1.55
	12/9/2020	<1.00	<5.00	<1.00	<1.00	6.49	<0.400	1.63	211	6.980	<0.500	262	3.86	<0.500	158	2.68
MW-10	12/2/1996	<0.50	<0.50	<0.50	<0.20	<0.30	<0.50	<0.20	<0.20	<1	<0.20	2.7	<1	--	0.4	<0.50
	11/13/1997	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.53	<0.50	--	3.65	<1
	8/11/1999	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.02	<1	--	1.24	<0.50
	11/16/1999	<1	<2.5	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	69.6	1.89	--	10.3	<0.50
	2/28/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.63	<1	--	1.16	<0.50
	6/27/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.72	<1	--	3.74	<0.50
	5/30/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.25	<1	--	2.52	<0.50
	5/30/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.05	<0.50	--	1.43	<0.50
	5/28/2003	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	0.86	<0.50	<0.50	2.21	<0.50	--	1.28	<0.50
	11/2/2004	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.93	<0.50	--	0.98	<0.50
	11/16/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.1	<0.50	--	3.4	<0.50
	3/23/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.02	<0.50	--	1.21	<0.50
	5/17/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.26	<0.50	--	1.19	<0.50
	9/12/2007	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.59 J	<0.50	--	0.83	<0.50
	3/5/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	1.66	<0.500	<0.500	1.67	<0.500
	9/18/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	1.13	<0.500	<0.500	1.4	<0.500
	3/25/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	1.6	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	2	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	1.6	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	1.4	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	0.8	<0.50
	9/14/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	2.1	<0.50
	3/6/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	2	<0.50
9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.98	<0.50	<0.50	1.4	<0.50	
3/13/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.6	<0.50	<0.50	3.1	<0.50	
9/18/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	1.4	<0.50	
3/19/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	8.8	<0.50	<0.50	16	<0.50
9/26/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2	<0.50	<0.50	2	<0.50	
3/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.7	<0.50	<0.50	1.8	<0.50	
9/21/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.4	<0.50	<0.50	1.6	<0.50	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-10 (continued)	3/7/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.98	<0.50
	9/27/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	1.4	<0.50
	3/30/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	1.5	<0.5
	9/27/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	3.7	<0.50	<0.50	2.4	<0.50
	11/6/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.5	<0.50	<0.50	1.1	<0.50
	6/29/2018	<0.500	<2.50	<0.500	<0.500	0.161 J	<0.500	<0.500	0.8	<0.500	<0.500	5.7	0.145 J	<0.500	5.8	<0.500
	9/25/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	1.74	<0.400	<0.500	1.45	<0.400
	9/25/2018 DUP	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	1.76	<0.400	<0.500	1.54	<0.400
	3/21/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	3.24	<0.400	<0.500	2.00	<0.400
	6/6/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	7.51	<0.400	<0.500	4.19	<0.400
	9/25/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	2.03	<0.400	<0.500	1.35	<0.400
	12/4/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	1.65	<0.400	<0.500	1.15	<0.400
	3/11/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	1.97	<0.400	<0.500	1.53	<0.400
	6/17/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	9.74	<0.400	<0.500	5	<0.400
	10/8/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	2.34	<0.400	<0.500	1.81	<0.400
12/9/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	2.40	<0.400	<0.500	1.95	<0.400	
MW-11	12/2/1996	<50	<50	<50	<20	<30	<50	52	140	<100	<20	2,200	550	--	5,900	<50
	11/13/1997	<50	<100	<50	<50	<50	<50	<50	<50	<50	<50	686	90.3	--	2,720	<100
	8/10/1999	<5	<25	<2.5	<2.5	13.7	<2.5	22.8	14.4	<2.5	<2.5	259	112	--	1,300	<2.5
	11/16/1999	<20	<50	<10	<20	12	<10	16.8	18.8	<10	<10	478	94.8	--	1,500	<10
	2/28/2000	<5	<25	<2.5	<2.5	2.71	<2.5	7.9	5.05	<2.5	<2.5	247	30.2	--	473	<2.5
	6/27/2000	<10	<50	<5	<5	12.1	<5	28.9	14.8	<5	<5	337	108	--	1,390	<5
	8/31/2000	<20	<100	<10	<10	15.4	<10	28	24.8	<10	<10	646	159	--	1,690	<10
	11/30/2000	<20	<100	<10	<10	12.2	<10	26.4	19.3	<10	<10	342	125	--	1,550	<10
	2/27/2001	<5	<25	<2.5	<2.5	3.65	<2.5	7.82	7.1	<2.5	<2.5	198	35.1	--	468	<2.5
	5/30/2001	<10	<50	<5	<5	5.2	<5	13.6	9.09	<5	<5	256	48.8	--	858	<5
	9/25/2001	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	260	57	--	820	<13
	12/17/2001	<10	<50	<5	<5	<5	<5	15.4	25.9	<5	<5	983	40.9	--	1,390	<5
	3/18/2002	<10	<5	<5	<10	11.9	<5	19.4	17.1	<5	<5	433	79.8	--	1,370	<5
	5/30/2002	<10	<5	<5	<10	5.9	<5	10.9	15.6	<5	<5	571	45.6	--	965	<5
	11/7/2002	<10	<5	<5	<10	15	<5	19.3	18.9	<5	<5	347	112	--	1,640	<5
	1/23/2003	<5	<2.5	<2.5	<5	3.35	<2.5	4.3	5.35	<2.5	<2.5	265	24.1	--	534	<2.5
	5/28/2003	<10	<5	<5	<10	13.3	<5	17.9	17.6	<5	<5	305	105	--	1,580	<5
11/11/2003	<5	<5	<5	<5	5	<5	5.15	9.15	<5	<5	191	38.8	--	504	<5	
1/26/2004	<10	<5	<5	<10	9.6	<5	11.5	13.5	<5	<5	369	73.3	--	1,070	<5	
3/22/2004	Well Abandoned															

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-12	12/2/1996	<50	<50	<50	<20	<30	<50	<20	29	<100	<20	2,500	<100	--	950	<50
	11/12/1997	<250	<500	<250	<250	<250	<250	<250	2,710	<250	<250	12,900	645	--	5,400	<500
	8/11/1999	<200	<1	<100	<100	120	<100	<100	2,680	<100	<100	11,300	758	--	3,520	<100
	11/16/1999	<200	<500	<100	<200	<100	<100	<100	160	<100	<100	18,200	922	--	4,630	<100
	2/28/2000	<200	<1	<100	<100	<100	<100	<100	908	<100	<100	3,780	<200	--	1,210	<100
	6/27/2000	<100	<500	<50	<50	161	<50	<50	2,880	<50	<50	12,000	712	--	3,180	<50
	5/30/2001	<50	<250	<25	<25	64.8	<25	54	1,650	<25	<25	4,990	298	--	1,810	<25
	5/30/2002	<5	<2.5	<2.5	<5	4.25	<2.5	<2.5	101	<2.5	<2.5	344	6.6	--	81.6	<2.5
	5/29/2003	<5	<2.5	<2.5	<5	28.4	<2.5	8	601	5.7	<2.5	362	18.2	--	199	<2.5
	11/16/2004	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	59	<2.5	<2.5	410	3.5	--	96	<2.5
	3/23/2005	<20	<10	<10	<20	247	<10	53	3,640	40.2	<10	1,080	49.8	--	639	14.2
	5/18/2005	<1	<0.50	<0.50	<1	0.96	<0.50	0.98	30.1	0.57	<0.50	51.1	0.92	--	21.4	<0.50
	5/22/2007	<5	<5	<5	<5	35.6	<5	7.45	785	11.1	<5	233	7.8	--	139	<5
	9/11/2007	<100	<50	<50	<100	316	<50	57	6,700	53	<50	431	<50	--	516	<50
	12/12/2007	<2	<1	<1	<2	1.1	<1	<1	43.8	<1	<1	106	3.16	--	39.6	<1
	3/5/2008	<1	4.97	<0.500	<1	156	2.01	46.2	3,170	41.8	<0.500	440	21.2	<0.500	329	18.5
	9/19/2008	<50	<25	<25	<50	394	<25	66	7,650	69	<25	968	45	<25	924	58
	12/10/2008	<4	<4	<4	<4	33	<4	6.6	670	8.7	<4	99	5	<4	80	<4
	3/27/2009	<4	4.8	<4	<4	230	<4	39	4,800	46	<4	540	28	<4	440	31
	03/27/2009 DUP	<4	5	<4	<4	250	<4	44	4,700	51	<4	600	32	<4	490	35
	6/18/2009	<15	<15	<15	<15	170	<15	32	3,500	36	<15	270	<15	<15	230	26
	06/18/2009 DUP	<15	<15	<15	<15	170	<15	32	3,600	37	<15	310	<15	<15	250	25
	9/18/2009	<15	<15	<15	<15	240	<15	46	4,200	50	<15	540	26	<15	440	51
	09/18/2009 DUP	<15	<15	<15	<15	260	<15	49	4,600	52	<15	590	28	<15	470	56
	12/18/2009	<0.50	<0.50	<0.50	<0.50	2.4	<0.50	<0.50	100	1.1	1.3	170	2.2	<0.50	65	<0.50
	12/18/2009 DUP	<0.50	<0.50	<0.50	<0.50	2.2	<0.50	<0.50	96	1.1	1.3	160	2.1	<0.50	62	<0.50
	3/19/2010	<0.50	4.1	<0.50	<0.50	220	2.6	48	4,400	53	<0.50	480	28	0.7	380	37
	03/19/2010 DUP	<15	<15	<15	<15	270	<15	44	4,900	54	<15	600	29	<15	460	39
	6/16/2010	<0.50	<0.50	<0.50	<0.50	0.56	<0.50	<0.50	19	<0.50	<0.50	38	<0.50	<0.50	17	<0.50
	06/16/2010 DUP	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	18	0.54	<0.50	37	<0.50	<0.50	16	<0.50
	9/23/2010	<15	<15	<15	<15	260	<15	47	4,800	56	<15	780	38	<15	560	68
	9/23/2010 DUP	<15	<15	<15	<15	260	<15	49	4,800	57	<15	800	41	<15	580	65

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-12 (continued)	12/9/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.5	<0.5	<0.5	5.1	<0.5	<0.5	2.1	<0.5
	12/09/10 DUP	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.4	<0.5	<0.5	5.8	<0.5	<0.5	2	<0.5
	3/10/2011	<0.50	0.67	<0.50	<0.50	94	0.96	17	1,900	19	0.55	340	12	<0.50	220	11
	03/10/2011 DUP	<0.50	0.87	<0.50	<0.50	93	1	17	1,600	19	0.55	260	13	<0.50	180	11
	6/7/2011	<0.5	<0.5	<0.5	<0.5	1.8	<0.5	<0.5	59	1	<0.5	53	0.7	<0.5	25	<0.5
	06/07/2011 DUP	<0.5	<0.5	<0.5	<0.5	1.8	<0.5	<0.5	60	1	<0.5	58	0.69	<0.5	27	<0.5
	9/19/2011	<0.50	3	<0.50	<0.50	240	2.5	45	4,700	55	<0.50	860	65	0.94	690	63
	09/19/2011 DUP	<20	<20	<20	<20	240	<20	53	4,700	60	<20	860	60	<20	680	68
	12/7/2011	<0.50	<0.50	<0.50	<0.50	130	1.3	28	2,900	33	<0.50	520	34	0.54	380	40
	12/07/2011 DUP	<0.50	<15	<0.50	<0.50	140	1.3	29	2,900	33	<0.50	580	34	0.55	400	41
	3/12/2012	<15	<15	<15	<15	210	<15	44	3,800	45	<15	770	48	<15	540	46
	03/12/2012 DUP	<20	<20	<20	<20	220	<20	44	4,000	47	<20	740	50	<20	540	45
	06/22/2012	<5	<5	<5	<5	100	<5	16	1,700	39	<5	270	13	<5	200	22
	06/22/2012 DUP	<5	<5	<5	<5	100	<5	16	1,700	39	<5	270	13	<5	190	22
	9/14/2012	<5	<5	<5	<5	220	<5	45	4,700	56	<5	890	61	<5	590	58
	09/14/2012 DUP	<15	<15	<15	<15	270	<15	58	5,400	73	<15	1,100	76	<15	730	84
	12/13/2012	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	62	0.97	<0.50	38	0.52	<0.50	22	<0.50
	12/13/2012 DUP	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	62	0.92	<0.50	38	0.53	<0.50	23	<0.50
	3/15/2013	<0.50	1	<0.50	<0.50	200	1.7	40	4,300	55	<0.50	760	53	0.71	540	53
	03/15/2013 DUP	<0.50	1	<0.50	<0.50	200	1.8	40	4,200	56	<0.50	750	52	0.66	520	54
	6/13/2013	<15	<15	<15	<15	230	<15	38	4,700	53	<15	590	44	<15	480	55
	06/13/2013 DUP	<15	<15	<15	<15	240	<15	39	4,800	53	<15	610	46	<15	500	59
	9/20/2013	<0.50	<0.50	<0.50	<0.50	170	1.6	37	3,400	49	<0.50	510	37	0.66	400	50
	09/20/2013 DUP	<0.50	<0.50	<0.50	<0.50	180	1.7	36	3,400	48	<0.50	520	37	0.63	400	49
	12/16/2013	<2.5	<2.5	<2.5	<2.5	36	<2.5	7.5	800	10	<2.5	150	5.7	<2.5	110	9.6
	12/16/2013 DUP	<2.5	<2.5	<2.5	<2.5	35	<2.5	7.6	770	9.6	<2.5	140	5.8	<2.5	110	9.8
	3/24/2014	<0.50	<0.50	<0.50	<0.50	110	0.77	18	1,900	25	<0.50	180	8.6	<0.50	170	47
	3/24/2014 DUP	<7	<7	<7	<7	97	<7	16	1,900	22	<7	170	7.5	<7	140	35
6/24/2014	<1.5	<1.5	<1.5	<1.5	14	<1.5	1.7	300	2.1	<1.5	42	<1.5	<1.5	32	<1.5	
6/24/2014 DUP	<1.5	<1.5	<1.5	<1.5	14	<1.5	1.9	310	2.3	<1.5	42	1.6	<1.5	34	<1.5	
9/30/2014	<15	<15	<15	<15	190	<15	39	3,500	45	<15	670	36	<15	480	42	
9/30/2014 DUP	<15	<15	<15	<15	180	<15	39	3,500	45	<15	680	35	<15	460	42	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-12	12/11/2014	<0.50	<0.50	<0.50	<0.50	0.72	<0.50	<0.50	34	0.64	<0.50	25	<0.50	<0.50	15	<0.50
(continued)	12/11/2014 DUP	<0.50	<0.50	<0.50	<0.50	0.73	<0.50	<0.50	32	0.6	<0.50	24	<0.50	<0.50	14	<0.50
	3/20/2015	<5	<5	<5	<5	102	<5	25.4	2,110	29.4	<5	584	17.8	<5	344	36.8
	3/20/2015 DUP	<12.5	<12.5	<12.5	<12.5	143	<12.5	25.8	2,490	28.8	<12.5	495	21.7	<12.5	340	29
	6/19/2015	<10	<10	<10	<10	151	<10	28.2	2,570	25	<10	514	23.6	<10	356	31.1
	6/19/2015 DUP	<10	<10	<10	<10	157	<10	31	2,680	30	<10	516	23.4	<10	362	33.2
	9/22/2015	<8.3	<8.3	<8.3	<8.3	120	<8.3	16.9	2,250	23.4	<8.3	343	15.7	<8.3	239	22.5
	9/22/2015 DUP	<8.3	<8.3	<8.3	<8.3	134	<8.3	21.4	2,490	25.7	<8.3	425	20.1	<8.3	282	26.5
	12/8/2015	<5	<5	<5	<5	8	<5	<5	40	0.7	<5	45	0.5	<5	22	<5
	3/8/2016	<3.6	<14.3	<3.6	<3.6	79.9	<3.6	15.4	1,380	16.2	<3.6	325	7.7	<3.6	209	21.3
	3/8/2016 DUP	<3.6	<14.3	<3.6	<3.6	82	<3.6	16.6	1,390	15.6	<3.6	336	7.7	<3.6	210	21.2
	6/16/2016	<8.4	<33.4	<8.4	<8.4	174	<8.4	29.9	3,310	31.6	<8.4	314	12.8	<8.4	288	52.3
	6/16/2016 DUP	<8.4	<33.4	<8.4	<8.4	192	<8.4	31.9	3,420	37.4	<8.4	367	15.4	<8.4	311	67
	9/27/2016	<10	<40	<10	<10	26	<10	<10	525	<10	<10	67.6	<10	<10	45.4	14.8
	9/27/2016 DUP	<2.5	<10	<2.5	<2.5	44.4	<2.5	11.5	867	11.4	<2.5	387	3.9	<2.5	163	22.6
	12/14/2016	<1	<4	<1	<1	<1	<1	<1	6.9	2.3	<1	<1	<1	<1	<1	20.5
	12/14/2016 DUP	<2.5	29.1	<2.5	<2.5	16.5	<2.5	4.7	744	<2.5	<2.5	62.3	<2.5	<2.5	42.2	21.2
	3/30/2017	<10	<40	<10	<10	<10	<10	<10	1,120	<10	<10	55.9	<10	<10	29.6	37.8
	3/30/2017 DUP	<2.5	<10	<2.5	<2.5	11.4	<2.5	3.8	853	6.1	<2.5	49	<2.5	<2.5	26	28.3
	6/12/2017	<125	<12.5	<3.1	<3.1	14.0	<3.1	4.7	893	7.6	<3.1	42.4	<3.1	<3.1	18.1	48.4
	6/12/2017 DUP	<3.1	<12.5	<3.1	<3.1	12.8	<3.1	<3.1	860	7.1	<3.1	40.0	<3.1	<3.1	16.5	47.4
	9/28/2017	<3.1	17.4	<3.1	<3.1	19.5	<3.1	<3.1	457	5.4	<3.1	<3.1	<3.1	<3.1	<3.1	47.7
	9/28/2017 DUP	<1.7	16.3	<1.7	<1.7	17.3	<1.7	<1.7	428	5.2	<1.7	<1.7	<1.7	<1.7	<1.7	45.1
	11/9/2017	<2.0	15.4	<0.50	<0.50	4.5	<0.50	<0.50	22	1.4	<0.50	<0.50	<0.50	<0.50	<0.50	49.1
	11/9/2017 DUP	<2.0	12.6	<0.50	<0.50	4.5	<0.50	<0.50	21	1.6	<0.50	<0.50	<0.50	<0.50	<0.50	36.4
	3/20/2018	<0.500	7.50	<0.500	<0.500	0.5	<0.500	<0.500	6	1.3	<0.500	<0.500	<0.500	<0.500	0.271 J	2.8
	3/20/2018 DUP	<0.500	8.18	<0.500	<0.500	0.550 J	<0.500	<0.500	6	1.29 J	<0.500	0.203 J	<0.500	<0.500	0.261 J	2.6
	7/1/2018	<0.500	9.73	<0.500	<0.500	0.9	<0.500	<0.500	4	1.6	<0.500	0.304 J	<0.500	<0.500	1.0	1.5
	7/1/2018 DUP	<0.500	8.34	<0.500	<0.500	0.8	<0.500	<0.500	4	1.6	<0.500	0.289 J	<0.500	<0.500	1.0	1.3
	9/25/2018	<1.00	24.5	<1.00	<1.00	0.730	<0.400	<0.400	1.46	0.520	<0.500	<0.400	<0.400	<0.500	<0.400	1.23
	9/25/2018 DUP	<1.00	23.7	<1.00	<1.00	0.670	<0.400	<0.400	1.31	0.500	<0.500	<0.400	<0.400	<0.500	<0.400	1.21
	12/4/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	4	0.4	<0.500	1.3	<0.400	<0.500	1.3	1.7
	12/4/2018 DUP	<1.00	6.03	<1.00	<1.00	0.5	<0.400	<0.400	4	0.4	<0.500	1.0	<0.400	<0.500	1.0	1.6

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-12 (continued)	3/20/2019	<2.00	<5.00	<1.00	<1.00	0.655	<0.400	<0.400	6.70	0.675	<0.500	2.11	<0.400	<0.500	1.33	1.64
	3/20/2019 DUP	<2.00	<5.00	<1.00	<1.00	0.615	<0.400	<0.400	6.31	0.621	<0.500	2.05	<0.400	<0.500	1.15	1.56
	6/5/2019	<2.00	<5.00	<1.00	<1.00	0.716	<0.400	<0.400	9.17	0.756	<0.500	3.30	<0.400	<0.500	3.45	2.64
	6/5/2019 DUP	<2.00	<5.00	<1.00	<1.00	0.719	<0.400	<0.400	9.36	0.725	<0.500	3.64	<0.400	<0.500	3.41	2.74
	9/26/2019	<1.00	18.1	<1.00	<1.00	6.26	<0.400	<0.400	5.31	0.565	<0.500	<0.400	<0.400	<0.500	0.442	6.82
	9/26/2019 DUP	<1.00	16	<1.00	<1.00	6.12	<0.400	<0.400	5.06	0.55	<0.500	<0.400	<0.400	<0.500	0.459	6.45
	12/5/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.61	<0.400	<0.500	2.37	<0.400	<0.500	1.41	0.413
	12/5/2019 DUP	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.51	<0.400	<0.500	2.18	<0.400	<0.500	1.23	<0.400
	3/11/2020	<1.00	<5.00	<1.00	<1.00	0.803	<0.400	<0.400	8.18	0.515	<0.500	7.01	<0.400	<0.500	4.17	0.423
	3/11/2020 DUP	<1.00	<5.00	<1.00	<1.00	0.806	<0.400	<0.400	8.47	0.561	<0.500	6.95	<0.400	<0.500	4.25	<0.400
	6/18/2020	<1.00	<5.00	<1.00	<1.00	1.25	<0.400	<0.400	14.2	0.41	<0.500	2.49	<0.400	<0.500	2.6	1.1
	6/18/2020 DUP	<1.00	<5.00	<1.00	<1.00	1.30	<0.400	<0.400	14.1	<0.400	<0.500	2.59	<0.400	<0.500	2.68	1.04
	10/7/2020	<1.00	<10.0	<1.00	<1.00	36.6	<0.400	<0.400	80.9	0.582	<0.500	<0.400	<0.400	<0.500	0.745	184
	10/7/2020 DUP	<1.00	<10.0	<1.00	<1.00	37.8	<0.400	<0.400	81.7	0.632	<0.500	<0.400	<0.400	<0.500	0.750	196
	12/8/2020	<2.00	<5.00	<1.00	<1.00	1.55	<0.400	<0.400	9.92	<0.400	<0.500	13.5	<0.400	<0.500	6.47	7.36
12/8/2020 DUP	<2.00	<5.00	<1.00	<1.00	1.52	<0.400	<0.400	9.61	<0.400	<0.500	12.9	<0.400	<0.500	6.24	7.12	
MW-13	12/2/1996	0.7	<0.50	<0.50	<0.20	<0.30	<0.50	0.3	9.1	<1	<0.20	750	6.6	--	82	<0.50
	11/12/1997	<250	<500	<250	<250	291	<250	<250	5,050	<250	<250	18,100	<250	--	9,050	<500
	8/11/1999	<200	<1	<100	<100	<100	<100	<100	2,280	<100	<100	9,590	<200	--	3,920	<100
	11/16/1999	<50	<125	<25	<50	108	<25	51	2,620	<25	<25	7,210	67.5	--	3,050	--
	2/28/2000	<200	<1	<100	<100	<100	<100	<100	562	<100	<100	1,340	<200	--	602	<100
	6/28/2000	<100	<500	<50	<50	132	<50	142	4,210	<50	<50	14,700	155	--	6,360	<50
	5/30/2001	<200	<1,000	<100	<100	<100	<100	<100	2,460	<100	<100	10,300	<200	--	4,620	<100
	5/30/2002	<2	<1	<1	<2	1.44	<1	1.28	60.4	<1	<1	241	1.68	--	86.4	<1
	5/28/2003	<1	<0.50	<0.50	<1	1.71	<0.50	1.75	79.6	1.26	<0.50	121	1.58	--	130	<0.50
	11/16/2004	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	1,200	<12	--	230	<12
	5/18/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	3.14	<0.50	<0.50	71.2	<0.50	--	10.3	<0.50
	9/12/2007	<50	<25	<25	<50	55	<25	28	1,290	<25	<25	2,730	29.5	--	2,020	<25
	12/12/2007	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	3.36	<0.50	<0.50	51.3	0.64	--	19.5	<0.50
	3/5/2008	<1	<0.500	<0.500	<1	8.32	<0.500	4.46	174	4.52	<0.500	383	4.21	<0.500	337	0.96
	6/25/2008	<5	<5	<5	<5	15.2	<5	<5	320	10.4	<5	132	<5	--	160	<5
	9/19/2008	<5	<2.50	<2.50	<5	5.6	<2.50	<2.50	116	2.65	<2.50	266	<2.50	<2.50	187	<2.50
	12/10/2008	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	0.62	32	0.69	<0.50	25	0.6	<0.50	39	<0.50
	3/27/2009	<0.50	<0.50	<0.50	<0.50	0.7	<0.50	<0.50	15	<0.50	<0.50	25	<0.50	<0.50	17	<0.50
	03/27/2009 DUP	<0.50	<0.50	<0.50	<0.50	0.79	<0.50	<0.50	15	<0.50	<0.50	25	<0.50	<0.50	17	<0.50
	6/18/2009	<0.50	<0.50	<0.50	<0.50	2.4	<0.50	0.8	58	1.8	<0.50	16	<0.50	<0.50	42	<0.50
9/17/2009	<0.50	<0.50	<0.50	<0.50	5.8	<0.50	3.3	130	2.9	<0.50	430	4	<0.50	270	1	
12/18/2009	<0.50	<0.50	<0.50	<0.50	0.62	<0.50	<0.50	16	<0.50	<0.50	66	0.61	<0.50	45	<0.50	
3/19/2010	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	1.4	64	1.2	<0.50	130	1.3	<0.50	110	<0.50	
6/16/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	14	<0.50	<0.50	7.6	<0.50	
9/23/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.7	<0.5	<0.5	45	<0.5	<0.5	12	<0.5	
12/21/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-13	3/11/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	0.65	<0.50
(continued)	6/9/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.8	<0.5	<0.5	6.1	<0.5	<0.5	4.2	<0.5
	9/19/2011	<0.50	0.54	<0.50	<0.50	35	<0.50	17	700	20	<0.50	2,200	17	0.63	1,300	3.6
	12/9/2011	<9	<9	<9	<9	23	<9	11	530	18	<9	2,800	12	<9	1,400	<9
	3/12/2012	<9	<9	<9	<9	24	<9	14	600	14	<9	1,800	11	<9	1,200	<9
	6/22/2012	<4	<4	<4	<4	40	<4	13	940	30	<4	1,300	8.6	<4	1,000	4.5
	9/14/2012	<4	<4	<4	<4	38	<4	21	900	22	<4	3,100	16	<4	1,800	<4
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	13	0.62	<0.50	88	<0.50	<0.50	51	<0.50
	3/15/2013	<0.50	<0.50	<0.50	<0.50	34	<0.50	21	890	20	<0.50	2,400	14	0.68	1,700	3.2
	6/14/2013	<4	<4	<4	<4	19	<4	9.4	520	15	<4	1,100	6	<4	920	<4
	9/20/2013	<0.50	<0.50	<0.50	<0.50	40	<0.50	20	770	19	<0.50	2,600	13	0.74	1,700	3.4
	12/13/2013	<4	<4	<4	<4	11	<4	6.6	280	5.8	<4	1,300	4.9	<4	720	<4
	3/21/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	14	<0.50	<0.50	100	<0.50	<0.50	54	<0.50
	6/24/2014	<0.50	<0.50	<0.50	<0.50	12	<0.50	<0.50	880	33	<0.50	1,500	12	0.67	1,300	3.2
	9/30/2014	<4	<4	<4	<4	38	<4	20	890	19	<4	3,100	13	<4	2,000	<4
	12/11/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	18	0.66	<0.50	91	<0.50	<0.50	65	<0.50
	3/18/2015	<1.6	<1.6	<1.6	<1.6	19	<1.6	3.1	515	7.4	<1.6	551	2.4	<1.6	609	<1.6
	6/18/2015	<0.50	<0.50	<0.50	<0.50	33.9	<0.50	15.9	615	15.3	<0.50	1,960	10.4	<0.50	1,390	2
	9/22/2015	<0.50	<0.50	<0.50	<0.50	33.9	<0.50	21	754	15.6	<0.50	2,370	10.4	<0.50	1,740	2.4
	12/8/2015	<0.50	<0.50	<0.50	<0.50	0.89	<0.50	0.64	30.5	0.88	<0.50	185	0.7	<0.50	121	<0.50
	3/8/2016	<2.5	<10	<2.5	<2.5	14.3	<2.5	6.4	336	4.6	<2.5	839	3.7	<2.5	736	<2.5
	6/16/2016	<8.4	<33.4	<8.4	<8.4	41.3	<8.4	17.8	841	19.2	<8.4	2,470	10.1	<8.4	1,820	<8.4
	9/28/2016	<2.5	<10	<2.5	<2.5	<2.5	<2.5	<2.5	148	<2.5	<2.5	4,840	<2.5	<2.5	895	<2.5
	9/28/2016 DUP	<2.5	<10	<2.5	<2.5	<2.5	<2.5	<2.5	145	<2.5	<2.5	5,090	<2.5	<2.5	951	<2.5
	12/16/2016	<5	<20	<5	<5	<5	<5	<5	509	<5	<5	1,020	<5	<5	394	<5
	3/30/2017	<5	<20	<5	<5	<5	<5	<5	101	<5	<5	176	<5	<5	57.6	<5
	6/15/2017	<1.0	<4.0	<1.0	<1.0	<1.0	<1.0	1.2	272	1.6	<1.0	97.7	<1.0	<1.0	56.3	4.1
	9/27/2017	<1.0	<4.0	<1.0	<1.0	<1.0	<1.0	5.0	3,220	7.3	<1.0	3.3	<1.0	<1.0	1.3	25.0
	11/7/2017	<16.7	<16.7	<4.2	<4.2	<4.2	<4.2	<4.2	1,360	5.4	<4.2	<4.2	<4.2	<4.2	<4.2	25.0

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-13 (continued)	3/20/2018	<0.500	3.29	<0.500	<0.500	0.879	<0.500	2.55	1,730	5.20	<0.500	0.396 J	<0.500	<0.500	2.19	211
	7/1/2018	<0.500	<2.50	<0.500	<0.500	18.3	0.148 J	5.98	1680	26.9	<0.500	<0.500	<0.500	<0.500	0.781	2030
	9/25/2018	<1.00	10.9	<1.00	<1.00	1.91	<0.400	<0.400	9.78	1.26	<0.500	0.410	<0.400	<0.500	0.800	113
	12/5/2018	<1.00	6.7	<1.00	<1.00	<0.400	<0.400	<0.400	6.17	0.682	<0.500	0.567	<0.400	<0.500	0.413	55.2
	3/19/2019	<1.00	5.64	<1.00	<1.00	<0.400	<0.400	<0.400	2.69	<0.400	<0.500	<0.400	<0.400	<0.500	0.433	2.02
	6/6/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	4.62	<0.400	<0.500	<0.400	<0.400	<0.500	0.673	2.89
	9/26/2019	<1.00	<5.00	<1.00	<1.00	1.07	<0.400	<0.400	1.94	0.439	<0.500	<0.400	<0.400	<0.500	<0.400	2.01
	12/3/2019	<1.00	<5.00	<1.00	<1.00	1.50	<0.400	<0.400	1.06	0.488	<0.500	<0.400	<0.400	<0.500	<0.400	1.42
	3/10/2020	<1.00	<5.00	<1.00	<1.00	9.19	<0.400	1.97	72.5	2.040	<0.500	<0.400	<0.400	<0.500	7.59	134
	6/18/2020	<1.00	<5.00	<1.00	<1.00	0.610	<0.400	<0.400	1.15	<0.400	<0.500	<0.400	<0.400	<0.500	1.12	5.28
	10/7/2020	<1.00	7.1	<1.00	<1.00	18.1	<0.400	<0.400	3.47	0.920	<0.500	0.470	<0.400	<0.500	0.870	98.8
	12/8/2020	<2.00	<5.00	<1.00	<1.00	2.67	<0.400	<0.400	0.606	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	2.3
MW-14	11/12/1997	<5	<10	<5	<5	5.01	<5	<5	<5	<5	<5	42.6	<5	--	394	<10
	8/10/1999	<20	<100	<10	<10	<10	<10	<10	15.1	<10	<10	121	35.6	--	853	<10
	11/16/1999	<2	<5	<1	<2	2.48	<1	2.48	4.2	<1	<1	186	10.8	--	313	<1
	2/28/2000	<100	<500	<50	<50	<50	<50	83.2	85.1	<50	<50	711	190	--	5,300	<50
	6/27/2000	<10	<50	<5	<5	10.1	<5	18.9	219	<5	<5	207	46.2	--	1,150	<5
	11/30/2000	<2	<10	<1	<1	1.08	<1	1.88	2.27	<1	<1	21.3	5.54	--	157	<1
	5/30/2001	<1	<50	<5	<5	6.16	<5	13.8	30.4	<5	<5	268	28.2	--	1,280	<5
	5/30/2002	<10	<5	<5	<10	<5	<5	<5	8.4	<5	<5	78.3	11.9	--	303	<5
	5/28/2003	<1	<0.50	<0.50	<1	0.9	<0.50	1.47	4.15	<0.50	<0.50	80.6	4.99	--	188	<0.50
	11/15/2004	<25	<25	<25	<25	<25	<25	<25	96	<25	<25	480	<25	--	1,200	<25
	5/17/2005	<2	<1	<1	<2	4.64	<1	2.3	41.1	<1	<1	127	9.28	--	367	<1
	9/12/2007	<20	<10	<10	<20	21.6	<10	<10	162	<10	<10	180	22.2	--	963	<10
	3/5/2008	<1	<0.500	0.850 J	<1	24.3	<0.500	13.9	217	3.86	<0.500	549	27.2	<0.500	1,770	<0.500
	6/25/2008	<5	<5	<5	<5	15.2	<5	10.2	113	<5	<5	360	18.2	--	1,290	<5
	9/19/2008	<5	<2.50	<2.50	<5	19.1	<2.50	8.6	173	<2.50	<2.50	425	16.6	<2.50	1,320	<2.50
	12/10/2008	<5	<5	<5	<5	17	<5	9.6	160	<5	<5	330	17	<5	1,200	<5
	3/27/2009	<2.5	<2.5	<2.5	<2.5	16	<2.5	6.7	160	2.5	<2.5	320	14	<2.5	980	<2.5
	6/17/2009	<2.5	<2.5	<2.5	<2.5	21	<2.5	12	150	<2.5	<2.5	400	21	<2.5	1,400	<2.5
	9/18/2009	<0.50	<0.50	0.74	<0.50	19	<0.50	8.8	150	2	<0.50	440	17	<0.50	1,300	<0.50
	12/15/2009	<2.5	<2.5	<2.5	<2.5	11	<2.5	4.7	120	<2.5	<2.5	410	7.6	<2.5	820	<2.5
3/17/2010	<2.5	<2.5	<2.5	<2.5	22	<2.5	9.5	140	<2.5	<2.5	320	15	<2.5	1,300	<2.5	
7/2/2010	<2.5	<2.5	<2.5	<2.5	7	<2.5	4.8	52	<2.5	<2.5	220	5.9	<2.5	610	<2.5	
9/22/2010	<3	<3	<3	<3	16	<3	6.5	140	<3	<3	230	10	<3	800	<3	
12/8/2010	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	0.7	11	<0.5	<0.5	82	1.5	<0.5	150	<0.5	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-14 (continued)	3/9/2011	<3	<3	<3	<3	6.8	<3	3.8	55	<3	<3	200	5	<3	540	<3
	6/8/2011	<0.5	<0.5	<0.5	<0.5	0.64	<0.5	<0.5	1.8	<0.5	<0.5	27	1.1	<0.5	66	<0.5
	9/14/2011	<2.5	<2.5	<2.5	<2.5	12	<2.5	5.7	120	<2.5	<2.5	300	8	<2.5	850	<2.5
	12/6/2011	<2.5	<2.5	<2.5	<2.5	8.4	<2.5	3.9	88	<2.5	<2.5	320	5.7	<2.5	740	<2.5
	3/7/2012	<2.5	<2.5	<2.5	<2.5	9.3	<2.5	4.6	87	<2.5	<2.5	270	6.1	<2.5	760	<2.5
	6/19/2012	<2.5	<2.5	<2.5	<2.5	11	<2.5	5.6	70	<2.5	<2.5	200	7.4	<2.5	730	<2.5
	9/11/2012	<2.5	<2.5	<2.5	<2.5	11	<2.5	5.1	110	<2.5	<2.5	280	6.6	<2.5	730	<2.5
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.51	<0.50	<0.50	16	<0.50	<0.50	27	<0.50
	3/12/2013	<0.50	<0.50	0.56	<0.50	12	<0.50	4.4	100	1.7	<0.50	230	7.2	<0.50	670	<0.50
	6/12/2013	<3	<3	<3	<3	11	<3	5	84	<3	<3	260	6.6	<3	770	<3
	9/18/2013	<0.50	<0.50	<0.50	<0.50	13	<0.50	4.6	130	2	<0.50	240	5.9	<0.50	640	<0.50
	12/11/2013	<1.5	<1.5	<1.5	<1.5	8.4	<1.5	2.8	83	<1.5	<1.5	180	3.7	<1.5	460	<1.5
	3/18/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	11	<0.50	<0.50	20	<0.50
	6/24/2014	<0.50	<0.50	<0.50	<0.50	17	<0.50	7	120	1.8	<0.50	210	0.87	<0.50	670	<0.50
	9/24/2014	<2.5	<2.5	<2.5	<2.5	10	<2.5	4	120	<2.5	<2.5	240	4	<2.5	640	<2.5
	12/9/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.7	<0.50	<0.50	29	0.61	<0.50	63	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	15.4	<0.50	5.9	128	2.2	<0.50	312	5.9	<0.50	912	<0.50
	6/16/2015	<3.1	<3.1	<3.1	<3.1	14.7	<3.1	4.9	117	<3.1	<3.1	248	4.4	<3.1	792	<3.1
	9/21/2015	<0.50	<0.50	<0.50	<0.50	15.2	<0.50	5.6	116	2.1	<0.50	201	4.7	<0.50	654	<0.50
	12/8/2015	Not sampled; well monument under water.														
	3/8/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	4.2	<0.50	<0.50	12.5	<0.50	<0.50	29.2	<0.50
	9/27/2016	<0.50	<2	<0.50	<0.50	7.2	<0.50	2.1	61.8	0.94	<0.50	100	1.7	<0.50	218	<0.50
	12/13/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	0.56	<0.50	<0.50	0.97	<0.50
	3/27/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	69.2	<0.5	<0.5	14.7	<0.5	<0.5	33.4	0.62
	6/13/2017	<2.0	<2.0	<0.50	<0.50	10	<1.0	5.3	432	2.7	<0.50	58.3	2.1	<0.50	204	2.5
	9/26/2017	<0.84	<3.3	<0.84	<0.84	6	<0.84	2.6	279	2.8	<0.84	62.4	<0.84	<0.84	265	<0.84
	11/8/2017	<3.3	<3.3	<0.84	<0.84	5	<0.84	2.1	306	2.2	<0.84	39.3	<0.84	<0.84	160	0.9

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Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-14 (continued)	3/20/2018	<0.500	1.67 J	<0.500	<0.500	5	<0.500	3.6	500	2.6	<0.500	36.0	0.6	<0.500	150	1.35 J
	6/28/2018	<0.500	<2.50	<0.500	<0.500	11	<0.500	2.5	255	2.5	<0.500	34.9	1.6	<0.500	247	0.7
	9/26/2018	<10.0	<50.0	<10.0	<10.0	12.1	<4.00	4.40	361	4.50	<5.00	84.3	<4.00	<5.00	484	<4.00
	12/5/2018	<10.0	<50.0	<10.0	<10.0	5	<4.00	<4.00	333	<4.00	<5.00	83.4	<4.00	<5.00	260	<4.00
	3/19/2019	<5.00	<25.0	<5.00	<5.00	5.40	<4.00	<4.00	223	2.06	<2.50	31.4	<2.00	<2.50	178	<2.00
	6/6/2019	<1.00	<5.00	<1.00	<1.00	1.74	<0.400	1.09	151	0.937	<0.500	19.1	<0.400	<0.500	76.4	<0.400
	9/25/2019	<1.00	<5.00	<1.00	<1.00	12.5	<0.400	4.58	264	3.6	<0.500	91.8	1.47	<0.500	327	0.482
	12/4/2019	<1.00	<5.00	<1.00	<1.00	7.81	<0.400	3.17	242	2.88	<0.500	107	0.704	<0.500	351	<0.400
	3/11/2020	<1.00	<5.00	<1.00	<1.00	6.8	<2.00	2.72	186	2.45	<2.50	85.9	<2.00	<2.50	294	<2.00
	6/17/2020	<5.00	<25.0	<5.00	<5.00	3.50	<2.00	<2.00	82.6	<2.00	<2.50	62.6	<2.00	<2.50	197	<2.00
	10/8/2020	<5.00	<25.0	<5.00	<5.00	14.6	<2.00	4.79	207	<2.00	<2.50	124	<2.00	<2.50	680	<2.00
	12/9/2020					7.77	<2.00	3.04	180	2.520	<2.50	109	<2.00	<2.50	339	<2.00
MW-15	11/13/1997	<0.50	<1	<0.50	<0.50	<0.50	1.1	<0.50	6.78	<0.50	<0.50	2.38	1.68	--	1.81	<1
	11/16/1999	<1	<2.5	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	967	13.7	--	63.4	<0.50
	2/28/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	17.9	1.55	--	1.01	<0.50
	6/27/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.44	1.03	--	0.565	<0.50
	5/30/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.32	<1	--	<0.50	<0.50
	5/31/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.59	0.63	--	<0.50	<0.50
	5/29/2003	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	0.53	<0.50	<0.50	4.42	<0.50	--	1.3	<0.50
	11/2/2004	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.9	<0.50	--	<0.50	<0.50
	11/16/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.73	<0.50	<0.50	12	<0.50	--	3.1	<0.50
	3/24/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.74	<0.50	--	1.49	<0.50
	5/17/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.54	<0.50	--	0.58	<0.50
	9/13/2007	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.54 J	<0.50	--	<0.50	<0.50
	3/7/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	2.63 J	<0.500	<0.500	<0.500	<0.500
	9/18/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.86	<0.500	<0.500	<0.500	<0.500
	3/25/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	<0.50	<0.50
	9/17/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.81	<0.50	<0.50	<0.50	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.7	<0.50	<0.50	<0.50	<0.50
	9/23/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.76	<0.5	<0.5	<0.5	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
9/16/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.64	<0.50	<0.50	<0.50	<0.50	
3/9/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.7	<0.50	<0.50	<0.50	<0.50	
9/10/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	<0.50	<0.50	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-15 (continued)	3/14/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.58	<0.50	<0.50	<0.50	<0.50
	9/19/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.56	<0.50	<0.50	<0.50	<0.50
	3/21/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/30/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.87	<0.50	<0.50	<0.50	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	<0.50	<0.50
	9/23/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.62	<0.50	<0.50	<0.50	<0.50
	3/8/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.59	<0.50	<0.50	<0.50	<0.50
	9/30/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.51	<0.50	<0.50	<0.50	<0.50
	3/28/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/28/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	11/6/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.6	<0.50	<0.50	<0.50	<0.50
	7/2/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.60	<0.500	<0.500	<0.500	<0.500
	6/6/2019	<1.00	<5.00	<1.00	<1.00	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.531	<0.500	<0.500	<0.500	<0.500
	6/18/2020	<1.00	<5.00	<1.00	<1.00	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.540	<0.400	<0.500	<0.400	<0.400
MW-16	11/12/1997	<5	<10	<5	<5	19.8	<5	27.8	23.6	<5	<5	328	57.5	--	142	<10
	8/11/1999	<5	<25	<2.5	<2.5	15.2	<2.5	<2.5	7.2	<2.5	<2.5	205	55.6	--	85.6	<2.5
	2/28/2000	<2	<10	<1	<1	10.4	<1	12	7.4	<1	<1	523	54.5	--	112	<1
	6/27/2000	<10	<50	<5	<5	12.4	<5	13.9	8.39	<5	<5	236	45	--	93.8	<5
	5/30/2001	<10	<50	<5	<5	9.28	<5	12	8.95	<5	<5	302	30.1	--	110	<5
	5/30/2002	<5	<2.5	<2.5	<5	13.5	<2.5	10.6	8.65	<2.5	<2.5	467	24	--	119	<2.5
	5/29/2003	<5	<2.5	<2.5	<5	3.6	<2.5	3.35	2.85	<2.5	<2.5	412	13.4	--	76	<2.5
	11/2/2004	<2	<10	<1	<1	<1	<1	<1	1.66	<1	<1	260	6.9	--	25.4	<1
	11/16/2004	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	300	7.8	--	26	<2.5
	3/24/2005	<2	<1	<1	<2	1.8	<1	1.34	1.96	<1	<1	373	11.8	--	49.4	<1
	5/17/2005	<1	<0.50	<0.50	<1	4.39	<0.50	3.14	9.25	<0.50	<0.50	120	9.09	--	41.5	<0.50
	11/15/2005	<1	<0.500	<0.500	<1	2.75	<0.500	1.86	2.5	<0.500	<0.500	152	8.94	--	33.4	<0.500
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/6/2006	<2	<2	<2	<2	12.2	<2	3.38	210	<2	<2	84.6	2.56	--	25.2	5.64
	12/6/2006	<2	<1	<1	<2	4.2	<1	2.12	16.7	<1	<1	176	5.88	--	45.6	<1
	5/23/2007	<1	<1	<1	<1	2.57	<1	<1	14	<1	<1	98.8	3.35	--	23.8	<1
9/13/2007	<1	<0.50	<0.50	<1	3.15	<0.50	1.08	6.6	<0.50	<0.50	163	5.87	--	49.2	<0.50	
12/12/2007	<2	<1	<1	<1	2.32	<1	1.44	5.9	<1	<1	110	5.92	--	28.2	<1	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-16	3/7/2008	<1	<0.500	<0.500	<1	3	<0.500	1.86	5.93	<0.500	<0.500	280	6.12	<0.500	73.3	<0.500
(continued)	9/18/2008	<5	<2.50	<2.50	<5	2.7	<2.50	<2.50	5.15	<2.50	<2.50	300	6.2	<2.50	65.2	<2.50
	12/9/2008	<1	<1	<1	<1	2.6	<1	1.8	5.5	<1	<1	300	5.7	<1	67	<1
	3/26/2009	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	0.82	3.2	<0.50	<0.50	150	5.2	<0.50	28	<0.50
	6/17/2009	<0.50	<0.50	<0.50	<0.50	5	<0.50	0.95	29	<0.50	<0.50	54	1.8	<0.50	16	0.68
	9/17/2009	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	1.1	2	<0.50	<0.50	220	4.8	<0.50	33	<0.50
	12/17/2009	<0.50	<0.50	<0.50	<0.50	0.87	<0.50	0.6	1.4	<0.50	<0.50	100	3.2	<0.50	19	<0.50
	3/19/2010	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	1	2	<0.50	<0.50	110	4.5	<0.50	36	<0.50
	6/16/2010	<0.50	<0.50	<0.50	<0.50	4.9	<0.50	0.91	37	<0.50	<0.50	39	0.94	<0.50	9.9	1.6
	9/23/2010	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	0.94	2.8	<0.5	<0.5	240	4.2	<0.5	43	<0.5
	12/10/2010	<0.5	<0.5	<0.5	<0.5	0.85	<0.5	0.54	1.6	<0.5	<0.5	94	2.4	<0.5	18	<0.5
	3/10/2011	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	0.5	6.2	<0.50	<0.50	110	1.9	<0.50	21	<0.50
	6/9/2011	<0.5	<0.5	<0.5	<0.5	4.9	<0.5	1.2	63	<0.5	<0.5	28	<0.5	<0.5	7.1	2.2
	9/19/2011	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	5.1	<0.50	<0.50	160	2.7	<0.50	13	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	0.92	<0.50	0.61	2.2	<0.50	<0.50	210	2.9	<0.50	38	<0.50
	6/20/2012	<0.5	<0.5	<0.5	<0.5	3.6	<0.5	0.56	24	<0.5	<0.5	60	0.98	<0.5	14	0.62
	9/13/2012	<0.50	<0.50	<0.50	<0.50	1.7	<0.50	0.61	6.5	<0.50	<0.50	190	2.4	<0.50	35	<0.50
	12/13/2012	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	0.68	5.7	<0.50	<0.50	110	1.1	<0.50	24	<0.50
	3/14/2013	<0.50	<0.50	<0.50	<0.50	0.98	<0.50	0.7	4.7	<0.50	<0.50	200	2	<0.50	50	<0.50
	6/14/2013	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	6	<0.50	<0.50	84	0.96	<0.50	18	<0.50
	9/19/2013	<0.50	<0.50	<0.50	<0.50	0.92	<0.50	0.75	7.1	<0.50	<0.50	180	1.4	<0.50	57	<0.50
	12/13/2013	<0.50	<0.50	<0.50	<0.50	0.8	<0.50	0.68	5.9	<0.50	<0.50	160	1.4	<0.50	52	<0.50
	3/20/2014	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	0.89	19	<0.50	<0.50	52	<0.50	<0.50	13	0.55
	6/24/2014	<0.50	<0.50	<0.50	<0.50	2	<0.50	<0.50	10	<0.50	<0.50	70	0.7	<0.50	12	<0.50
	9/27/2014	<0.50	<0.50	<0.50	<0.50	0.77	<0.50	0.66	8.8	<0.50	<0.50	200	1.4	<0.50	47	<0.50
	12/11/2014	<0.50	<0.50	<0.50	<0.50	0.64	<0.50	<0.50	4	<0.50	<0.50	76	0.96	<0.50	17	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	0.7	<0.50	<0.50	6	<0.50	<0.50	157	0.94	<0.50	31	<0.50
	6/17/2015	<0.50	<0.50	<0.50	<0.50	0.61	<0.50	<0.50	10.5	<0.50	<0.50	179	1	<0.50	41.6	<0.50
	9/23/2015	<0.50	<0.50	<0.50	<0.50	0.56	<0.50	0.65	10.4	<0.50	<0.50	173	1.2	<0.50	43.5	<0.50
	12/7/2015	Not sampled; well monument under water.														

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-16 (continued)	9/28/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	9.5	<0.50	<0.50	144	0.66	<0.50	35.6	<0.50
	12/14/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	3.1	<0.50	<0.50	51.5	<0.50	<0.50	11.6	<0.50
	3/29/2017	<0.5	<2	<0.5	<0.5	1.6	<0.5	<0.5	19	<0.5	<0.5	27	<0.5	<0.5	6.4	<0.5
	6/14/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	6.4	<0.50	<0.50	53.7	0.66	<0.50	5.4	<0.50
	9/25/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	1.3	<0.50	<0.50	148.0	1.00	<0.50	11.1	<0.50
	11/6/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	3.8	<0.50	<0.50	150.0	0.96	<0.50	17.4	<0.50
	3/19/2018	<0.500	<2.50	<0.500	<0.500	0.232 J	<0.500	0.190 J	3.8	<0.500	<0.500	99.7	0.82	<0.500	12.6	<0.500
	7/2/2018	<0.500	<2.50	<0.500	<0.500	0.500 J	<0.500	0.209 J	9.6	<0.500	<0.500	72.5	0.86	<0.500	7.4	<0.500
	9/25/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	15.8	<0.400	<0.500	171	0.580	<0.500	33.9	<0.400
	12/6/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	4.5	<0.400	<0.500	130.0	0.76	<0.500	20.8	<0.400
	3/22/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	7.90	<0.400	<0.500	136	0.771	<0.500	24.3	<0.400
	6/4/2019	<1.00	<5.00	<1.00	<1.00	0.810	<0.400	<0.400	14.3	<0.400	<0.500	30.1	<0.400	<0.500	5.34	<0.400
	9/25/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	14.4	<0.400	<0.500	136	0.658	<0.500	23.9	<0.400
	12/3/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	8.75	<0.400	<0.500	102	0.598	<0.500	19.9	<0.400
	3/11/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	8.67	<0.400	<0.500	79	0.552	<0.500	12.7	<0.400
	6/18/2020	<1.00	<5.00	<1.00	<1.00	1.070	<0.400	<0.400	23.8	<0.400	<0.500	27.3	<0.400	<0.500	5.89	0.42
	10/7/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	26.7	<0.400	<0.500	172	0.642	<0.500	35.9	<0.400
12/9/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	15.7	<0.400	<0.500	122	0.550	<0.500	15.5	<0.400	
MW-17	11/13/1997	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.9	<0.50	--	<0.50	<1
	11/16/1999	<1	<2.5	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	127	1.5	--	9.54	<0.50
	2/28/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.85	<1	--	2.51	<0.50
	6/27/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.27	<1	--	<0.50	<0.50
	5/30/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1	--	<0.50	<0.50
	5/30/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.82	<0.50	--	<0.50	<0.50
	5/28/2003	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.75	<0.50	--	0.92	<0.50
	11/15/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.5	<0.50	--	<0.50	<0.50
	5/17/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.06	<0.50	--	6.68	<0.50
	5/23/2007	<1	<1	<1	<1	<1	<1	<1	8.82	<1	<1	37.8	<1	--	28.2	<1
	9/11/2007	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50 J	<0.50	--	<0.50	<0.50
	3/5/2008	<1	<0.500	<0.500	<1	0.9	<0.500	<0.500	0.96	<0.500	<0.500	1.05	<0.500	<0.500	3.62	<0.500
	9/19/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.8	<0.500
	3/25/2009	<0.50	<0.50	<0.50	<0.50	0.57	<0.50	<0.50	1	<0.50	<0.50	0.69	<0.50	<0.50	3	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.8	<0.50	<0.50	0.72	<0.50	<0.50	3.2	<0.50
3/23/2010	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	3.9	<0.50	<0.50	3.2	0.58	<0.50	18	<0.50	
9/20/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.69	<0.5	<0.5	0.71	<0.5	<0.5	3	<0.5	
3/9/2011	<0.50	<0.50	<0.50	<0.50	0.65	<0.50	<0.50	<0.50	<0.50	<0.50	2.5	<0.50	<0.50	8.2	<0.50	
9/13/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.96	<0.50	<0.50	0.71	<0.50	<0.50	3.1	<0.50	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-17 (continued)	3/7/2012	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	5.4	<0.50	<0.50	6.8	0.56	<0.50	25	<0.50
	9/11/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.73	<0.50	<0.50	0.66	<0.50	<0.50	2.5	<0.50
	3/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.9	<0.50	<0.50	4.1	<0.50	<0.50	11	<0.50
	9/17/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	4.2	<0.50	<0.50	8.9	<0.50
	3/18/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/24/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	3.2	<0.50	<0.50	6.8	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	0.71	<0.50	<0.50	2.4	<0.50	<0.50	3.9	<0.50	<0.50	12.6	<0.50
	9/17/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.53	<0.50	<0.50	2.5	<0.50	<0.50	4.2	<0.50
	3/8/2016	<0.50	<2	<0.50	<0.50	0.83	<0.50	<0.50	3.3	<0.50	<0.50	9.4	<0.50	<0.50	22.7	<0.50
	9/27/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	4.2	<0.50	<0.50	10.4	<0.50
	3/29/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/29/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	2.7	<0.50	<0.50	4.6	<0.50	<0.50	11.4	<0.50
	11/8/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	9.3	<0.50	<0.50	9.9	<0.50	<0.50	21.9	<0.50
	6/28/2018	<0.500	<2.50	<0.500	<0.500	0.516	<0.500	<0.500	2.7	<0.500	<0.500	3.7	<0.500	<0.500	9.0	<0.500
	9/26/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.6	<0.400	<0.500	2.2	<0.400	<0.500	4.6	<0.400
	3/19/2019	<1.00	<5.00	<1.00	<1.00	0.623	<0.400	<0.400	10.5	<0.400	<0.500	6.91	<0.400	<0.500	15.2	<0.400
	6/6/2019	<1.00	<5.00	<1.00	<1.00	0.413	<0.400	<0.400	4.34	<0.400	<0.500	4.34	<0.400	<0.500	10.0	<0.400
	9/26/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	3.87	<0.400	<0.500	2.41	<0.400	<0.500	4.6	<0.400
	12/3/2019	<1.00	<5.00	<1.00	<1.00	0.829	<0.400	<0.400	26.8	<0.400	<0.500	5.54	<0.400	<0.500	15.1	<0.400
	3/10/2020	<1.00	<5.00	<1.00	<1.00	1.06	<0.400	<0.400	18.7	<0.400	<0.500	4.74	<0.400	<0.500	11.6	<0.400
6/17/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	5.11	<0.400	<0.500	4.06	<0.400	<0.500	7.4	<0.400	
10/7/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.28	<0.400	<0.500	1.75	<0.400	<0.500	3.61	<0.400	
12/8/2020	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	17.9	<0.400	<0.500	4.76	<0.400	<0.500	8.70	<0.400	
MW-18i	9/29/2000	ND	ND	0.694	ND	0.843	ND	ND	16.5	ND	ND	11.7	ND	--	8.32	ND
	11/30/2000	<1	<5	<0.50	<0.50	0.907	<0.50	<0.50	11.6	<0.50	<0.50	12.4	<1	--	17.6	<0.50
	2/27/2001	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	10.2	<2.5	<2.5	15.2	<5	--	10	<2.5
	5/30/2001	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	6.47	<2.5	<2.5	29.5	<5	--	8.06	<2.5
	9/25/2001	<1	<1	<1	<1	1.8	<1	<1	23	<1	<1	62	2.3	--	39	<1
	3/29/2002	<1	<0.50	<0.50	<1	1.2	<0.50	<0.50	17.3	<0.50	<0.50	71.1	1.22	--	31	<0.50
	5/30/2002	<1	<0.50	<0.50	<1	1.18	<0.50	<0.50	18.6	<0.50	<0.50	53.2	1.14	--	19.3	<0.50
	8/29/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	6.91	<0.50	<0.50	18.2	<0.50	--	7.34	<0.50
	11/7/2002	<1	<0.50	<0.50	<1	0.56	<0.50	<0.50	10.1	<0.50	<0.50	23.3	<0.50	--	9.7	<0.50
	1/23/2003	<1	<0.50	<0.50	<1	0.68	<0.50	<0.50	12.3	<0.50	<0.50	27.6	0.5	--	12.5	<0.50
	5/29/2003	<1	<0.50	<0.50	<1	0.59	<0.50	<0.50	10.4	<0.50	<0.50	23.9	0.5	--	10.8	<0.50
	11/11/2003	<1	<1	<1	<1	<1	<1	<1	16.1	<1	<1	31.5	<1	--	16.3	<1

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-18i (continued)	1/27/2004	<1	<0.50	<0.50	<1	0.67	<0.50	<0.50	14.2	<0.50	<0.50	69.7	0.53	--	12	<0.50
	5/4/2004	<1	<1	<1	<1	<1	<1	<1	15.6	<1	<1	112	<1	--	12.1	<1
	8/17/2004	<1	<0.50	3.76	<0.50	0.81	1.86	<0.50	22.6	0.78	<0.50	43.8	0.96	--	24	<1
	11/2/2004	<0.50	<0.50	<0.50	<0.50	1.09	<0.50	<0.50	21.8	<0.50	<0.50	32.2	0.6	--	17.8	<0.50
	11/16/2004	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	24	<0.50	<0.50	42	0.69	--	21	<0.50
	2/1/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	8.92	<0.50	<0.50	13	<0.50	--	6.01	<0.50
	5/18/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	11	<0.50	<0.50	9.69	<0.50	--	7.3	<0.50
	8/18/2005	<1	<0.500	<0.500	<1	1.17	<0.500	<0.500	18 B	<0.500	<0.500	21.4 B	0.58	--	16.3 B	<0.500
	08/18/2005 DUP	<1	<0.500	<0.500	<1	1.17	<0.500	<0.500	18.5 B	<0.500	<0.500	21.8 B	0.57	--	16.2 B	<0.500
	11/15/2005	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	7.31	<0.500	<0.500	11.4	<0.500	--	6.31	<0.500
	2/21/2006	<1	<0.500	<0.500	<1	0.93	<0.500	<0.500	14.8	<0.500	<0.500	24.3	0.52	--	15.2	<0.500
	6/6/2006	<1	<1	<1	<1	<1	<1	<1	5.88	<1	<1	8.46	<1	--	4.47	<1
	9/6/2006	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	5.79	<0.50	<0.50	7.89	<0.50	--	4.23	<0.50
	12/6/2006	<1	<0.50	<0.50	<1	0.56	<0.50	<0.50	11.6	<0.50	<0.50	11.2	<0.50	--	6.91	<0.50
	2/7/2007	<1	<0.50	<0.50	<1	0.68	<0.50	<0.50	12	<0.50	<0.50	15	<0.50	--	9.32	<0.50
	5/23/2007	<1	<1	<1	<1	<1	<1	<1	14.6	<1	<1	17.2	<1	--	11.3	<1
	9/11/2007	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	4.87	<0.50	<0.50	1.13	<0.50	--	1.46	<0.50
	12/13/2007	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	2.99	<0.50	<0.50	5.57	<0.50	--	3.32	<0.50
	3/6/2008	<1	<0.500	<0.500	<1	0.82	<0.500	<0.500	13.2	<0.500	<0.500	13.2	<0.500	<0.500	9.78	<0.500
	6/10/2008	<1	1	1	<1	<1	<1	<1	4.17	<1	<1	4.31	<1	--	2.18	<1
	9/17/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	3.95	<0.500	<0.500	3.1	<0.500	<0.500	2.55	<0.500
	12/9/2008	<0.50	<0.50	<0.50	<0.50	0.7	<0.50	<0.50	12	<0.50	<0.50	8.5	<0.50	<0.50	7.4	<0.50
	3/26/2009	<0.50	<0.50	<0.50	<0.50	0.51	<0.50	<0.50	8	<0.50	<0.50	4.8	<0.50	<0.50	4.7	<0.50
6/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.3	<0.50	<0.50	2.5	<0.50	<0.50	1.7	<0.50	
9/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.2	<0.50	<0.50	5.9	<0.50	<0.50	4.5	<0.50	
12/15/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	2.5	<0.50	<0.50	1.6	<0.50	
3/18/2010	<0.50	<0.50	<0.50	<0.50	0.52	<0.50	<0.50	11	<0.50	<0.50	9.7	<0.50	<0.50	6	<0.50	
6/15/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3	<0.50	<0.50	3.6	<0.50	<0.50	1.8	<0.50	
9/22/2010	<0.5	<0.5	<0.5	<0.5	0.71	<0.5	0.5	15	<0.5	<0.5	9.8	<0.5	<0.5	7.4	<0.5	
12/9/2010	<0.5	<0.5	<0.5	<0.5	0.66	<0.5	0.5	15	<0.5	<0.5	12	<0.5	<0.5	8	<0.5	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-18i	3/10/2011	<0.50	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	12	<0.50	<0.50	9.4	<0.50	<0.50	5.2	<0.50
(continued)	6/9/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2	<0.5	<0.5	2.1	<0.5	<0.5	1	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.3	<0.50	<0.50	2.9	<0.50	<0.50	1.9	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	9.8	<0.50	<0.50	8.5	<0.50	<0.50	4.8	<0.50
	3/7/2012	<0.50	<0.50	<0.50	<0.50	0.62	<0.50	<0.50	15	<0.50	<0.50	12	<0.50	<0.50	6.4	<0.50
	6/21/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.7	<0.5	<0.5	1.5	<0.5	<0.5	0.97	<0.5
	9/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.2	<0.50	<0.50	1.7	<0.50	<0.50	1	<0.50
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.3	<0.50	<0.50	3.9	<0.50	<0.50	2.1	<0.50
	3/13/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.2	<0.50	<0.50	3.8	<0.50	<0.50	2.1	<0.50
	6/13/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.9	<0.50	<0.50	2.4	<0.50	<0.50	1.3	<0.50
	9/19/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.1	<0.50	<0.50	2.2	<0.50	<0.50	1.3	<0.50
	12/13/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	11	<0.50	<0.50	5.3	<0.50	<0.50	3.6	<0.50
	3/20/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	1	<0.50	<0.50	0.7	<0.50
	6/26/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.63	<0.50	<0.50	0.19	<0.50	<0.50	1	<0.50
	9/26/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.51	<0.50	<0.50	1.5	<0.50	<0.50	0.93	<0.50
	12/10/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.9	<0.50	<0.50	2	<0.50	<0.50	1.3	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.3	<0.50	<0.50	2	<0.50	<0.50	1.1	<0.50
	6/17/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	2	<0.50	<0.50	1.1	<0.50
	9/23/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.5	<0.50	<0.50	3.4	<0.50	<0.50	1.8	<0.50
	12/7/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.5	<0.50	<0.50	4	<0.50	<0.50	2.6	<0.50
	3/9/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	1	<0.50
	6/16/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.98	<0.50	<0.50	0.73	<0.50
	9/28/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	0.85	<0.50
	12/14/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	2.8	<0.50	<0.50	1.5	<0.50	<0.50	1.2	<0.50
	3/29/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5	1.4	<0.5	<0.5	1.2	<0.5
	6/13/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	0.66	<0.50
	9/27/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	6.40	<0.50	<0.50	1.9	<0.50	<0.50	1.30	<0.50
	11/7/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.9	<0.50	<0.50	0.50	<0.50
	3/21/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	1.43	<0.500	<0.500	1.5	<0.500	<0.500	0.82	<0.500
	7/2/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	0.63	<0.500	<0.500	0.6	0.320 J	<0.500	<0.500	<0.500
	9/27/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	0.7	<0.400	<0.500	<0.400	<0.400
	12/6/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.96	<0.400	<0.500	1.3	<0.400	<0.500	0.70	<0.400

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-18i (continued)	3/21/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.53	<0.400	<0.500	1.38	<0.400	<0.500	1.03	<0.400
	6/3/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.31	<0.400	<0.500	0.970	<0.400	<0.500	0.560	<0.400
	9/25/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.63	<0.400	<0.500	0.920	<0.400	<0.500	0.647	<0.400
	12/3/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	1.300	<0.400	<0.500	0.589	<0.400
	3/11/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.6	<0.400	<0.500	0.896	<0.400	<0.500	0.502	<0.400
	6/17/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.94	<0.400	<0.500	0.880	<0.400	<0.500	0.400	<0.400
	10/7/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	0.891	<0.400	<0.500	0.419	<0.400
	12/9/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	0.764	<0.400	<0.500	<0.400	<0.400
MW-19	11/7/2002	<20	<10	<10	<20	252	<10	66.2	2,450	23	<10	3,100	139	--	1,810	79.2
	5/30/2003	<50	<25	<25	<50	109	<25	36	1,300	<25	<25	7,160	104	--	2,070	35.5
	11/16/2004	<50	<50	<50	<50	<50	65	<50	490	<50	<50	7,300	130	--	1,400	<50
	5/18/2005	<10	<5	<5	<10	19.3	<5	<5	161	<5	<5	1,500	33.8	--	205	24.6
	11/15/2005	<20	<10	<10	<20	27	<10	18.8	230	<10	<10	3,080	67.2	--	785	14.6
	11/15/2005 DUP	<20	<10	<10	<20	25	<10	20.2	221	<10	<10	2,860	64.4	--	762	15.2
	6/5/2006	<10	<10	<10	<10	<10	<10	<10	80.9	<10	<10	1,280	13.1	--	237	<10
	12/6/2006	<20	<10	<10	<20	<10	<10	<10	76.2	<10	<10	2,060	17.2	--	304	<10
	5/22/2007	<20	<20	<20	<20	<20	<20	<20	114	<20	<20	2,720	51.4	--	504	<20
	9/11/2007	<50	<25	<25	<50	<25	<25	<25	85.5	<25	<25	3,370	62.5	--	608	<25
	12/12/2007	<50	<25	<25	<50	<25	<25	<25	80	<25	<25	2,070	38.5	--	326	<25
	03/05/2008 ⁷	<1	<0.500	<0.500	<1	12.5	<0.500	20.5	149	4.53	<0.500	4,060	66	<0.500	1,030	6.41
	6/25/2008	<20	<20	<20	<20	45.8	<20	29.6	435	<20	<20	2,790	46.6	--	1,410	<20
	9/19/2008	<50	<25	<25	<50	62	<25	37.5	715	<25	<25	4,990	56.5	<25	2,870	39.5
	12/10/2008	<25	<25	<25	<25	51	<25	<25	500	<25	<25	6,600	110	<25	1,100	<25
	3/27/2009	<15	<15	<15	<15	53	<15	39	650	<15	<15	4,500	120	<15	1,900	25
	03/27/2009 DUP	<15	<15	<15	<15	56	<15	39	670	<15	<15	4,800	130	<15	1,900	25
	6/18/2009	<2.5	<2.5	<2.5	<2.5	5.4	<2.5	5.3	82	<2.5	<2.5	680	8.6	<2.5	240	<2.5
	06/18/2009 DUP	<2.5	<2.5	<2.5	<2.5	5.1	<2.5	5.4	80	<2.5	<2.5	660	8.4	<2.5	240	<2.5
	9/18/2009	<2.5	<2.5	<2.5	<2.5	12	<2.5	36	170	4.6	<2.5	9,400	140	<2.5	2,000	11
09/18/2009 DUP	<2.5	<2.5	<2.5	<2.5	12	<2.5	36	170	4.4	<2.5	9,700	140	<2.5	2,000	12	
12/18/2009	<10	<10	<10	<10	87	<10	29	780	13	<10	3,200	57	<10	1,200	35	
12/18/2009 DUP	<10	<10	<10	<10	84	<10	27	740	12	<10	3,100	53	<10	1,200	32	
3/19/2010	<5	<5	<5	<5	<5	<5	<5	8.3	45	<5	1,900	19	<5	380	<5	
03/19/2010 DUP	<7	<7	<7	<7	<7	<7	<7	8.3	44	<7	1,800	18	<7	360	<7	
6/17/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.7	<0.50	<0.50	67	<0.50	<0.50	25	<0.50	
06/17/2010 DUP	<0.50	<0.50	<0.50	<0.50	0.53	<0.50	<0.50	6.9	<0.50	<0.50	65	0.52	<0.50	24	<0.50	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-19	9/23/2010	<2.5	<2.5	<2.5	<2.5	8.7	<2.5	21	110	3.6	<2.5	3,400	50	<2.5	920	12
(continued)	09/23/2010 DUP	<2.5	<2.5	<2.5	<2.5	8.5	<2.5	21	110	3.4	<2.5	3,700	49	<0.25	890	13
	12/9/2010	<15	<15	<15	<15	59	<15	38	590	<15	<15	6,200	68	<15	1,500	48
	12/09/2010 DUP	<1.5	<1.5	<1.5	<1.5	58	<1.5	37	590	<1.5	<1.5	6,000	67	<1.5	1,500	48
	3/8/2011	<5	<5	<5	<5	23	<5	12	280	<5	<5	1,500	18	<5	590	13
	6/10/2011	<0.9	<0.9	<0.9	<0.9	22	<0.9	2.7	160	1.4	<0.9	240	3.6	<0.9	130	5.6
	06/10/2011 DUP	<0.9	<0.9	<0.9	<0.9	19	<0.9	2.3	140	1.3	<0.9	220	3.3	<0.9	120	5
	9/19/2011	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	53	<1.5	<1.5	400	3	<1.5	78	<1.5
	09/19/2011 DUP	<2	<2	<2	<2	<2	<2	<2	53	<2	<2	410	3.2	<2	80	<2
	12/9/2011	<1.5	<1.5	<1.5	<1.5	5	<1.5	4.3	110	<1.5	<1.5	730	10	<1.5	220	3.9
	12/09/2011 DUP	<2	<2	<2	<2	5.4	<2	4.7	120	<2	<2	770	10	<2	230	3.9
	3/9/2012	<2.5	<2.5	<2.5	<2.5	46	<2.5	26	820	1	<2.5	2,400	50	<2.5	1,200	67
	03/09/2012 DUP	<4	<4	<4	<4	43	<4	24	770	8.8	<4	2,400	46	<4	1,200	62
	06/22/2012	<5	<5	<5	<5	74	<5	17	1,000	14	<5	1,300	21	<5	1,000	57
	06/22/2012 DUP	<5	<5	<5	<5	74	<5	18	1,000	13	<5	1,300	22	<5	1,000	57
	9/14/2012	<5	<5	<5	<5	<5	<5	5.7	300	<5	<5	2,200	31	<5	340	8
	09/14/2012 DUP	<5	<5	<5	<5	<5	<5	5.9	300	<5	<5	2,300	31	<5	340	<5
	12/14/2012	<1.5	9.8	<1.5	<1.5	21	<1.5	1.8	330	3.6	<1.5	290	3.2	<1.5	140	3.1
	12/14/2012 DUP	<1	9.3	<1	<1	21	<1	1.7	340	3.7	<1	300	3.1	<1	140	3
	3/15/2013	<1.5	4.7	<1.5	<1.5	29	<1.5	21	870	5.5	<1.5	3,200	67	<1.5	1,600	9
	03/15/2013 DUP	<1.5	4.7	<1.5	<1.5	30	<1.5	20	820	6.1	<1.5	3,200	68	<1.5	1,500	9.2
	6/14/2013	<9	<9	<9	<9	25	<9	13	730	<9	<9	2,500	29	<9	1,000	<9
	06/14/2013 DUP	<9	<9	<9	<9	25	<9	11	720	<9	<9	2,400	26	<9	1,000	<9
	9/20/2013	<0.50	1.2	<0.50	<0.50	14	<0.50	25	520	4.5	<0.50	3,000	61	<0.50	1,100	10
	09/20/2013 DUP	<1	1.1	<1	<1	12	<1	21	490	3.8	<1	3,200	52	<1	1,200	9
	12/16/2013	<15	<15	<15	<15	37	<15	22	680	<15	<15	3,000	36	<15	1,100	<15
	12/16/2013 DUP	<15	<15	<15	<15	36	<15	22	660	<15	<15	2,900	37	<15	1,100	<15
	3/21/2014	<0.50	1.4	<0.50	<0.50	4.8	<0.50	2.4	130	1.2	<0.50	180	1.6	<0.50	51	4.3
	3/21/2014 DUP	<0.50	1.4	<0.50	<0.50	4.8	<0.50	2.2	130	1.1	<0.50	180	1.6	<0.50	51	4.3

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Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-19	6/26/2014	<5	0.89	<0.50	<0.50	0.54	110	38	2,000	21	<0.50	1,900	36	0.8	1,500	6.2
(continued)	6/26/2014 DUP	<5	1.1	<0.50	<0.50	110	<0.50	38	1,900	21	<0.50	1,900	36	0.74	1,600	6.1
	9/30/2014	<15	<15	<15	<15	18	<15	38	520	<15	<15	4,400	61	<15	1,700	32
	9/30/2014 DUP	<15	<15	<15	<15	18	<15	37	510	<15	<15	4,400	60	<15	1,700	30
	12/12/2014	<5	<5	<5	<5	96	<5	20	1,500	12	<5	1,400	19	<5	790	60
	12/12/2014 DUP	<5	<5	<5	<5	110	<5	21	1,500	14	<5	1,500	21	<5	890	68
	3/18/2015	<4.2	<4.2	<4.2	<4.2	72.5	<4.2	48	1,460	17.5	<4.2	5,920	56.5	<4.2	3,970	53.7
	3/18/2015 DUP	<4.2	<4.2	<4.2	<4.2	82.9	<4.2	47.9	1,410	17.8	<4.2	4,930	56.2	<4.2	3,500	46.6
	6/18/2015	<0.50	<0.50	<0.50	<0.50	21.5	<0.5	48.5	628	6.6	<0.50	8,080	94.3	<0.50	2,200	28
	6/18/2015 DUP	<0.50	<0.50	<0.50	<0.50	22.7	<0.50	48.8	614	7.5	<0.50	7,990	985	<0.50	2,090	30.7
	9/22/2015	<0.50	<0.50	<0.50	<0.50	4.9	<0.5	31.7	185	2	<0.50	7,200	74.8	<0.50	791	6.8
	12/8/2015	<0.50	<0.50	<0.50	<0.50	150	<0.5	33.5	1,640	16.4	<0.50	2,900	36	<0.50	1,550	87.3
	12/8/2015 DUP	<0.50	<0.50	<0.50	<0.50	155	<0.50	35.1	1,680	17.2	<0.50	3,020	37.1	<0.50	1,600	89.8
	3/8/2016	<10	<40	<10	<10	96.6	<10	42	1,520	20.2	<10	4,080	40.8	<10	2,610	64.8
	3/8/2016 DUP	<10	<40	<10	<10	93	<10	42.8	1,460	18.2	<10	3,760	40.4	<10	2,560	72.4
	6/16/2016	<10	<40	<10	<10	<10	<10	22.2	507	<10	<10	3,250	29.2	<10	1,030	18.3
	6/16/2016 DUP	<12.5	<50	<12.5	<12.5	19.5	<12.5	23.8	505	<12.5	<12.5	3,460	28.1	<12.5	1,020	17.6
	9/26/2016	<5	<20	<5	<5	10.4	<5	11	235	<5	<5	1,520	14.5	<5	592	10.1
	12/12/2016	<5	<20	<5	<5	72.8	<5	11.2	1,030	10.7	<5	1,730	10.9	<5	812	28.2
	12/12/2016 DUP	<2.5	<10	<2.5	<2.5	78.7	<2.5	14.2	1,010	11.6	<2.5	1,530	15.5	<2.5	975	31.9
	3/28/2017	<5	<20	<5	<5	197	<5	25.5	1,930	19.7	<5	664	17	<5	826	58.5
	3/28/2017 DUP	<5	<20	<5	<5	214	<5	26.7	1,990	21.5	<5	755	19.9	<5	896	63.2
	6/14/2017	<2.5	<10	<2.5	<2.5	40.6	<2.5	15.4	481	6.1	<2.5	531	8.1	<2.5	481	16.5
	6/14/2017 DUP	<2.5	<10	<2.5	<2.5	41.8	<2.5	15.8	486	6.2	<2.5	566	8.2	<2.5	506	17.2
	9/26/2017	<2.5	<10	<2.5	<2.5	<2.5	<2.5	26.5	1,160	5.4	<2.5	3,620	38.9	<2.5	1,450	111.0
	9/26/2017 DUP	<2.5	<10	<2.5	<2.5	11.1	<2.5	28.9	1,150	5.4	<2.5	3,710	40.4	<2.5	1,480	111.0
	11/9/2017	<20	<20	<5.0	<5.0	104.0	<5.0	24.9	1,660	24.0	<5.0	1,530	20.2	<5.0	1,020	109.0
	11/9/2017 DUP	<2.0	<2.0	<0.50	<0.50	56.5	<0.50	14.7	1,040	14.7	<0.50	970	13.0	0.75	790	115.0
	3/21/2018	<0.500	3.90	<0.500	<0.500	59.0	0.225 J	31.4	2,430	11.2	<0.500	1,250	17.0	0.339 J	1,340	413.0
	3/21/2018 DUP	<0.500	4.26	<0.500	<0.500	58.2	0.242 J	30.7	2,470	10.8	<0.500	996	17.0	0.277 J	1,180	412.0

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Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-19	6/28/2018	<0.500	<2.50	<0.500	<0.500	81.6	<0.500	35.6	3,890	16.4	<0.500	163	10.9	0.210 J	148	773.0
	6/28/2018 DUP	<0.500	<2.50	<0.500	<0.500	80.2	<0.500	36.3	4,190	18.4	<0.500	177	11.7	0.244 J	191	799.0
	9/25/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1,900	<0.400	<0.500	3,720	<0.400	<0.500	2,190	115.0
	9/25/2018 DUP	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1,960	<0.400	<0.500	3,830	<0.400	<0.500	2,270	116.0
	12/5/2018	<1.00	<500	<1.00	<1.00	91.8	0.453	39.3	1,750	18.2	<0.500	3,090	21.8	0.67	1,490	79.0
	12/5/2018 DUP	<1.00	<500	<1.00	<1.00	90.1	<0.400	39.2	1,610	18.4	<0.500	2,460	21.3	0.67	1,290	77.1
	3/20/2019	<40.0	<100	<20.0	<20.0	49.7	<8.00	39.5	1,910	13.9	<10.0	2,970	22.7	<10.0	2,090	75.8
	3/20/2019 DUP	<40.0	<100	<20.0	<20.0	46.9	<8.00	37.6	1,820	13.5	<10.0	2,960	23.7	<10.0	2,040	70.2
	6/7/2019	<80.0	<100	<20.0	<20.0	108	<10.0	52.6	1,910	20.4	<12.5	894	<10.0	<12.5	793	70.1
	6/7/2019 DUP	<80.0	<100	<20.0	<20.0	89.6	<8.0	41.6	1,810	16.8	<10.0	772	8.60	<10.0	698	80.8
	9/26/2019	<10.0	<50.0	<10.0	<10.0	33.3	<4	35.1	958	9.59	<5	4,340	26.90	<5	1,430	35.4
	9/26/2019 DUP	<10.0	<50.0	<10.0	<10.0	41.9	<4	40.2	1,160	12.1	<5	4,010	30.60	<5	1,620	39.1
	12/3/2019	<50.0	<250	<50.0	<50.0	57.4	<20.0	28.6	1,250	<20.0	<25.0	1,670	<20.0	<25.0	1,190	25.6
	12/3/2019 DUP	<50.0	<250	<50.0	<50.0	53.4	<20.0	27.2	1,190	<20.0	<25.0	1,650	<20.0	<25.0	1,200	23.2
	3/11/2020	<25.0	<125	<25.0	<25.0	31.8	<10.0	55.4	1,290	<10.0	<12.5	4,600	28.80	<12.5	1,800	143
	3/11/2020 DUP	<25.0	<125	<25.0	<25.0	35.4	<10.0	60.4	1,450	14.8	<12.5	4,730	29.10	<12.5	2,010	154
	6/18/2020	<10.0	<50.0	<10.0	<10.0	25.7	<4.00	21.1	1,060	5.6	<5.00	1,000	9.40	<5.00	580	96.3
	6/18/2020 DUP	<50.0	<250	<50.0	<50.0	32.5	<20.0	27.5	956	<20.0	<25.0	1,080	<20.0	<25.0	697	95
	10/7/2020	<50.0	<250	<50.0	<50.0	44.5	<20.0	53.20	1,470	<20.0	<25.0	7,450	39.00	<25.0	2,760	52.4
	10/7/2020 DUP	<50.0	<250	<50.0	<50.0	46.9	<20.0	58.80	1,510	<20.0	<25.0	8,110	39.00	<25.0	2,920	53.8
12/8/2020	<200	<500	<100	<100	54.5	<40.0	<40.0	1,150	<40.0	<50.0	3,880	<40.0	<50.0	1,110	117	
12/8/2020 DUP	<200	<500	<100	<100	70.8	<40.0	<40.0	1,330	<40.0	<50.0	3,300	<40.0	<50.0	1,210	87.9	
MW-19i	6/10/2008	<1	<1	<1	<1	<1	<1	<1	8.46	<1	<1	<1	<1	<1	1.28	<1
	9/17/2008	<1	<0.500	<0.500	<1	1.93	0.53	<0.500	27.1	<0.500	<0.500	1.72	<0.500	<0.500	5.77	<0.500
	12/10/2008	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	28	<0.50	<0.50	<0.50	<0.50	<0.50	5.6	<0.50
	3/26/2009	<0.50	<0.50	<0.50	<0.50	1.7	<0.50	<0.50	25	<0.50	<0.50	<0.50	<0.50	<0.50	3.3	<0.50
	6/17/2009	<0.50	<0.50	<0.50	<0.50	0.9	<0.50	<0.50	10	<0.50	<0.50	0.67	<0.50	<0.50	1.5	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	1.7	0.64	<0.50	28	<0.50	<0.50	<0.50	<0.50	<0.50	1.8	0.79
	12/15/2009	<0.50	<0.50	<0.50	<0.50	0.87	<0.50	<0.50	10	<0.50	<0.50	<0.50	<0.50	<0.50	0.7	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	1.1	0.53	<0.50	15	<0.50	<0.50	<0.50	<0.50	<0.50	1.9	<0.50
	6/15/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	1.2	0.58	<0.5	20	<0.5	<0.5	<0.5	<0.5	<0.5	2.4	<0.5
	12/9/2010	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	14	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	0.94	<0.50	<0.50	14	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50
	6/9/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.88	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.1	<0.50	<0.50	<0.50	<0.50	<0.50	0.73	<0.50
	12/9/2011	<0.50	<0.50	<0.50	<0.50	0.72	<0.50	<0.50	8.8	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50
	3/12/2012	<0.50	<0.50	<0.50	<0.50	0.86	<0.50	<0.50	13	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50
	6/21/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
9/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.2	<0.50	<0.50	<0.50	<0.50	<0.50	0.65	<0.50	
12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-19i	3/14/2013	<0.50	<0.50	<0.50	<0.50	0.65	<0.50	<0.50	9.5	<0.50	<0.50	<0.50	<0.50	<0.50	1.1	<0.50
(continued)	6/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/19/2013	<0.50	<0.50	<0.50	<0.50	0.56	<0.50	<0.50	6.8	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/13/2013	<0.50	<0.50	<0.50	<0.50	0.6	<0.50	<0.50	6.6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/20/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/24/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.1	<0.50	<0.50	0.83	<0.50	<0.50	1.6	<0.50
	9/27/2014	<0.50	<0.50	<0.50	<0.50	0.56	<0.50	<0.50	6.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/10/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/23/2015	<0.50	<0.50	<0.50	<0.50	0.75	<0.50	<0.50	11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/7/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/8/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	5.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	3.2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/28/2016	<5	<2	<0.50	<0.50	<0.50	<0.50	<0.50	5.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/14/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	2.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/29/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	6/14/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/28/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	0.83	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	11/8/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	0.57	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/20/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	0.228 J	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	7/2/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	0.212 J	<0.500	<0.500	0.223 J	<0.500	<0.500	<0.500	<0.500
	9/27/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/6/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/25/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/3/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	9/26/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.43	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/4/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/12/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/18/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	10/7/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-20i	6/10/2008	<1	<1	<1	<1	<1	<1	<1	18	<1	<1	5.77	<1	<1	3.2	<1
	9/17/2008	<1	<0.500	<0.500	<1	2.12	<0.500	<0.500	42.3	<0.500	<0.500	12.8	<0.500	<0.500	11	<0.500
	12/11/2008	<0.50	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	47	<0.50	<0.50	11	<0.50	<0.50	9.3	<0.50
	3/25/2009	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	36	<0.50	<0.50	8.4	<0.50	<0.50	6.4	<0.50
	6/16/2009	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	30	<0.50	<0.50	6.3	<0.50	<0.50	5.1	<0.50
	9/17/2009	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	34	<0.50	<0.50	7.4	<0.50	<0.50	5	<0.50
	12/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	9.3	<0.50	<0.50	1.1	<0.50	<0.50	0.69	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	47	<0.50	<0.50	11	<0.50	<0.50	6.9	<0.50
	6/15/2010	<0.50	<0.50	<0.50	<0.50	0.51	<0.50	<0.50	13	<0.50	<0.50	4.3	<0.50	<0.50	2.3	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	1.8	<0.5	<0.5	43	<0.5	<0.5	17	<0.5	<0.5	10	<0.5
	12/9/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	13	<0.5	<0.5	3.7	<0.5	<0.5	2	<0.5
	3/11/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	9.6	<0.50	<0.50	2.4	<0.50	<0.50	2.3	<0.50
	6/8/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	0.96	<0.50	<0.50	21	<0.50	<0.50	7.6	<0.50	<0.50	4.5	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	26	<0.50	<0.50	6.4	<0.50	<0.50	4.2	<0.50
	3/7/2012	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	32	<0.50	<0.50	11	<0.50	<0.50	5.9	<0.50
	6/21/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8.3	<0.5	<0.5	2.6	<0.5	<0.5	1.5	<0.5
	9/13/2012	<0.50	<0.50	<0.50	<0.50	0.83	<0.50	<0.50	18	<0.50	<0.50	6.1	<0.50	<0.50	3.8	<0.50
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.9	<0.50	<0.50	1.4	<0.50	<0.50	0.84	<0.50
	3/14/2013	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	28	<0.50	<0.50	9.2	<0.50	<0.50	6	<0.50
	6/13/2013	<0.50	<0.50	<0.50	<0.50	0.72	<0.50	<0.50	14	<0.50	<0.50	7.3	<0.50	<0.50	3.7	<0.50
	9/19/2013	<0.50	<0.50	<0.50	<0.50	0.64	<0.50	<0.50	11	<0.50	<0.50	3.9	<0.50	<0.50	2.4	<0.50
	12/13/2013	<0.50	<0.50	<0.50	<0.50	0.9	<0.50	<0.50	16	<0.50	<0.50	2.4	<0.50	<0.50	1.9	<0.50
	3/20/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.4	<0.50	<0.50	0.56	<0.50	<0.50	<0.50	<0.50
	6/30/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4	<0.50	<0.50	1.1	<0.50	<0.50	0.58	<0.50
	9/27/2014	<0.50	<0.50	<0.50	<0.50	0.68	<0.50	<0.50	12	<0.50	<0.50	4.3	<0.50	<0.50	2.6	<0.50
	12/12/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.1	<0.50	<0.50	0.68	<0.50	<0.50	<0.50	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10.3	<0.50	<0.50	3	<0.50	<0.50	1.7	<0.50
	6/17/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10.8	<0.50	<0.50	3.7	<0.50	<0.50	2.2	<0.50
	9/23/2015	<0.50	<0.50	<0.50	<0.50	0.69	<0.50	<0.50	13.8	<0.50	<0.50	4.1	<0.50	<0.50	2.1	<0.50
	12/7/2015	Not sampled; well monument under water.														

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-20i (continued)	3/8/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	6.8	<0.50	<0.50	3.4	<0.50	<5	1.8	<0.50
	6/16/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	7.4	<0.50	<0.50	2.1	<0.50	<0.50	1.5	<0.50
	9/28/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	8.7	<0.50	<0.50	4	<0.50	<0.50	2.2	<0.50
	12/14/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	2.5	<0.50	<0.50	0.54	<0.50	<0.50	<0.50	<0.50
	3/30/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	6/14/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	5.6	<0.50	<0.50	1.5	<0.50	<0.50	0.84	<0.50
	9/27/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	0.7	<0.50	<0.50	<0.50	<0.50
	11/7/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	7.7	<0.50	<0.50	2.8	<0.50	<0.50	1.50	<0.50
	3/21/2018	<0.500	<2.50	<0.500	<0.500	0.303 J	<0.500	<0.500	5.7	<0.500	<0.500	1.4	<0.500	<0.500	0.90	<0.500
	7/2/2018	<0.500	<2.50	<0.500	<0.500	0.436 J	<0.500	<0.500	9.7	<0.500	<0.500	2.3	<0.500	<0.500	1.60	<0.500
	9/25/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	7.7	<0.400	<0.500	2.1	<0.400	<0.500	1.39	<0.400
	12/6/2018	<1.00	<5.00	<1.00	<1.00	0.43	<0.400	<0.400	10.7	<0.400	<0.500	2.2	<0.400	<0.500	1.55	<0.400
	3/22/2019	<1.00	<5.00	<1.00	<1.00	0.492	<0.400	<0.400	10.5	<0.400	<0.500	2.04	<0.400	<0.500	1.65	<0.400
	6/3/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	4.58	<0.400	<0.500	0.950	<0.400	<0.500	0.590	<0.400
	9/25/2019	<1.00	<5.00	<1.00	<1.00	0.461	<0.400	<0.400	9.43	<0.400	<0.500	2.340	<0.400	<0.500	1.440	<0.400
	12/3/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	8.68	<0.400	<0.500	1.370	<0.400	<0.500	0.897	<0.400
	3/11/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	9.21	<0.400	<0.500	2.320	<0.400	<0.500	1.260	<0.400
	6/17/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.93	<0.400	<0.500	0.410	<0.400	<0.500	<0.400	<0.400
	10/7/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	7.66	<0.400	<0.500	1.11	<0.400	<0.500	0.850	<0.400
	12/9/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	10.0	<0.400	<0.500	1.57	<0.400	<0.500	0.856	<0.400
MW-21i-105	6/10/2008	<2	<2	<2	<2	2	<2	<2	15.8	<2	<2	53.2	<2	<0.50	25.1	<2
	9/18/2008	<1	<0.500	<0.500	<1	0.78	<0.500	<0.500	5.42	<0.500	<0.500	2.97	<0.500	<0.50	1.77	<0.500
	12/11/2008	<0.50	<0.50	<0.50	<0.50	2.2	<0.50	0.88	61	<0.50	<0.50	33	0.87	<0.50	17	<0.50
	3/26/2009	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	61	<0.50	<0.50	0.76	<0.50	<0.50	0.7	<0.50
	6/17/2009	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	76	<0.50	<0.50	4.3	0.6	<0.50	3.4	<0.50
	9/17/2009	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	73	<0.50	<0.50	11	0.59	<0.50	6.7	<0.50
	12/16/2009	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	60	<0.50	<0.50	14	0.65	<0.50	9.3	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	1.7	<0.50	<0.50	64	<0.50	<0.50	6.2	0.58	<0.50	7.6	<0.50
	6/15/2010	<0.50	<0.50	<0.50	<0.50	1.7	<0.50	0.63	60	<0.50	<0.80	29	0.84	<0.50	22	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	75	<0.5	<0.5	5.2	0.55	<0.50	5.1	<0.5
	12/8/2010	<0.5	<0.5	<0.5	<0.5	2	<0.5	0.52	72	<0.5	<0.5	27	0.91	<0.50	14	<0.50
	3/9/2011	<0.50	<0.50	<0.50	<0.50	1.9	<0.50	0.69	61	<0.50	<0.50	32	1.1	<0.50	17	<0.50
	6/9/2011	<0.5	<0.5	<0.5	<0.5	1.6	<0.5	0.61	63	<0.5	<0.5	29	0.7	<0.5	17	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	1.9	<0.50	<0.50	88	<0.50	<0.50	12	0.59	<0.50	12	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	73	<0.50	<0.50	15	0.58	<0.50	9.3	<0.50

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-21i-105	3/7/2012	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	38	<0.50	<0.50	5.6	<0.50	<0.50	5.7	<0.50
(continued)	6/20/2012	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	52	<0.5	<0.5	1.4	<0.5	<0.5	3	<0.5
	9/12/2012	<0.50	<0.50	<0.50	<0.50	0.82	<0.50	<0.50	34	<0.50	<0.50	5	<0.50	<0.50	6.3	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	60	1	<0.50	13	<0.50	<0.50	15	<0.50
	3/13/2013	<0.50	<0.50	<0.50	<0.50	0.9	<0.50	<0.50	42	<0.50	<0.50	2.4	<0.50	<0.50	3.7	<0.50
	6/13/2013	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	48	<0.50	<0.50	1.2	<0.50	<0.50	9.9	<0.50
	9/18/2013	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	51	<0.50	<0.50	2.8	<0.50	<0.50	4.2	<0.50
	12/12/2013	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	61	1.6	<0.50	4	<0.50	<0.50	5.4	<0.50
	3/20/2014	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	52	<0.50	<0.50	4.4	<0.50	<0.50	6.8	<0.50
	6/25/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/26/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.8	<0.50	<0.50	5.4	<0.50	<0.50	3.3	<0.50
	12/10/2014	<0.50	<0.50	<0.50	<0.50	0.94	<0.50	<0.50	37	<0.50	<0.50	5.4	<0.50	<0.50	9.6	<0.50
	3/17/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	13.3	<0.50	<0.50	6.6	<0.50	<0.50	5.4	<0.50
	6/17/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	20.8	<0.50	<0.50	3.5	<0.50	<0.50	4	<0.50
	9/23/2015	<0.50	<0.50	<0.50	<0.50	0.91	<0.50	<0.50	41.4	<0.50	<0.50	3.4	<0.50	<0.50	5.4	<0.50
	12/7/2015	<0.50	<0.50	<0.50	<0.50	0.79	<0.50	<0.50	28.5	<0.50	<0.50	4.9	<0.50	<0.50	8.1	<0.50
	3/8/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/26/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	11.7	<0.50	<0.50	5.8	<0.50	<0.50	5.1	<0.50
	12/13/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/29/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	4.8	<0.5	<0.5	5.7	<0.5	<0.5	2.9	<0.5
	6/13/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	4.7	<0.50	<0.50	7.6	<0.50	<0.50	4.1	<0.50
	9/27/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	4.3	<0.50	<0.50	5.7	<0.50	<0.50	3.9	<0.50
	11/8/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	13.0	<0.50	<0.50	7.4	<0.50	<0.50	6.4	<0.50
	3/22/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	0.7	<0.500	<0.500	0.5	<0.500	<0.500	0.477 J	<0.500
	6/29/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	1.9	<0.500	<0.500	1.8	<0.500	<0.500	1.3	<0.500
	9/26/2018	<1.00	<5.00	<1.00	<1.00	0.82	<0.400	<0.400	36.4	<0.400	<0.500	8.6	<0.400	<0.500	11.0	<0.400
	12/6/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	8.6	<0.400	<0.500	9.5	<0.400	<0.500	5.9	<0.400
	3/21/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.04	<0.400	<0.500	1.08	<0.400	<0.500	0.760	<0.400
	6/6/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	4.11	<0.400	<0.500	3.90	<0.400	<0.500	2.38	<0.400
	9/25/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	4.08	<0.400	<0.500	4.93	<0.400	<0.500	2.62	<0.400
	12/4/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	3.09	<0.400	<0.500	5.61	<0.400	<0.500	2.79	<0.400
	3/12/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.48	<0.400	<0.500	3.60	<0.400	<0.500	2.02	<0.400
	6/18/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.59	<0.400	<0.500	3.08	<0.400	<0.500	1.49	<0.400
	10/8/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.76	<0.400	<0.500	4.60	<0.400	<0.500	1.96	<0.400
	12/9/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.88	<0.400	<0.500	3.53	<0.400	<0.500	1.62	<0.400

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-21i-40	9/18/2008	<1	<0.500	<0.500	<1	7.48	<0.500	4.38	124	0.77	<0.500	107	2.01	<0.500	133	<0.500
	12/11/2008	<0.50	<0.50	<0.50	<0.50	6.6	<0.50	3.6	130	0.84	<0.50	100	1.6	<0.50	110	<0.50
	3/26/2009	<0.50	<0.50	<0.50	<0.50	6.2	<0.50	3.6	130	0.63	<0.50	77	1.3	<0.50	88	<0.50
	6/17/2009	<0.50	<0.50	<0.50	<0.50	6.6	<0.50	3.1	120	0.79	<0.50	71	1.5	<0.50	88	<0.50
	9/18/2009	<0.50	<0.50	<0.50	<0.50	5.9	<0.50	3.2	120	1	<0.50	75	1.3	<0.50	92	0.55
	12/16/2009	<0.50	<0.50	<0.50	<0.50	5.7	<0.50	2.6	120	1	<0.50	90	1.2	<0.50	89	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	5.5	<0.50	2.8	120	0.74	<0.50	84	1.1	<0.50	91	<0.50
	6/15/2010	<0.50	<0.50	<0.50	<0.50	5.4	<0.50	2.4	120	0.89	<0.50	62	1.2	<0.50	64	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	4.9	<0.5	2.2	110	0.73	<0.5	68	0.93	<0.5	75	<0.5
	12/8/2010	<0.5	<0.5	<0.5	<0.5	5.1	<0.5	2.3	110	0.77	<0.5	72	1	<0.5	69	<0.5
	3/10/2011	<0.50	<0.50	<0.50	<0.50	4.6	<0.50	1.9	100	0.64	<0.50	53	1	<0.50	57	<0.50
	6/9/2011	<0.5	<0.5	<0.5	<0.5	4.7	<0.5	2.1	110	0.7	<0.5	50	0.96	<0.5	55	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	5	<0.50	1.9	110	0.65	<0.50	54	1.1	<0.50	57	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	4.8	<0.50	2.1	110	0.66	<0.50	61	0.96	<0.50	60	<0.50
	3/7/2012	<0.50	<0.50	<0.50	<0.50	5.3	<0.50	2.1	110	0.76	<0.50	74	1.5	<0.50	58	<0.50
	6/20/2012	<0.5	<0.5	<0.5	<0.5	5	<0.5	2	160	0.84	<0.5	19	0.81	<0.5	23	<0.5
	9/12/2012	<0.50	<0.50	<0.50	<0.50	5	<0.50	1.8	110	0.63	<0.50	50	1.1	<0.50	48	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	5.3	<0.50	2	120	0.69	<0.50	74	1.1	<0.50	53	<0.50
	3/13/2013	<0.50	<0.50	<0.50	<0.50	4.6	<0.50	1.8	120	0.6	<0.50	43	0.83	<0.50	42	<0.50
	6/13/2013	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	48	<0.50	<0.50	12	<0.50	<0.50	9.9	<0.50
	9/18/2013	<0.50	<0.50	<0.50	<0.50	4.7	<0.50	1.4	100	0.53	<0.50	38	0.68	<0.50	33	<0.50
	12/12/2013	<0.50	<0.50	<0.50	<0.50	4.6	<0.50	1.3	100	1	<0.50	41	0.73	<0.50	37	<0.50
	3/20/2014	<0.50	<0.50	<0.50	<0.50	4.5	<0.50	1.5	100	0.61	<0.50	40	0.76	<0.50	34	<0.50
	6/25/2014	<0.50	<0.50	<0.50	<0.50	4.3	<0.50	1.3	100	0.51	<0.50	33	0.65	<0.50	29	<0.50
	9/26/2014	<0.50	<0.50	<0.50	<0.50	4	<0.50	1.4	100	86	<0.50	31	0.51	<0.50	32	<0.50
	12/10/2014	<0.50	<0.50	<0.50	<0.50	4.2	<0.50	1.4	100	0.6	<0.50	30	0.51	<0.50	32	<0.50
	3/17/2015	<0.50	<0.50	<0.50	<0.50	3.8	<0.50	1.5	102	0.51	<0.50	43.6	<0.50	<0.50	37.2	<0.50
	6/19/2015	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	0.76	61.6	<0.50	<0.50	24.7	<0.50	<0.50	21.8	<0.50
	9/23/2015	<0.50	<0.50	<0.50	<0.50	3.3	<0.50	0.95	84.2	<0.50	<0.50	26.3	<0.50	<0.50	26.6	<0.50
	12/7/2015	<0.50	<0.50	<0.50	<0.50	2.8	<0.50	0.7	63.6	<0.50	<0.50	24.7	<0.50	<0.50	21.1	<0.50

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-21i-40 (continued)	3/9/2016	<0.50	<2	<0.50	<0.50	2.1	<0.50	<0.50	58.6	<0.50	<0.50	14.2	<0.50	<0.50	15.1	<0.50
	6/16/2016	<0.50	<2	<0.50	<0.50	2.3	<0.50	0.8	67.8	<0.50	<0.50	18.1	<0.50	<0.50	17.1	<0.50
	9/26/2016	<0.50	<2	<0.50	<0.50	2.6	<0.50	0.87	77.2	<0.50	<0.50	20.1	<0.50	<0.50	19.8	<0.50
	12/13/2016	<0.50	<2	<0.50	<0.50	2.4	<0.50	0.83	74.2	<0.50	<0.50	21.4	<0.50	<0.50	19.4	<0.50
	3/29/2017	<0.5	<2	<0.5	<0.5	2.6	<0.5	0.91	87.6	0.58	<0.5	21.8	<0.5	<0.5	16.2	<0.5
	6/13/2017	<2.0	<2.0	<0.50	<0.50	2.3	<1.0	0.63	63.6	0.56	<0.50	24.1	<0.50	<0.50	15.1	<0.50
	9/27/2017	<2.0	<2.0	<0.50	<0.50	2.3	<1.0	0.70	60.0	<0.50	<0.50	18.1	<0.50	<0.50	15.0	<0.50
	11/8/2017	<2.0	<2.0	<0.50	<0.50	2.6	<0.50	0.84	65.4	0.63	<0.50	17.4	<0.50	<0.50	14.6	<0.50
	3/22/2018	<0.500	<2.50	<0.500	<0.500	2.1	<0.500	0.64	55.1	0.391 J	<0.500	22.5	<0.500	<0.500	16.5	<0.500
	6/28/2018	<0.500	<2.50	<0.500	<0.500	2.6	<0.500	0.75	63.2	0.53	<0.500	26.0	0.145 J	<0.500	17.0	<0.500
	9/27/2018	<1.00	<5.00	<1.00	<1.00	2.5	<0.400	0.70	62.1	0.69	<0.500	24.5	<0.400	<0.500	17.1	<0.400
	12/6/2018	<1.00	<5.00	<1.00	<1.00	2.4	<0.400	0.67	59.1	0.48	<0.500	32.7	<0.400	<0.500	19.3	<0.400
	3/21/2019	<1.00	<5.00	<1.00	<1.00	2.48	<0.400	0.700	48.8	0.500	<0.500	24.6	<0.400	<0.500	16.2	<0.400
	6/3/2019	<1.00	<5.00	<1.00	<1.00	2.23	<0.400	0.730	60.9	0.470	<0.500	24.1	<0.400	<0.500	16.9	<0.400
	9/25/2019	<1.00	<5.00	<1.00	<1.00	2.48	<0.400	0.768	55.5	0.657	<0.500	22.5	<0.400	<0.500	14.9	<0.400
	12/3/2019	<1.00	<5.00	<1.00	<1.00	2.5	<0.400	0.614	56.3	0.521	<0.500	32.1	<0.400	<0.500	19.1	<0.400
	3/11/2020	<1.00	<5.00	<1.00	<1.00	1.95	<0.400	0.626	47.4	0.411	<0.500	31.2	<0.400	<0.500	17.6	<0.400
	6/17/2020	<1.00	<5.00	<1.00	<1.00	1.95	<0.400	0.540	45.9	0.400	<0.500	31.1	<0.400	<0.500	14.6	<0.400
	10/7/2020	<1.00	<5.00	<1.00	<1.00	2.16	<0.400	0.527	50.7	0.433	<0.500	32.7	<0.400	<0.500	18.7	<0.400
	12/9/2020					2.46	<0.400	0.558	53.3	0.486	<0.500	30.0	<0.400	<0.500	15.8	<0.400
MW-22i	6/10/2008	<1	<1	<1	<1	1.02	<1	<1	30	<1	<1	10.3	<1	<1	30	<1
	9/17/2008	<1	<0.500	<0.500	<1	7.48	<0.500	4.38	124	0.77	<0.500	107	2.01	<0.500	133	<0.500
	12/11/2008	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	0.73	63	<0.50	<0.50	1.1	<0.50	<0.50	6.8	<0.50
	3/25/2009	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	0.64	50	<0.50	<0.50	2.5	<0.50	<0.50	14	<0.50
	6/16/2009	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	0.52	39	<0.50	<0.50	8.5	<0.50	<0.50	24	<0.50
	9/17/2009	<0.50	<0.50	<0.50	<0.50	1	<0.50	0.57	40	<0.50	<0.50	3.3	<0.50	<0.50	21	<0.50
	12/15/2009	<0.50	<0.50	<0.50	<0.50	0.8	<0.50	<0.50	28	<0.50	<0.50	3.8	<0.50	<0.50	20	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	0.86	<0.50	<0.50	34	<0.50	<0.50	2.6	<0.50	<0.50	16	<0.50
	6/14/2010	<0.50	<0.50	<0.50	<0.50	0.6	<0.50	<0.50	17	<0.50	<0.50	4	<0.50	<0.50	18	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	0.75	<0.5	<0.5	24	<0.5	<0.5	3.6	<0.5	<0.5	18	<0.5
	12/8/2010	<0.5	<0.5	<0.5	<0.5	0.73	<0.5	<0.5	21	<0.5	<0.5	3.5	<0.5	<0.5	18	<0.5
	3/11/2011	<0.50	<0.50	<0.50	<0.50	0.67	<0.50	<0.50	17	<0.50	<0.50	3.6	<0.50	<0.50	17	<0.50
	6/8/2011	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	18	<0.5	<0.5	1.8	<0.5	<0.5	12	<0.5

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)															
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride	
MW-22i (continued)	9/14/2011	<0.50	<0.50	<0.50	<0.50	0.55	<0.50	<0.50	18	<0.50	<0.50	1.3	<0.50	<0.50	11	<0.50	
	12/8/2011	<0.50	<0.50	<0.50	<0.50	0.58	<0.50	<0.50	17	<0.50	<0.50	2.5	<0.50	<0.50	14	<0.50	
	3/6/2012	<0.50	<0.50	<0.50	<0.50	0.51	<0.50	<0.50	13	<0.50	<0.50	2.4	<0.50	<0.50	13	<0.50	
	6/20/2012	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	12	<0.5	<0.5	1.9	<0.5	<0.5	11	<0.5	
	9/12/2012	<0.50	<0.50	<0.50	<0.50	0.52	<0.50	<0.50	16	<0.50	<0.50	1.5	<0.50	<0.50	10	<0.50	
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	13	<0.50	<0.50	1.8	<0.50	<0.50	11	<0.50	
	3/13/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	12	<0.50	<0.50	2.2	<0.50	<0.50	11	<0.50	
	6/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	14	<0.50	<0.50	1.1	<0.50	<0.50	9.6	<0.50	
	9/18/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10	<0.50	<0.50	2.1	<0.50	<0.50	11	<0.50	
	12/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	9.3	<0.50	<0.50	1.4	<0.50	<0.50	8.2	<0.50	
	3/19/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10	<0.50	<0.50	1.3	<0.50	<0.50	9.6	<0.50	
	6/25/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	9	<0.50	<0.50	1.1	<0.50	<0.50	5.7	<0.50	
	9/26/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.8	<0.50	<0.50	1.7	<0.50	<0.50	9.8	<0.50	
	12/10/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	9.2	<0.50	<0.50	2.1	<0.50	<0.50	11	<0.50	
	3/17/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.2	<0.50	<0.50	1.8	<0.50	<0.50	8.7	<0.50	
	6/16/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.6	<0.50	<0.50	1.6	<0.50	<0.50	9	<0.50	
	9/23/2015	<0.50	<0.50	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	10	<0.50	<0.50	2.1	<0.50	<0.50	1.15	<0.50
	12/7/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	<0.50	<0.50	2.1	<0.50	<0.50	11	<0.50
	3/9/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	<0.50	<0.50	2.2	<0.50	<0.50	12	<0.50
	6/16/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.5	<0.50	<0.50	1	<0.50	<0.50	7.9	<0.50
	9/28/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.1	<0.50	<0.50	1.3	<0.50	<0.50	9	<0.50
	12/13/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.6	<0.50	<0.50	2	<0.50	<0.50	10.2	<0.50
	3/29/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	10	<0.5	<0.5	1.1	<0.5	<0.5	9.7	<0.5
6/13/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	9.6	<0.50	<0.50	0.63	<0.50	<0.50	6.2	<0.50	
9/27/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	8.8	<0.50	<0.50	0.88	<0.50	<0.50	6.3	<0.50	
11/7/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	9.7	<0.50	<0.50	1.20	<0.50	<0.50	6.4	<0.50	
3/22/2018	<0.500	<2.50	<0.500	<0.500	<0.500	0.330 J	<0.500	<0.500	9.6	<0.500	<0.500	1.76	<0.500	<0.500	7.8	<0.500	
6/29/2018	<0.500	<2.50	<0.500	<0.500	<0.500	0.52	<0.500	<0.500	12.4	<0.500	<0.500	2.77	<0.500	<0.500	8.1	<0.500	
9/26/2018	<1.00	<5.00	<1.00	<1.00	<1.00	0.42	<0.400	<0.400	12.5	<0.400	<0.500	2.42	<0.400	<0.500	6.8	<0.400	
12/5/2018	<1.00	<5.00	<1.00	<1.00	<1.00	0.47	<0.400	<0.400	11.7	<0.400	<0.500	3.34	<0.400	<0.500	8.2	<0.400	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-22i (continued)	3/21/2019	<1.00	<5.00	<1.00	<1.00	0.510	<0.400	<0.400	12.2	<0.400	<0.500	1.24	<0.400	<0.500	4.92	<0.400
	6/6/2019	<1.00	<5.00	<1.00	<1.00	0.584	<0.400	<0.400	15.5	<0.400	<0.500	2.22	<0.400	<0.500	7.22	<0.400
	9/25/2019	<1.00	<5.00	<1.00	<1.00	0.577	<0.400	<0.400	15.5	<0.400	<0.500	3.12	<0.400	<0.500	6.88	<0.400
	12/4/2019	<1.00	<5.00	<1.00	<1.00	0.461	<0.400	<0.400	15.2	<0.400	<0.500	1.94	<0.400	<0.500	7.35	<0.400
	3/12/2020	<1.00	<5.00	<1.00	<1.00	0.587	<0.400	<0.400	16.1	<0.400	<0.500	3.32	<0.400	<0.500	8.23	<0.400
	6/18/2020	<1.00	<5.00	<1.00	<1.00	0.580	<0.400	<0.400	13.6	<0.400	<0.500	3.17	<0.400	<0.500	7.62	<0.400
	10/8/2020	<1.00	<5.00	<1.00	<1.00	0.502	<0.400	<0.400	16.0	<0.400	<0.500	3.68	<0.400	<0.500	8.02	<0.400
	12/9/2020	<1.00	<5.00	<1.00	<1.00	0.565	<0.400	<0.400	15.6	<0.400	<0.500	4.07	<0.400	<0.500	7.86	<0.400
MW-23i	6/10/2008	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	06/10/2008 DUP	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	9/17/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	12/9/2008	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/25/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.54	<0.50	<0.50	<0.50	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/15/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/17/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	7/2/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	12/8/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/8/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/13/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/6/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/7/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/19/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/11/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.67	<0.50	<0.50	<0.50	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
3/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
6/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
9/18/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
12/11/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
3/19/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
6/25/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
9/24/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
12/9/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-23i (continued)	3/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.78	<0.50
	6/16/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/17/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/7/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/8/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/27/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/13/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/27/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	6/13/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/26/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	11/8/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/21/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	0.207 J	<0.500	<0.500	0.402 J	<0.500	<0.500	0.215 J	<0.500
	6/28/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	0.202 J	<0.500	<0.500	0.247 J	<0.500	<0.500	0.212 J	<0.500
	9/27/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/6/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/22/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/3/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	9/26/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	0.59	<0.400	<0.500	<0.400	<0.400
	12/5/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
3/12/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400	
6/17/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400	
10/7/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400	
12/9/2020		<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400	
MW-24i	10/1/2010	<0.50	<0.50	<0.50	<0.50	3.3	<0.50	0.94	52	<0.50	<0.50	52	1.9	<0.50	29	<0.50
	12/10/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.5	<0.5	<0.5	6.3	<0.5	<0.5	2	<0.5
	3/14/2011	<0.50	<0.50	<0.50	<0.50	0.88	<0.50	<0.50	15	<0.50	<0.50	23	1	<0.50	7.4	<0.50
	6/7/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2	<0.5	<0.5	6.6	<0.5	<0.5	1.4	<0.5
	9/16/2011	<0.50	<0.50	<0.50	<0.50	13	<0.50	2.5	270	1.7	<0.50	27	5.6	<0.50	24	19
	12/7/2011	<0.50	<0.50	<0.50	<0.50	5	<0.50	0.84	100	<0.50	<0.50	19	2.9	<0.50	14	7.5
	3/12/2012	<0.50	<0.50	<0.50	<0.50	5.9	<0.50	<0.50	79	<0.50	<0.50	30	2.3	<0.50	11	4.5
	6/22/2012	<0.5	<0.5	<0.5	<0.5	1.8	<0.5	<0.5	14	<0.5	<0.5	0.85	<0.5	<0.5	<0.5	2.6
	9/14/2012	<0.50	<0.50	<0.50	<0.50	4.4	<0.50	0.87	58	<0.50	<0.50	31	0.79	<0.50	20	<0.50
	12/14/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.1	<0.50	<0.50	2.1	<0.50	<0.50	0.65	<0.50

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-24i (continued)	3/15/2013	<0.50	<0.50	<0.50	<0.50	2.8	<0.50	<0.50	48	<0.50	<0.50	23	0.57	<0.50	15	<0.50
	6/14/2013	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	<0.50	28	<0.50	<0.50	6.2	<0.50	<0.50	3.6	<0.80
	9/20/2013	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	15	<0.50	<0.50	15	<0.50	<0.50	5.9	<0.80
	12/16/2013	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	8.4	<0.50	<0.50	6.7	<0.50	<0.50	3.4	<0.50
	3/24/2014	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	16	<0.50	<0.50	10	<0.50	<0.50	5.5	<0.80
	6/23/2014	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	13	<0.50	<0.50	1.3	<0.50	<0.50	5.2	2.1
	9/30/2014	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	21	<0.50	<0.50	20	<0.50	<0.50	10	<0.50
	12/15/2014	<0.50	<0.50	<0.50	<0.50	0.6	<0.50	<0.50	12	<0.50	<0.50	2.4	<0.50	<0.50	1.1	<0.50
	3/20/2015	<0.50	<0.50	<0.50	<0.50	0.58	<0.50	<0.50	5.9	<0.50	<0.50	6.1	<0.50	<0.50	3.1	<0.50
	6/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/22/2015	<0.50	<0.50	<0.50	<0.50	1.9	<0.50	<0.50	4.7	<0.50	<0.50	2.2	<0.50	<0.50	0.8	<0.50
	12/8/2015	<0.50	<0.50	<0.50	<0.50	0.7	<0.50	<0.50	18	<0.50	<0.50	189	<0.50	<0.50	36.4	<0.50
	3/8/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	3.5	<0.50	<0.50	4.1	<0.50	<0.50	1.6	<0.50
	6/17/2016	<0.50	<2	<0.50	<0.50	0.99	<0.50	<0.50	7.8	<0.50	<0.50	11.5	<0.50	<0.50	6.3	<0.50
	9/28/2016	<0.50	<2	<0.50	<0.50	0.53	<0.50	<0.50	5.4	<0.50	<0.50	5.8	<0.50	<0.50	3.1	<0.50
	12/12/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	<0.50	<0.50
	3/30/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5
	6/15/2017	<0.50	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	3.2	<0.50	<0.50	6.6	<0.50	<0.50	2.8	<0.50
	9/26/2017	<2.0	<2.0	<0.50	<0.50	2.10	<1.0	<0.50	24.5	<0.50	<0.50	30.1	<0.50	<0.50	16.6	<0.50
	11/9/2017	<2.0	<2.0	<0.50	<0.50	1.10	<0.50	<0.50	9.6	<0.50	<0.50	12.7	<0.50	<0.50	5.9	<0.50
	3/21/2018	<0.500	<2.50	<0.500	<0.500	1.42	<0.500	<0.500	13.5	<0.500	<0.500	19.1	<0.500	<0.500	10.2	<0.500
	6/28/2018	<0.500	<2.50	<0.500	<0.500	1.44	<0.500	<0.500	13.6	1.09	<0.500	10.3	<0.500	<0.500	5.9	<0.500
	9/27/2018	<1.00	<5.00	<1.00	<1.00	2.18	<0.400	<0.400	25.0	<0.400	<0.500	24.8	<0.400	<0.500	14.3	<0.400
	12/4/2018	<1.00	<5.00	<1.00	<1.00	0.80	<0.400	<0.400	5.1	<0.400	<0.500	10.2	<0.400	<0.500	3.8	<0.400
	3/25/2019	<1.00	<5.00	<1.00	<1.00	0.888	<0.400	<0.400	8.46	<0.400	<0.500	11.7	<0.400	<0.500	5.91	<0.400
	6/7/2019	<1.00	<5.00	<1.00	<1.00	0.601	<0.400	<0.400	4.99	<0.400	<0.500	7.39	<0.400	<0.500	3.55	<0.400
	9/27/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
12/3/2019	<1.00	<5.00	<1.00	<1.00	0.775	<0.400	<0.400	3.82	<0.400	<0.500	8.78	<0.400	<0.500	3.72	<0.400	
3/12/2020	<1.00	<5.00	<1.00	<1.00	1.3	<0.400	<0.400	15.4	<0.400	<0.500	17	<0.400	<0.500	8.42	<0.400	
6/18/2020	<1.00	<5.00	<1.00	<1.00	0.61	<0.400	<0.400	2.91	<0.400	<0.500	6.24	<0.400	<0.500	2.84	<0.400	
10/9/2020	<1.00	<5.00	<1.00	<1.00												
MW-24d	9/14/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/9/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/8/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/21/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-24d	9/14/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
(continued)	12/14/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/15/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/14/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/20/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/16/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/24/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	12	<0.50	<0.50	4	<0.50	<0.50	1.6	<0.50
	6/23/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	10/2/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/15/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.8	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.8	<0.50	<0.50	3.8	<0.50	<0.50	1.7	<0.50
	9/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/9/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/9/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/17/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	0.87	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/30/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	0.62	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/12/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/28/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	6/15/2017	<0.50	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/25/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	11/6/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/20/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	0.259 J	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.199 J
	6/27/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.275 J
	9/28/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/10/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/25/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/4/2019	<4.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	9/27/2019	<1.00	<5.00	<1.00	<1.00	0.415	<0.400	<0.400	1.00	<0.400	<0.500	1.62	<0.400	<0.500	0.845	<0.400
	12/3/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/12/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/18/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	10/9/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-25i	9/16/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/6/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/20/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/11/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/13/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/13/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/18/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/11/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/19/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/25/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/24/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/9/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/17/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/21/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.75	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/7/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/9/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/9/2016 DUP	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/15/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/29/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	0.81	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/13/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	0.77	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/29/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	6/15/2017	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/27/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	11/8/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/21/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	0.245 J	<0.500	<0.500	0.248 J	<0.500	<0.500	<0.500	<0.500
	6/29/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	0.274 B J	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	9/27/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/6/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-25i (continued)	3/22/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/4/2019	<4.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	9/25/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/3/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.54	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/12/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/18/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.44	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	10/7/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/9/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
MW-26	9/16/2011	<2	<2	<2	<2	7	<2	2.2	120	2.6	<2	250	5.7	<2	490	<2
	12/8/2011	<2	<2	<2	<2	7.1	<2	2.5	110	2.2	<2	300	5.8	<2	500	<2
	3/6/2012	<2	<2	<2	<2	8.2	<2	2.2	99	<2	<2	210	4.6	<2	450	<2
	6/19/2012	<2	<2	<2	<2	14	<2	3	90	<2	<2	160	5.2	<2	460	<2
	9/11/2012	<2	<2	<2	<2	6.3	<2	2.3	110	3	<2	280	4.3	<2	460	<2
	12/12/2012	<2	<2	<2	<2	5.6	<2	<2	120	3.7	<2	300	3.8	<2	470	<2
	3/13/2013	<2	<2	<2	<2	4.9	<2	<2	83	<2	<2	210	2.9	<2	390	<2
	6/12/2013	<2	<2	<2	<2	8.2	<2	<2	80	<2	<2	170	4.5	<2	360	<2
	9/18/2013	<2	<2	<2	<2	5.7	<2	<2	96	2.4	<2	210	3.2	<2	410	<2
	12/11/2013	<2	<2	<2	<2	7.8	<2	<2	75	<2	<2	150	3.9	<2	370	<2
	3/19/2014	<2	<2	<2	<2	4.9	<2	<2	95	2.1	<2	220	2.9	<2	350	<2
	6/24/2014	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	6.4	49	0.86	<0.50	150	2.1	<0.50	200	<0.50
	9/24/2014	<2	<2	<2	<2	3.9	<2	<2	68	<2	<2	220	3.1	<2	340	<2
	12/9/2014	<0.90	<0.90	<0.90	<0.90	3.8	<0.90	0.96	55	1.3	<0.90	160	2.8	<0.90	280	<0.90
	3/17/2015	<1	<1	<1	<1	5.8	<1	1.7	75.7	1.8	<1	265	3.7	<1	458	<1
	6/16/2015	<1.7	<1.7	<1.7	<1.7	5	<1.7	<1.7	77.9	<1.7	<1.7	205	2.8	<1.7	385	<1.7
	9/21/2015	<1.7	<1.7	<1.7	<1.7	4.3	<1.7	<1.7	72.4	1.7	<1.7	176	2.7	<1.7	326	<1.7
	12/7/2015	<1.2	<1.2	<1.2	<1.2	8.5	<1.2	1.7	75	1.6	<1.2	179	3.5	<1.2	393	<1.2
	3/8/2016	<1.2	<5	<1.2	<1.2	8	<1.2	1.5	76.1	1.8	<1.2	171	3.7	<1.2	370	<1.2
	6/15/2016	<1	<4	<1	<1	4.6	<1	1.4	83.1	2.2	<1	192	2.2	<1	343	<1
9/27/2016	<0.50	<2	<0.50	<0.50	3.9	<0.50	1.1	61.1	1.6	<0.50	160	2.4	<0.50	288	<0.50	
12/13/2016	<0.50	<2	<0.50	<0.50	8.9	<0.50	2.4	85.9	2	<0.50	167	3.3	<0.50	410	<0.50	
3/29/2017	<5	<20	<5	<5	<5	<5	<5	170	<5	<5	214	<5	<5	452	<5	
6/13/2017	<2.0	<2.0	<0.50	<0.50	6.7	<1.0	1.9	113	2.0	<0.50	160	2.1	<0.50	311 E, J	0.65	
9/26/2017	<2.0	<2.0	<0.50	<0.50	5.1	<1.0	1.0	192	2.1	<0.50	68	0.8	<0.50	192	0.98	
11/8/2017	<2.0	2	<0.50	<0.50	4.8	<0.50	1.5	204	2.3	<0.50	88	1.0	<0.50	170	1.80	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-26 (continued)	3/20/2018	<0.500	0.633 J	0.149 J	<0.500	4.9	<0.500	1.4	157	1.9	<0.500	108	1.2	<0.500	190	1.75
	6/29/2018	<0.500	<2.50	<0.500	<0.500	5.1	<0.500	1.5	114	1.9	<0.500	138	1.9	<0.500	221	1.02
	9/24/2018	<1.00	<5.00	<1.00	<1.00	4.2	<0.400	1.2	141	2.1	<0.500	117	1.2	<0.500	233	1.18
	12/5/2018	<2.00	<10.0	<2.00	<2.00	3.0	<0.800	1.1	147	1.9	<1.00	139	0.8	<1.00	210	0.85
	3/22/2019	<2.00	<10.0	<2.00	<2.00	7.74	<0.800	2.18	142	3.18	<1.00	139	2.09	<1.00	383	<0.800
	6/3/2019	<20.0	<25.0	<5.00	<5.00	5.75	<2.00	<2.00	92.2	2.35	<2.50	148	2.10	<2.50	336	<2.00
	9/26/2019	<5.00	<25.0	<5.00	<5.00	5.14	<2.00	<2.00	104	2.6	<2.50	133	<2.00	<2.50	272	<2.00
	12/3/2019					2.63	<2.00	<2.00	95	<2.00	<2.50	137	<2.00	<2.50	216	<2.00
	3/11/2020	<5.00	<25.0	<5.00	<5.00	3.65	<2.00	<2.00	59.7	<2.00	<2.50	79.1	<2.00	<2.50	205	<2.00
	6/17/2020	<2.00	<10.0	<2.00	<2.00	5.16	<0.800	1.38	64.2	1.9	<1.00	143	2.20	<1.00	299	<0.800
	10/7/2020	<5.00	<25.0	<5.00	<5.00	2.64	<2.00	<2.00	62.8	<2.00	<2.50	118	<2.00	<2.50	208	<2.00
	12/9/2020					3.34	<2.00	<2.00	64.3	<2.00	<2.50	147	<2.00	<2.50	218	<2.00
MW-32s	3/24/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.79	<0.50	--	<0.50	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/14/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/6/1908	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	9/17/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	12/9/2008	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/15/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	7/2/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/22/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/7/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/9/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	0.94	<0.5	<0.5	1.1	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/21/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/11/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/14/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
6/11/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
9/20/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
12/16/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MW-32s (continued)	3/24/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/25/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/25/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/11/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/19/2015	<0.50	<0.50	0.77	<0.50	1.5	<0.50	<0.50	73.5	2.5	<0.50	<0.50	3.5	<0.50	52	<0.50
	6/17/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/7/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/14/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/14/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	11/10/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/22/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	10/1/2018	<2.0	<2.0	<0.50	<0.50	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	12/10/2018	<0.500	<2.50	<0.500	<0.500	0.860	<0.400	<0.400	16.5	<0.400	<0.500	14.7	<0.400	<0.500	5.99	<0.400
	3/25/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	9/26/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
3/13/2020	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400	
10/9/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400	
MW-32i	11/10/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	7	<0.50	<0.50	8.2	<0.50	<0.50	3.4	<0.50
MW-F	6/14/1995	--	<10	<5	<5	<5	5	<5	15	<5	--	<5	<5	--	<5	<10
	2/27/2001	<1	<5	<0.50	<0.50	0.754	<0.50	<0.50	5.99	<0.50	<0.50	0.506	<1	--	1.18	<0.50
	5/29/2001	<1	<5	<0.50	<0.50	0.58	<0.50	<0.50	6.47	<0.50	<0.50	<0.50	<1	--	0.585	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	6.5	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	1.44	<0.50	<0.50	17.9	<0.50	<0.50	<0.50	<1	--	0.709	<0.50
	3/18/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/28/2002	<1	<0.50	<0.50	<1	1.12	0.65	<0.50	9.54	<0.50	<0.50	<0.50	<0.50	--	0.69	<0.50
	11/8/2002	<1	<0.50	<0.50	<1	1.15	0.81	<0.50	9.86	<0.50	<0.50	<0.50	<0.50	--	0.65	<0.50
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/29/2003	<1	<0.50	<0.50	<1	1.11	0.83	<0.50	10.6	<0.50	<0.50	<0.50	<0.50	--	0.62	<0.50
	11/10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-F (continued)	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/24/2005	<1	<0.50	<0.50	<1	0.87	0.64	<0.50	8.31	<0.50	<0.50	0.52	<0.50	--	0.74	<0.50
	5/17/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/14/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/13/2007	<1	<0.50	<0.50	<1	0.5	0.52	<0.50	5.93	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
9/18/2008	<1	<0.500	<0.500	<1	0.85	0.72	<0.500	8.57	<0.500	<0.500	<0.500	<0.500	<0.500	0.57	<0.500	
EW-1	4/25/1991	--	<2	--	--	35	20	--	750	--	--	9,100	280	--	440	9.3
	11/17/1993	--	<200	---	--	<100	<100	--	1,700	--	--	8,600	<100	--	480	<200
	9/1/1995	<25	<50	<25	<25	<25	<25	<25	140	<25	<25	2,400	74	--	340	<50
	9/24/1996	<1	<4	3	<0.4	8.5	2.1	<0.40	260	6.2	<0.40	49	34	--	29	89
	12/2/1996	0.7	<0.50	1.9	<0.20	5.7	5	1	530	3.3	<0.20	310	86	--	98	10
	11/12/1997	<2.5	<5	<2.5	<2.5	5.05	3.38	<2.5	68.5	4.91	<2.5	111	5.1	--	47.4	9.2
	8/11/1999	<10	<50	<5	<5	<5	<5	<5	14.5	<5	<5	369	<10	--	39.9	<5
	11/16/1999	<5	<12.5	<2.5	<5	<2.5	3.15	<2.5	41.7	3	<2.5	314	6.9	--	35.5	5.1
	2/29/2000	<2	<10	<1	<1	<1	6.42	<1	13.7	<1	<1	97.3	3.48	--	20.8	<1
	6/27/2000	<2	<10	2.12	<1	<1	6.42	<1	17.5	<1	<1	293	5.37	--	35.1	<1
	8/31/2000	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	31.9	<2.5	<2.5	325	<5	--	38.4	<2.5
	1/30/2000	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	45.6	<2.5	<2.5	380	5.86	--	53.9	<2.5
	2/27/2001	<2	<10	1.42	<1	2.51	2.83	<1	35	<1	<1	240	7.98	--	47.5	2.43
	5/29/2001	<10	<50	<5	<5	<5	<5	<5	22.4	<5	<5	338	<10	--	61.1	<5
	9/25/2001	<5	<5	<5	<5	<5	<5	<5	14	<5	<5	320	9.5	--	61	<5
	12/17/2001	<2	<10	<1	<1	1.19	<1	<1	25.8	<1	<1	217	12.8	--	47.1	<1
	3/19/2002	<2	<1	<1	<2	1.04	<1	<1	17.5	<1	<1	323	5.66	--	46.1	<1
5/30/2002	<2	<1	1.38	<2	1	1.68	<1	23.5	<1	<1	319	6.46	--	39.9	<1	
8/29/2002	<2	<1	1.36	<2	2.44	1.24	<1	20.4	<1	<1	307	3.38	--	37.8	<1	
11/8/2002	<2	<1	1.46	<2	3.02	3.96	<1	28.4	<1	<1	274	5.54	--	50.2	<1	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
EW-1 (continued)	1/23/2003	<2	<1	1.36	<2	2.34	<1	<1	17	<1	<1	252	5.06	--	51.9	<1
	5/30/2003	<2	<1	5.22	<2	<1	<1	<1	6.12	<1	<1	255	5.06	--	41.1	<1
	11/10/2003	<5	<5	<5	<5	<5	<5	<5	9	<5	<5	85.8	<5	--	16.2	<5
	1/27/2004	<1	<0.50	2.07	<1	0.87	0.78	<0.50	5.2	<0.50	<0.50	151	4.26	--	37.6	<0.50
	5/4/2004	<1	<1	4.73	<1	<1	1.25	<1	4.36	<1	<1	168	3.09	--	30.8	<1
	8/17/2004	<1	<0.50	3.76	<0.50	0.81	1.86	<0.50	6.83	<0.50	<0.50	144	1.73	--	23.2	<0.50
	11/17/2004	<2.5	<2.5	4	<2.5	<2.5	<2.5	<2.5	9.6	<2.5	<2.5	180	3.6	--	33	<2.5
	5/18/2005	<2	<1	<1	<2	<1	<1	<1	8.28	<1	<1	207	<1	--	23.2	2.3
	11/14/2005	<2	<1	1.06	<2	1.36	2.7	<1	11.1	<1	<1	187	<1	--	26.1	<1
	6/5/2006	<1	<1	2.4	<1	<1	<1	<1	6.18	<1	<1	102	3.55	--	19.1	<1
	12/6/2006	<1	<0.50	2.07	<1	1.13	<0.50	<0.50	8.98	<0.50	<0.50	133	2.1	--	28.3	<0.50
	9/12/2007	<1	<0.50	2.66	<1	0.51	1.14	<0.50	6.28	<0.50	<0.50	76.9	1.47	--	18.3	<0.50
	3/6/2008	<1	<0.500	1.71 J	<1	0.64	1.04	<0.500	5.75	<0.500	<0.500	80.9	1.45	<0.500	19.9	<0.500
	9/19/2008	<5	<2.50	<2.50	<5	<2.50	<2.50	<2.50	14.6	<2.50	<2.50	86.1	<2.50	<2.50	20.8	<2.50
	3/26/2009	<0.50	<0.50	3.6	<0.50	<0.50	0.76	<0.50	3.8	<0.50	<0.50	81	1	<0.50	14	<0.50
	9/17/2009	<0.50	<0.50	3.4	<0.50	0.63	<0.50	<0.50	8.3	<0.50	<0.50	100	0.74	<0.50	17	<0.50
	3/19/2010	<0.50	<0.50	3.5 BE	<0.50	<0.50	<0.50	0.52	4.1	<0.50	<0.50	89	1.5	<0.50	22	<0.50
	9/23/2010	<0.50	<0.50	1.7 BE	<0.50	0.86	0.94	<0.50	10	<0.50	<0.50	87	0.64	<0.50	17	<0.50
	3/10/2011	<0.50	<0.50	5.2	<0.50	<0.50	<0.50	<0.50	2.9	<0.50	<0.50	67	0.89	<0.50	13	<0.50
	9/16/2011	<0.50	<0.50	2.7	<0.50	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	75	0.69	<0.50	9.9	<0.50
	3/12/2012	<0.50	<0.50	4.4	<0.50	<0.50	<0.50	<0.50	3	<0.50	<0.50	52	0.68	<0.50	13	<0.50
	9/13/2012	<0.50	<0.50	1.7	<0.50	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	60	0.58	<0.50	8.6	<0.50
	3/15/2012	<0.50	<0.50	2.4	<0.50	<0.50	<0.50	<0.50	3.1	<0.50	<0.50	78	0.63	<0.50	12	<0.50
	9/19/2013	<0.50	<0.50	2.2	<0.50	<0.50	<0.50	<0.50	5.3	<0.50	<0.50	63	0.57	<0.50	14	<0.50
	3/20/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	32	1.6	<0.50	12	<0.50
	9/27/2014	Insufficient water for sampling during monitoring event.														
	9/21/2015	<0.50	<0.50	2	<0.50	<0.50	<0.50	<0.50	3.9	<0.50	<0.50	45.3	0.56	<0.50	12.5	<0.50
3/8/2016	<0.50	<2	2	<0.50	<0.50	<0.50	<0.50	2.9	<0.50	<0.50	62.6	0.83	<0.50	14.3	<0.50	
9/29/2016	<0.50	<2	1.1	<0.50	<0.50	1.5	<0.50	5.4	<0.50	<0.50	38.6	<0.50	<0.50	10.5	<0.50	
3/30/2017	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10.7	<0.50	<0.50	2.4	<0.50	
9/28/2017	<2.0	<2.0	2.4	<0.50	<0.50	<1.0	<0.50	1.8	<0.50	<0.50	32.4	<0.50	<0.50	7.2	<0.50	
11/9/2017	<2.0	<2.0	0.91	<0.50	<0.50	<0.50	<0.50	3.30	<0.50	<0.50	33.0	0.66	<0.50	7.3	<0.50	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
EW-1 (continued)	7/1/2018	<0.500	<2.50	1.94	<0.500	0.134 J	<0.500	<0.500	1.15 B	<0.500	<0.500	30.7	0.56	<0.500	7.6	<0.500
	9/27/2018	<1.00	<5.00	1.15	<1.00	0.41	1.03	<0.400	3.18	<0.400	<0.500	29.7	0.41	<0.500	8.4	<0.400
	3/25/2019	<1.00	<5.00	1.85	<1.00	<0.400	<0.400	<0.400	1.70	<0.400	<0.500	30.7	0.676	<0.500	11.2	<0.400
	6/4/2019	<1.00	<5.00	1.45	<1.00	<0.400	0.590	<0.400	2.56	<0.400	<0.500	27.4	0.690	<0.500	9.53	<0.400
	9/26/2019	<1.00	<5.00	1.54	<1.00	<0.400	<0.4	<0.400	2.39	<0.400	<0.500	24.4	0.482	<0.500	7.4	<0.400
	12/4/2019					<0.400	0.552	<0.400	3.34	<0.400	<0.500	28.3	0.488	<0.500	9.99	<0.400
	3/11/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.811	<0.400	<0.500	15	<0.400	<0.500	5.04	<0.400
	6/17/2020	<1.00	<5.00	1.33	<1.00	<0.400	<0.400	<0.400	1.20	<0.400	<0.500	29.9	0.900	<0.500	6.78	<0.400
	10/7/2020	<1.00	<5.00	1.36	<1.00	<0.400	<0.400	<0.400	3.30	<0.400	<0.500	44.7	0.449	<0.500	10.6	<0.400
	12/9/2020					<0.400	<0.400	<0.400	1.61	<0.400	<0.500	32.2	0.766	<0.500	8.64	<0.400
S-1	8/10/1999	<1	<5	<0.50	<1	<0.50	<0.50	<0.50	2.63	<0.50	<0.50	7.81	1.3	--	20.6	<0.50
	2/29/2000	<1	<5	<0.50	<0.50	0.761	<0.50	<0.50	2.21	<0.50	<0.50	60.6	2.98	--	24.4	<0.50
	6/28/2000	<5	<25	<2.5	<2.5	<2.5	<2.5	2.7	58.2	<2.5	<2.5	749	14.5	--	232	<2.5
	8/31/2000	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	4.98	<2.5	<2.5	313	5.14	--	60.4	<2.5
	11/30/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	1.61	<0.50	<0.50	9.78	1.95	--	29.8	<0.50
	2/27/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	0.551	1.66	<0.50	<0.50	13.5	2.26	--	45.2	<0.50
	5/30/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	0.974	<0.50	<0.50	7.38	<1	--	12.6	<0.50
	9/25/2001	<2.5	<2.5	<2.5	<2.5	2.6	<2.5	4	2.7	<2.5	<2.5	39	18	--	210	<2.5
	3/19/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.21	<0.50	--	3.73	<0.50
	5/30/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.45	<0.50	--	10.4	<0.50
	11/7/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	2.34	<0.50	<0.50	8.71	1.02	--	19.7	<0.50
	1/23/2003	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	0.78	<0.50	<0.50	6.15	0.56	--	13	<0.50
	5/28/2003	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.2	<0.500	--	8.67	<0.50
	11/11/2003	<1	<1	<1	<1	<1	<1	<1	1.85	<1	<1	4.22	<1	--	13.2	<1
	1/26/2004	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.57	0.67	--	15.5	<0.50
	5/4/2004	<1	<1	<1	<1	<1	<1	<1	1.17	<1	<1	4.07	<1	--	10.6	<1
	11/15/2004	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	2.8	<0.50	<0.50	8.4	0.82	--	18	<0.50
	2/1/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	0.75	<0.50	<0.50	1.89	<0.50	--	2.87	<0.50
	5/18/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	2.24	<0.50	<0.50	3.73	<0.50	--	8.39	<0.50
	5/23/2007	<1	<1	<1	<1	<1	<1	<1	3.63	<1	<1	4.02	<1	--	6.85	<1
12/13/2007	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	4.61	<0.50	<0.50	4.87	<0.50	--	8.44	<0.50	
3/5/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	5.15	<0.500	<0.500	<0.500	4.14	<0.500	<0.500	<0.500	
6/25/2008	<1	<1	<1	<1	<1	<1	<1	1.67	<1	<1	<1	1.37	<1	<1	<1	
9/17/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	5.55	<0.500	<0.500	2.81	<0.500	<0.500	6.07	<0.500	
12/9/2008	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	0.62	<0.50	<0.50	1.4	<0.50	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
S-1	3/25/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.3	<0.50	<0.50	1.4	<0.50	<0.50	2.7	<0.50
(continued)	6/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.91	<0.50	<0.50	0.81	<0.50	<0.50	1.8	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.4	<0.50	<0.50	1.7	<0.50	<0.50	5	<0.50
	12/16/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.4	<0.50	<0.50	1.7	<0.50	<0.50	6.1	<0.50
	3/17/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	1	<0.50
	7/2/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.66	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5
	12/8/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	0.77	<0.5	<0.5	3	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	<0.50
	6/8/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.66	<0.5
	9/14/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	1.4	<0.50	<0.50	4	<0.50
	12/6/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	1.3	<0.50	<0.50	3.1	<0.50
	3/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.59	<0.50	<0.50	0.74	<0.50	<0.50	1.8	<0.50
	6/21/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.98	<0.5	<0.5	0.94	<0.5	<0.5	3.5	<0.5
	9/14/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.88	<0.50	<0.50	0.88	<0.50	<0.50	2.6	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	0.96	<0.50	<0.50	3.8	<0.50
	3/13/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.78	<0.50	<0.50	1.5	<0.50
	6/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.74	<0.50	<0.50	2.2	<0.50
	9/20/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	1.8	<0.50	<0.50	5.4	<0.50
	12/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	1.2	<0.50	<0.50	5.1	<0.50
	3/20/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50
	6/24/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.82	<0.50	<0.50	2.1	<0.50
	9/27/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	1.3	<0.50	<0.50	4.3	<0.50
	12/9/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	1.3	<0.50	<0.50	4.9	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.73	<0.50	<0.50	1.4	<0.50
	6/16/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.8	<0.50
	9/21/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	1.6	<0.50	<0.50	5.1	<0.50
	12/8/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.6	<0.50

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
S-1 (continued)	3/9/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/27/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	0.73	<0.50	<0.50	3	<0.50
	12/13/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	0.57	<0.50	<0.50	0.54	<0.50	<0.50	1.6	<0.50
	3/27/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	6/13/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/28/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	11/8/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/20/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	6/28/2018	<0.500	<2.50	<0.500	<0.500	1.01	<0.500	0.336 J	3.62	<0.500	<0.500	3.16	0.90	<0.500	24.20	<0.500
	9/26/2018	<1.00	<5.00	<1.00	<1.00	0.51	<0.400	<0.400	2.58	<4.00	<0.500	2.11	0.41	<0.500	10.40	<0.400
	12/5/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.10	<4.00	<0.500	1.94	<0.400	<0.500	7.39	<0.400
	3/19/2019	<1.00	<5.00	<1.00	<1.00	0.764	<0.400	<0.400	6.27	<0.400	<0.500	0.921	<0.400	<0.500	3.60	<0.400
	6/5/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.11	<0.400	<0.500	0.783	<0.400	<0.500	2.17	<0.400
	9/25/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.86	<0.400	<0.500	1.1	<0.400	<0.500	2.71	<0.400
	12/4/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.988	<0.400	<0.500	0.971	<0.400	<0.500	2.86	<0.400
	3/10/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	1.06	<0.400
	6/17/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	0.440	<0.400
10/7/2020	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.95	<0.400	<0.500	1.20	<0.400	<0.500	2.06	<0.400	
12/8/2020	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	1.30	<0.400	
S-2	8/11/1999	<1	<5	<0.50	<0.50	2.37	<0.50	<0.50	<0.50	<0.50	<0.50	1.7	<1	--	0.843	<0.50
	11/15/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.52	<0.50	<0.50	4.4	<0.50	--	1.6	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	<0.50	1.7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/13/2013	<0.50	<0.50	<0.50	<0.50	3.4	<0.50	<0.50	2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/12/2013	<0.50	<0.50	<0.50	<0.50	2.3	<0.50	<0.50	1.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/20/2013	<0.50	<0.50	<0.50	<0.50	3.7	<0.50	<0.50	3.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/12/2013	<0.50	<0.50	<0.50	<0.50	3	<0.50	<0.50	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/20/2014	<0.50	<0.50	<0.50	<0.50	1.9	<0.50	<0.50	2.2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/24/2014	<0.50	<0.50	<0.50	<0.50	3.1	<0.50	<0.50	3.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/27/2014	<0.50	<0.50	<0.50	<0.50	4.5	<0.50	<0.50	4.7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/9/2014	<0.50	<0.50	<0.50	<0.50	3.9	<0.50	<0.50	4.6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	4.5	<0.50	<0.50	5.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2015	<0.50	<0.50	<0.50	<0.50	4.1	<0.50	<0.50	3.8	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
12/8/2015	<0.50	<0.50	<0.50	<0.50	3	<0.50	<0.50	3.2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	

Please refer to notes at end of table.

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Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
S-2 (continued)	6/16/2016	<0.50	<2	<0.50	<0.50	4.3	<0.50	<0.50	6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/26/2016	<0.50	<2	<0.50	<0.50	6.2	<0.50	<0.50	11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/13/2016	<0.50	<2	<0.50	<0.50	3.5	<0.50	<0.50	4.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/27/2017	<0.5	<2	<0.5	<0.5	2.6	<0.5	<0.5	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	6/13/2017	<2.0	<2.0	<0.50	<0.50	3.3	<1.0	<0.50	4.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/28/2017	<2.0	<2.0	<0.50	<0.50	8.0	<1.0	<0.50	13.2	<0.50	<0.50	<0.50	0.86	<0.50	0.51	<0.50
	11/8/2017	<2.0	<2.0	<0.50	<0.50	7.1	<0.50	<0.50	12.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/20/2018	<0.500	<2.50	<0.500	<0.500	3.7	<0.500	<0.500	5.9	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	6/28/2018	<0.500	<2.50	<0.500	<0.500	4.1	<0.500	<0.500	23.2	0.56	<0.500	<0.500	1.00	<0.500	2.34	<0.500
	9/26/2018	<1.00	<5.00	<1.00	<1.00	10.0	<0.400	<0.400	50.9	0.70	<0.500	<4.00	1.74	<0.500	4.00	0.42
	12/5/2018	<1.00	<5.00	<1.00	<1.00	7.0	<0.400	<0.400	28.5	<4.00	<0.500	<0.400	<0.400	<0.500	2.18	<0.400
	3/19/2019	<1.00	<5.00	<1.00	<1.00	2.65	<0.400	<0.400	8.23	<4.00	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/5/2019	<1.00	<5.00	<1.00	<1.00	5.38	<0.400	<0.400	19.8	<0.400	<0.500	<0.400	<0.400	<0.500	0.925	<0.400
	9/25/2019	<1.00	<5.00	<1.00	<1.00	8.88	<0.400	<0.400	49.6	0.64	<0.500	<0.400	0.94	<0.500	2.85	<0.400
	12/4/2019	<1.00	<5.00	<1.00	<1.00	7.12	<0.400	<0.400	30.5	<0.400	<0.500	<0.400	<0.400	<0.500	1.75	<0.400
	3/10/2020	<1.00	<5.00	<1.00	<1.00	6.54	<0.400	<0.400	26.4	0.52	<0.500	<0.400	<0.400	<0.500	1.15	<0.400
	6/17/2020	<1.00	<5.00	<1.00	<1.00	4.24	<0.400	<0.400	15.5	<0.400	<0.500	<0.400	<0.400	<0.500	0.58	<0.400
10/7/2020	<1.00	<5.00	<1.00	<1.00	10.2	<0.400	<0.400	54.4	0.539	<0.500	<0.400	1.01	<0.500	3.08	0.448	
12/8/2020	<2.00	<5.00	<1.00	<1.00	7.72	<0.400	<0.400	31.4	<0.400	<0.500	<0.400	<0.400	<0.500	1.13	<0.400	
MGMS1-3(43)	6/28/2000	<50	<250	<25	<25	278	<25	55.9	4,270	<25	<25	734	<50	--	1,840	<25
	8/30/2000	<200	<1	<100	<100	420	<100	116	8,850	<100	<100	5,940	<200	--	3,040	<100
	11/29/2000	<100	<500	<50	<50	249	<50	76.2	4,560	<50	<50	1,210	<100	--	1,140	<50
	2/27/2001	<100	<500	<50	<50	697	<50	164	14,000	<50	<50	148	<100	--	1,390	133
	5/31/2001	<100	<500	<50	<50	<50	<50	<50	5,870	<50	<50	130	<100	--	599	<50
	9/24/2001	<13	<13	<13	<13	150	<13	32	4,700	<13	<13	310	<13	--	450	25
	12/18/2001	<50	<250	<25	<25	153	<25	33.3	3,600	<25	<25	276	<50	--	568	<25
	3/19/2002	<100	<50	<50	<100	310	<50	103	6,700	<50	<50	2,090	<50	--	1,720	86
	5/29/2002	<50	<25	<25	<50	188	<25	39	4,700	<25	<25	470	<25	--	624	37.5
	8/29/2002	<1	<0.50	<0.50	<1	3.72	<0.50	0.84	94.7	0.54	<0.50	34.9	0.75	--	35.7	1.46
	11/11/2002	<100	<50	<50	<100	183	<50	<50	4,810	<50	<50	757	<50	--	831	51
	1/23/2003	<100	<50	<50	<100	378	<50	76	10,500	<50	<50	782	<50	--	1,290	109
	5/28/2003	<100	<50	<50	<100	402	<50	72	9,510	<50	<50	270	<50	--	841	114
11/11/2003	<50	<50	<50	<50	252	<50	<50	9,710	<50	<50	516	<50	--	1,020	58	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS1-3(43) (continued)	1/27/2004	<50	<25	<25	<50	290	<25	54.5	8,160	53.5	<25	393	<25	--	808	95
	5/3/2004	<100	<100	<100	<100	370	<100	<100	12,300	<100	<100	830	<100	--	1,520	111
	8/17/2004	<100	<50	<50	<100	401	<50	114	12,700	109	<50	1,540	<50	--	2,340	151
	11/15/2004	<120	<120	<120	<120	270	<120	<120	9,600	<120	<120	1,400	<120	--	1,600	<120
	3/24/2005	<100	<50	<50	<100	481	<50	148	15,600	135	<50	1,390	<50	--	2,090	266
	5/16/2005	<50	<25	<25	<50	327	<25	89	9,670	83	<25	802	<25	--	1,410	157
	5/17/2005	<100	<50	<50	<100	353	<50	86	10,600	94	<50	920	<50	--	1,660	173
	11/17/2005	<100	<50	<50	<100	392	<50	121	13,400	133	<50	1,310	<50	--	2,280	186
	6/6/2006	<100	<100	<100	<100	385	<100	<100	11,800	115	<100	628	<100	--	1,370	192
	12/6/2006	<100	<50	<50	<100	256	<50	72	9,960	92	<50	843	<50	--	1,260	155
	5/22/2007	<100	<100	<100	<100	439	<100	119	14,200	152	<100	910	<100	--	1,920	245
	9/11/2007	<100	<50	<50	<100	303	<50	109	11,700	128	<50	1,100	<50	--	2,060	189
	12/12/2007	<100	<50	<50	<100	270	<50	75	8,740	93	<50	1,010	<50	--	1,540	167
	3/5/2008	<50	<25	<25	<50	370	<25	128	6,740	220	<25	1,480	36	<25	2,350	234
	9/16/2008	<100	<50	<50	<100	302	<50	112	10,400	139	<50	2,700	<50	<50	2,500	171
	12/8/2008	<4	<4	<4	<4	190	<4	63	6,000	78	<4	1,300	19	<4	1,200	100
	3/25/2009	<15	<15	<15	<15	110	<15	66	3,500	34	<15	3,600	49	<15	2,100	49
	9/15/2009	<15	<15	<15	<15	140	<15	74	4,200	45	<15	4,300	44	<15	2,300	84
	12/14/2009	<15	<15	<15	<15	140	<15	46	4,000	55	<15	1,500	15	<15	1,100	67
	3/17/2010	<15	<15	<15	<15	160	<15	63	4,600	44	<15	2,800	32	<15	1,900	78
6/14/2010	<25	<25	<25	<25	220	<25	46	5,400	69	<25	790	<25	<25	900	85	
9/21/2010	<15	<15	<15	<15	130	<15	55	3,800	43	<15	2,900	37	<15	1,900	68	
12/7/2010	<15	<15	<15	<15	190	<15	63	5,500	69	<15	2,500	23	<15	1,800	96	
3/8/2011	<20	<20	<20	<20	170	<20	52	4,600	56	<20	1,400	<20	<20	1,300	86	
6/6/2011	<15	<15	<15	<15	190	<15	36	4,700	71	<15	610	<15	<15	790	97	
9/13/2011	<20	<20	<20	<20	290	<20	78	8,000	160	<20	900	<20	<20	1,800	160	
3/8/2012	<4	<40	<40	<40	340	<40	62	9,500	150	<40	240	<40	<40	690	890	
6/21/2012	<20	<20	<20	<20	220	<20	25	4,400	76	<20	74	<20	<20	260	1,100	
9/12/2012	<20	<20	<20	<20	280	<20	72	8,800	180	<20	360	<20	<20	970	890	
12/11/2012	<20	<20	<20	<20	220	<20	40	6,100	110	<20	160	<20	<20	430	680	

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Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS1-3(43) (continued)	3/12/2013	<20	<20	<20	<20	220	<20	21	4,700	74	<20	110	<20	<20	340	1,600
	6/11/2013	<20	<20	<20	<20	190	<20	<20	3,900	56	<20	78	<20	<20	260	1,100
	9/17/2013	<15	<15	<15	<15	190	<15	21	4,600	66	<15	100	<15	<15	350	1,100
	12/10/2013	<15	<15	<15	<15	210	<15	18	3,600	54	<15	95	<15	<15	270	1,800
	3/18/2014	<20	<20	<20	<20	150	<20	<20	3,600	40	<20	93	<20	<20	260	440
	6/26/2014	<7	<7	<7	<7	120	<7	14	2,000	14	<7	21	<7	<7	57	480
	9/23/2014	<15	<15	<15	<15	190	<15	35	4,700	69	<15	120	<15	<15	420	550
	12/12/2014	<7	<7	<7	<7	200	<7	23	4,000	52	<7	100	<7	<7	350	810
	3/19/2015	<12.5	<12.5	<12.5	<12.5	131	<12.5	<12.5	2,450	16.6	<12.5	31.7	<12.5	<12.5	129	249
	6/18/2015	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	<0.50	59.1	<0.50	<0.50	0.84	<0.50	<0.50	2.8	3.1
	9/21/2015	<10	<10	<10	<10	124	<10	14.1	2,810	24.8	<10	53.5	<10	<10	171	129
	12/8/2015	<0.50	<0.50	<0.50	<0.50	92	<0.50	<0.50	1,580	11.5	<0.50	26.2	<0.50	<0.50	88	230
	3/9/2016	<10	<40	<10	<10	93.9	<10	<10	1,700	12.4	<10	24.1	<10	<10	81.9	209
	6/17/2016	<8.3	<33.3	<8.3	<8.3	163	<8.3	26.6	3,130	36.1	<8.3	64.6	<8.3	<8.3	248	288
	9/30/2016	<8.3	<33.3	<8.3	<8.3	81.9	<8.3	13.5	1,980	24.2	<8.3	230	<8.3	<8.3	366	52
	12/16/2016	<8.4	<33.4	<8.4	<8.4	92.6	<8.4	9.5	1,810	20.1	<8.4	64.1	<8.4	<8.4	171	239
	3/31/2017	<8.4	<33.4	<8.4	<8.4	90.8	<8.4	12.5	1,430	15.2	<8.4	45.8	<8.4	<8.4	119	348
	6/12/2017	<8.3	<33.3	<8.3	<8.3	173	<8.3	16.7	2,620	18.7	<8.3	24.4	<8.3	<8.3	116	681
	9/29/2017	<2.5	<10.0	<2.5	<2.5	60	<2.5	6.9	901	12.9	<2.5	70.7	<2.5	<2.5	126	117
	11/7/2017	<10.0	<10.0	<2.5	<2.5	153	<2.5	13.7	2,350 J	26.6	<2.5	108	<2.5	<2.5	211	181
	3/22/2018	<0.500	<2.50	<0.500	<0.500	192	<0.500	18.0	2,450	34.9	<0.500	80	0.8	0.200 J	278	236
	7/1/2018	<0.500	<2.50 J3	<0.500	<0.500	116	<0.500	13.8	1,880	32.8	<0.500	107	0.6	<0.500	246	118
	9/28/2018	<20.0	<100	<20.0	<20.0	141	<8.00	27.8	3,150	47.4	<10.0	252	<8.00	<10.0	528	134
	12/4/2018	<1.00	<5.00	<1.00	<1.00	148	<0.400	22.5	2,750	48.1	<0.500	146	1.1	<0.500	388	129
	3/26/2019	<40.0	<100	<20.0	<20.0	160	<8.00	22.3	3,210	42.2	<10.0	145	<8.00	<10.0	372	105
	6/7/2019	<20.0	<100	<20.0	<20.0	169	<8.00	26.5	3090	40.8	<10.0	115	<8.00	<10.0	315	145
	9/27/2019	<20.0	<100	<20.0	<20.0	156	<8.00	30.5	3240	53.9	<10.0	212	<8.00	<10.0	434	113
12/4/2019	<20.0	<100	<20.0	<20.0	124	<8.00	17.5	2860	40.9	<10.0	162	<8.00	<10.0	398	11.8	
3/11/2020	<25.0	<125	<25.0	<25.0	157	<10.0	29.7	3230	60.4	<12.5	228	<10.0	<12.5	495	157	
6/16/2020	<25.0	<125	<25.0	<25.0	114	<10.0	21.8	2520	31.5	<12.5	116	<10.0	<12.5	264	152	
10/6/2020	<25.0	<125	<25.0	<25.0												
MGMS1-2(60)	6/28/2000	<10	<50	<5	<5	53.6	<5	<5	369	<5	<5	658	19.7	--	240	<5
	8/30/2000	<20	<100	<10	<10	21.7	<10	13.1	267	<10	<10	2,590	108	--	586	<10
	11/29/2000	<2	<10	<1	<1	1.58	<1	1.09	57.7	<1	<1	121	4.58	--	40.3	<1

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS1-2(60) (continued)	2/27/2001	<1	<5	<0.5	<0.5	0.838	<0.5	0.686	32.9	<0.5	<0.5	54.6	2.06	--	24.7	<0.5
	5/31/2001	<1	<5	<0.50	<0.50	0.662	<0.50	0.581	39	<0.50	<0.50	69.4	<1	--	27.8	0.52
	9/24/2001	<13	<13	<13	<13	<13	<13	<13	89	<13	<13	830	14	--	150	<13
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	20.4	<0.50	<0.50	12.8	<1	--	15.7	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	2.52	<0.50	0.99	68	<0.50	<0.50	62.9	1.2	--	34	3.48
	5/29/2002	<1	<0.50	<0.50	<1	0.78	<0.50	<0.50	22.8	<0.50	<0.50	23.4	<0.50	--	14.2	0.6
	8/29/2002	<10	<5	<5	<10	30.6	<5	5.1	661	<5	<5	138	<5	--	116	<5
	11/11/2002	<1	<0.50	<0.50	<1	2.99	<0.50	0.83	86	<0.50	<0.50	38.2	1.16	--	38.9	<0.50
	1/23/2003	<1	<0.50	<0.50	<1	1.53	<0.50	0.74	42.6	<0.50	<0.50	42.8	0.78	--	34.2	1.04
	5/28/2003	<1	<0.50	<0.50	<1	2.87	<0.50	1.21	72	<0.50	<0.50	51.1	1.18	--	47.6	0.63
	11/11/2003	<1	<1	<1	<1	1.84	<1	<1	48.8	<1	<1	45.9	<1	--	36	<1
	1/27/2004	<1	<0.50	<0.50	<1	2.06	<0.50	1.06	72.3	0.69	<0.50	40.9	0.66	--	43.1	0.63
	5/3/2004	<1	<1	<1	<1	4.07	<1	1.22	70.7	<1	<1	54.8	1.36	--	43.5	2.53
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	0.68	39	<0.50	<0.50	31	<0.50	--	28	0.67
	2/1/2005	<1	<0.50	<0.50	<1	1.31	<0.50	<0.50	37.5	0.56	<0.50	33.2	<0.50	--	21.7	1.3
	5/16/2005	<1	<0.50	<0.50	<1	0.95	<0.50	<0.50	40.6	<0.50	<0.50	21.7	<0.50	--	19.8	<0.50
	05/16/2005 DUP	<1	<0.50	<0.50	<1	1.02	<0.50	<0.50	42.1	<0.50	<0.50	21.4	<0.50	--	20.5	<0.50
	8/18/2005	<1	<0.500	<0.500	<1	7.28	<0.500	2.41	145	1.2	<0.500	76.5 B	1.46	--	65.6	5.16 B
	11/17/2005	<1	<0.500	<0.500	<1	2.53	<0.500	0.99	87	0.59	<0.500	34.8	<0.500	--	26.4	0.93
	2/20/2006	<1	<0.500	<0.500	<1	6.17	<0.500	1.93	136	1.1	<0.500	61.9	0.93	--	45.5	4.17
	6/6/2006	<1	<1	<1	<1	1.02	<1	<1	33.7	<1	<1	23.4	<1	--	18.7	<1
	9/5/2006	<1	<0.50	<0.50	<1	5.37	<0.50	1.75	115	0.84	<0.50	55.9	0.8	--	37.5	4.79
	12/6/2006	<1	<0.50	<0.50	<1	3.39	<0.50	1.12	90.9	0.62	<0.50	39.5	<0.50	--	28.3	2.15
	2/7/2007	<1	<0.50	<0.50	<1	4.37	<0.50	1.37	116	0.93	<0.50	55.9	0.58	--	40.7	3
	5/22/2007	<1	<1	<1	<1	1.18	<1	<1	38.5	<1	<1	31.6	<1	--	25.2	<1
	9/11/2007	<5	<2.50	<2.50	<5	26.6	<2.50	8.75	711	7.2	<2.50	81.4	2.95	--	216	11.9
12/12/2007	<1	<0.50	<0.50	<1	1.83	<0.50	0.79	64.9	0.65	<0.50	28.1	<0.50	--	24.9	0.67	
3/4/2008	<1	<0.500	<0.500	<1	6.65	<0.500	2.22	166	2.92	<0.500	75.4	0.81	<0.500	60.5	2.79	
9/16/2008	<5	<2.50	<2.50	<2.50	5.5	<2.50	<2.50	160	<2.50	<2.50	38.8	<2.50	<2.50	65.5	<2.50	
12/8/2008	<0.50	<0.50	<0.50	<0.50	4.1	<0.50	1.2	88	1.1	<0.50	40	0.51	<0.50	38	1.3	
12/08/2008 DUP	<0.50	<0.50	<0.50	<0.50	3.9	<0.50	1.2	84	1.1	<0.50	42	0.52	<0.50	38	1.3	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS1-2(60) (continued)	3/25/2009	<0.50	<0.50	<0.50	<0.50	3.1	<0.50	1.3	71	0.75	<0.50	40	0.65	<0.50	37	0.54
	6/15/2009	<0.50	<0.50	<0.50	<0.50	1	<0.50	0.8	47	0.9	<0.50	26	<0.50	<0.50	30	0.55
	9/15/2009	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	0.82	44	0.58	<0.50	42	<0.50	<0.50	30	0.82
	12/14/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	17	<0.50	<0.50	18	<0.50	<0.50	16	<0.50
	3/17/2010	<0.50	<0.50	<0.50	<0.50	2.4	<0.50	0.96	61	0.68	<0.50	40	0.51	<0.50	38	<0.50
	6/14/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	20	<0.50	<0.50	17	<0.50	<0.50	15	<0.50
	9/21/2010	<0.5	<0.5	<0.5	<0.5	2.1	<0.5	0.57	46	<0.5	<0.5	42	<0.5	<0.5	32	0.8
	12/7/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	16	<0.5	<0.5	19	<0.5	<0.5	15	<0.5
	3/8/2011	<0.50	<0.50	<0.50	<0.50	0.54	<0.50	<0.50	19	<0.50	<0.50	27	<0.50	<0.50	16	<0.50
	6/6/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8.3	<0.5	<0.5	16	<0.5	<0.5	11	<0.5
	9/13/2011	<0.50	<0.50	<0.50	<0.50	2.5	<0.50	0.73	42	0.5	<0.50	42	0.89	<0.50	30	0.74
	12/6/2011	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	30	<0.50	<0.50	33	<0.50	<0.50	22	0.6
	3/8/2012	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	32	<0.50	<0.50	36	<0.50	<0.50	21	<5
	6/19/2012	<0.5	<0.5	<0.5	<0.5	0.71	<0.5	<0.5	28	<0.5	<0.5	22	<0.5	<0.5	16	<0.5
	9/12/2012	<0.50	<0.50	<0.50	<0.50	2.5	<0.50	0.66	36	<0.50	<0.50	33	<0.50	<0.50	20	1.1
	12/11/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	20	<0.50	<0.50	19	<0.50	<0.50	11	<0.50
	3/12/2013	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	0.56	38	<0.50	<0.50	35	<0.50	<0.50	20	0.66
	6/11/2013	<0.50	<0.50	<0.50	<0.50	0.66	<0.50	<0.50	29	<0.50	<0.50	27	<0.50	<0.50	18	<0.50
	9/17/2013	<0.50	<0.50	<0.50	<0.50	0.89	<0.50	<0.50	20	<0.50	<0.50	32	<0.50	<0.50	16	0.54
	12/10/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	16	<0.50	<0.50	17	<0.50	<0.50	11	<0.50
	3/18/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.5	<0.50	<0.50	10	<0.50	<0.50	5.8	<0.50
	6/26/2014	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	33	<0.50	<0.50	21	<0.50	<0.50	20	<0.50
	9/23/2014	<0.50	<0.50	<0.50	<0.50	2.3	<0.50	<0.50	26	<0.50	<0.50	34	<0.50	<0.50	20	12
	12/12/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	22	<0.50	<0.50	20	<0.50	<0.50	14	<0.50
	3/19/2015	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	26.1	<0.50	<0.50	22.7	<0.50	<0.50	16.1	<0.50
	6/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.95	<0.50	<0.50	17.7	<0.50	<0.50	9.1	<0.50
	9/21/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.3	<0.50	<0.50	1.6	<0.50
	12/8/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	18.8	<0.50	<0.50	13.8	<0.50	<0.50	12.4	<0.50
	3/9/2016	<0.50	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	17.5	<0.50	<0.50	16.9	<0.50	<0.50	14	<0.50
	6/17/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	11.8	<0.50	<0.50	18	<0.50	<0.50	11.1	<0.50
	9/30/2016	<0.50	<2	<0.50	<0.50	0.89	<0.50	<0.50	17.7	<0.50	<0.50	22.5	<0.50	<0.50	17.6	<0.50
	12/16/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	5.1	<0.50	<0.50	7.6	<0.50	<0.50	4.7	<0.50

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS1-2(60) (continued)	3/31/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	15.6	<0.5	<0.5	13.6	<0.5	<0.5	13.2	<0.5
	6/12/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	6.0	<0.50	<0.50	12.8	<0.50	<0.50	7.1	<0.50
	9/29/2017	<2.0	<2.0	<0.50	<0.50	2.00	<1.0	<0.50	18.3	<0.50	<0.50	18.3	<0.50	<0.50	13.4	<0.50
	11/7/2017	<2.0	<2.0	<0.50	<0.50	1.60	<0.50	<0.50	24.9	<0.50	<0.50	14.0	<0.50	<0.50	14.7	<0.50
	3/22/2018	<0.500	<2.50	<0.500	<0.500	1.30	<0.500	<0.500	13.4	<0.500	<0.500	23.3	<0.500	<0.500	13.9	<0.500
	7/1/2018	<0.500	<2.50	<0.500	<0.500	0.89	<0.500	<0.500	11.8	<0.500	<0.500	18.4	<0.500	<0.500	8.5	<0.500
	10/1/2018	<1.00	<5.00	<1.00	<1.00	6.66	<0.400	<0.400	23.9	<0.400	<0.500	29.4	<0.400	<0.500	16.6	20.00
	12/4/2018	<1.00	<5.00	<1.00	<1.00	0.67	<0.400	<0.400	9.6	<0.400	<0.500	14.4	<0.400	<0.500	8.2	<0.400
	3/26/2019	<1.00	<5.00	<1.00	<1.00	0.439	<0.400	<0.400	9.10	<0.400	<0.500	12.9	<0.400	<0.500	8.37	<0.400
	6/7/2019	<1.00	<5.00	<1.00	<1.00	0.651	<0.400	<0.400	11.4	<0.400	<0.500	15.5	<0.400	<0.500	9.57	<0.400
	9/27/2019	<1.00	<5.00	<1.00	<1.00	4.58	<0.400	0.44	27.9	<0.400	<0.500	33.2	<0.400	<0.500	19	7.9
	12/4/2019	<1.00	<5.00	<1.00	<1.00	0.465	<0.400	<0.400	8.86	<0.400	<0.500	16.8	<0.400	<0.500	9.35	<0.400
	3/12/2020	<1.00	<5.00	<1.00	<1.00	1.32	<0.400	<0.400	15.6	<0.400	<0.500	26.5	<0.400	<0.500	11.8	<0.400
	6/16/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	4.23	<0.400	<0.500	12.4	<0.400	<0.500	6.01	<0.400
	10/6/2020	<1.00	<5.00	<1.00	<1.00											
MGMS1-1(110)	6/28/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	3.78	<0.50	<0.50	3.9	<1	--	3.35	<0.50
	8/30/2000	<5	<25	<2.5	<2.5	3.7	<2.5	3.32	55	<2.5	<2.5	510	24	--	130	<2.5
	11/29/2000	<5	<25	<2.5	<2.5	4.21	<2.5	4.59	51	<2.5	<2.5	583	23.2	--	166	<2.5
	2/27/2001	<5	<25	<2.5	<2.5	5.21	<2.5	3.39	47.5	<2.5	<2.5	385	16.5	--	105	<2.5
	5/31/2001	<10	<50	<5	<5	<5	<5	<5	55.8	<5	<5	639	13.8	--	141	<5
	9/24/2001	<1.3	<1.3	<1.3	<1.3	6.1	<1.3	2.9	57	<1.3	<1.3	580	20	--	120	<1.3
	12/18/2001	<5	<25	<2.5	<2.5	5.04	<2.5	2.68	54.8	<2.5	<2.5	527	20.2	--	131	<2.5
	3/19/2002	<5	<2.5	<2.5	<5	5.25	<2.5	<2.5	54	<2.5	<2.5	454	10.8	--	98	<2.5
	5/29/2002	<5	<2.5	<2.5	<5	4.9	<2.5	<2.5	62.3	<2.5	<2.5	299	9.7	--	65.1	<2.5
	8/29/2002	<1	<0.50	<0.50	<1	5.43	<0.50	1.32	110	0.8	<0.50	60.2	3.62	--	47.8	<0.50
	11/11/2002	<2	<1	<1	<2	4.74	<1	1.2	46.1	<1	<1	208	7.84	--	66.1	<1
	1/23/2003	<2	<1	<1	<2	4.44	<1	1.24	65.3	<1	<1	210	6.54	--	74.1	<1
	5/28/2003	<2	<1	<1	<2	3.96	<1	<1	69.2	<1	<1	109	2.48	--	57.5	<1
	11/11/2003	<2	<2	<2	<2	4.14	<2	<2	44.8	<2	<2	256	3.6	--	60.2	<2
	1/27/2004	<2	<1	<1	<2	4.22	<1	1.1	67.1	<1	<1	167	4.16	--	69.7	<1
	5/3/2004	<1	<1	<1	<1	3.66	<1	<1	47.2	<1	<1	190	2.18	--	55.9	<1
	11/15/2004	<2.5	<2.5	<2.5	<2.5	3.7	<2.5	<2.5	95	<2.5	<2.5	76	<2.5	--	64	<2.5
	6/20/2005	<2	<1	<1	<2	9.22	<1	2.58	283	1.8	<1	23.6	1.62	--	70	1.24
	11/17/2005	<1	<0.500	<0.500	<1	2.93	<0.500	<0.500	51.3	<0.500	<0.500	102	1.95	--	76.1	<0.500
	6/6/2006	<1	<1	<1	<1	2.15	<1	<1	44	<1	<1	94.4	1.36	--	66.8	<1
12/6/2006	<1	<0.50	<0.50	<1	5.81	<0.50	0.6	142	<0.50	<0.50	53.8	0.88	--	74.6	0.57	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS1-1(110) (continued)	9/11/2007	<2	<1	<1	<2	3.78	<1	1.2	189	<1	<1	31.6	<1	--	61.1	<1
	3/4/2008	<1	<0.500	<0.500	<1	3.73	<0.500	0.91	242	2.37	<0.500	32.7	0.64	<0.500	44.4	<0.500
	3/25/2009	<0.50	<0.50	<0.50	<0.50	2.6	<0.50	0.87	160	0.9	<0.50	25	<0.50	<0.50	39	<0.50
	6/15/2009	<0.50	<0.50	<0.50	<0.50	2.3	<0.50	0.74	130	1	<0.50	24	<0.50	<0.50	39	<0.50
	9/15/2009	<2.5	<2.5	<2.5	<2.5	20	<2.5	2.7	620	3.6	<2.5	24	<2.5	<2.5	75	<2.5
	3/17/2010	<2.5	<2.5	<2.5	<2.5	20	<2.5	4.3	720	3.7	<2.5	20	<2.5	<2.5	79	<2.5
	9/21/2010	<0.5	<0.5	<0.5	<0.5	2.5	<0.5	1.1	150	1	<0.5	28	<0.5	<0.5	53	<0.5
	3/10/2011	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	0.57	83	0.52	<0.50	26	<0.50	<0.50	31	<0.50
	9/13/2011	<0.50	<0.50	<0.50	<0.50	1.9	<0.50	1.2	110	0.96	<0.50	30	<0.50	<0.50	59	<0.50
	3/8/2012	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	62	<0.50	<0.50	22	<0.50	<0.50	21	<0.50
	9/12/2012	<0.50	<0.50	<0.50	<0.50	0.93	<0.50	0.53	60	<0.50	<0.50	22	<0.50	<0.50	25	<0.50
	3/12/2013	<0.50	<0.50	<0.50	<0.50	0.95	<0.50	<0.50	65	<0.50	<0.50	23	<0.50	<0.50	24	<0.50
	9/17/2013	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	0.56	68	<0.50	<0.50	26	<0.50	<0.50	32	<0.50
	3/18/2014	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	63	<0.50	<0.50	23	<0.50	<0.50	27	0.65
	9/24/2014	Not sampled; 60-foot port accidentally sampled twice.														
	3/19/2015	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	0.69	126	<0.50	<0.50	23.7	<0.50	<0.50	41.5	0.82
	9/21/2015	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	49	<0.50	<0.50	19.4	<0.50	<0.50	20.4	<0.50
	9/30/2016	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	56.7	<0.50	<0.50	18.4	<0.50	<0.50	28.7	<0.50
	3/31/2017	<0.50	<20	<0.50	<0.50	13.3	<0.50	1.1	328	0.7	<0.50	20.1	<0.50	<0.50	62.0	6.5
	9/29/2017	<2.0	<2.0	<0.50	<0.50	5.9	<1.0	0.540	173	<0.50	<0.50	9.0	<0.50	<0.50	32.8	0.6
	11/7/2017	<2.0	<2.0	<0.50	<0.50	10.5	<0.50	0.910	257	0.7	<0.50	11.5	<0.50	<0.50	41.8	0.9
	7/1/2018	<0.500	<2.50	<0.500	<0.500	3.30	<0.500	0.462 J	104	0.357 J	<0.500	18.5	0.132 J	<0.500	36.6	0.6
	10/1/2018	<1.00	<5.00	<1.00	<1.00	6.12	<0.400	0.723	153	0.485	<0.500	13.0	<0.400	<0.500	39.3	0.7
6/7/2019	<1.00	<5.00	<1.00	<1.00	3.55	<0.400	<0.400	102	<0.400	<0.500	13.8	<0.400	<0.500	24.2	<0.400	
12/4/2019	<1.00	<5.00	<1.00	<1.00	4.61	<0.400	<0.400	134	<0.400	<0.500	14.0	<0.400	<0.500	31.9	<0.400	
6/16/2020	<1.00	<5.00	<1.00	<1.00	4.22	<0.400	0.450	141	<0.400	<0.500	17.6	<0.400	<0.500	33.2	<0.400	
12/8/2020	<2.00	<5.00	<1.00	<1.00	5.56	<0.400	0.523	163	0.488	<0.500	16.1	<0.400	<0.500	32.7	<0.400	
MGMS2-4(40)	6/28/2000	<50	<250	<25	<25	44.9	<25	<25	1,210	<25	<25	5,030	215	--	3,090	<25
	8/30/2000	<10	<50	<5	<5	23.4	<5	31.3	644	7.28	<5	2,980	152	--	1,850	<5
	11/29/2000	<100	<500	<50	<50	51.3	<50	94	1,420	<50	<50	8,740	424	--	3,980	<50
	2/27/2001	<50	<250	<25	<25	35.6	<25	66.2	753	<25	<25	7,360	280	--	3,360	<25
	5/31/2001	<50	<250	<25	<25	<25	<25	<25	604	<25	<25	3,610	94.4	--	2,050	<25
	9/24/2001	<5	<5	<5	<5	28	<5	26	780	13	<5	2,600	170	--	1,700	<5
	12/18/2001	<50	<250	<25	<25	175	<25	77	1,350	<25	<25	5,590	374	--	3,220	<25

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS2-4(40) (continued)	3/19/2002	<50	<25	<25	<50	36	<25	36	868	<25	<25	6,240	180	--	3,040	<25
	5/29/2002	<50	<25	<25	<50	76	<25	53	1,330	<25	<25	6,580	230	--	2,530	<25
	11/11/2002	<20	<10	<10	<20	19.8	<10	13.6	639	<10	<10	3,080	89.4	--	1,820	<10
	1/23/2003	<20	<10	<10	<20	13.4	<10	<10	353	<10	<10	2,290	52.6	--	1,480	<10
	5/28/2003	<10	<5	<5	<10	5.4	<5	<5	110	<5	<5	1,190	19.1	--	474	<5
	11/11/2003	<10	<10	<10	<10	<10	<10	<10	54.1	<10	<10	1,820	14	--	398	<10
	1/27/2004	<20	<10	<10	<20	45.2	<10	10	397	<10	<10	1,740	55.8	--	688	<10
	5/3/2004	<10	<10	<10	<10	<10	<10	<10	41.2	<10	<10	599	<10	--	200	<10
	8/17/2004	<10	<5	<5	<10	9.7	<5	6.1	158	<5	<5	1,530	30.7	--	705	<5
	11/15/2004	<25	<25	<25	<25	<25	<25	<25	310	<25	<25	2,900	<25	--	1,300	<25
	3/24/2005	<20	<10	<10	<20	10.8	<10	<10	159	<10	<10	1,900	25.8	--	834	<10
	5/16/2005	<20	<10	<10	<20	34.2	<10	28.2	489	<10	<10	2,540	52.2	--	1,150	<10
	11/16/2005	<50	<25	<25	<50	43.5	<25	<25	396	<25	<25	4,240	82.5	--	1,750	<25
	6/6/2006	<50	<50	<50	<50	62	<50	<50	917	<50	<50	4,820	55	--	1,770	<50
	12/5/2006	<50	<25	<25	<50	<25	<25	<25	370	<25	<25	3,090	31.5	--	1,200	<25
	5/21/2007	<20	<20	<20	<20	27.4	<20	<20	359	<20	<20	2,880	38.2	--	1,080	<20
	9/10/2007	<50	<25	<25	<50	<25	<25	<25	402	<25	<25	2,010	52.5	--	1,600	<25
	12/12/2007	<50	<25	<25	<50	26	<25	<25	330	<25	<25	2,080	35.5	--	914	<25
	03/04/2008 ⁷	<1	<0.500	<0.500	<1	20.4	<0.500	16.1	181	7.71	<0.500	1,810	53.7	0.51	950	4.68
	9/16/2008	<50	<25	<25	<25	<25	<25	<25	208	<25	<25	2,330	32	<25	1,130	<25
	12/8/2008	Not sampled. Air leak in sampling point prohibited the collection of the sample.														
	3/24/2009	<2	<2	<2	<2	8.4	<2	3.6	100	2	<2	990	14	<2	430	<2
	9/15/2009	<1.5	<1.5	<1.5	<1.5	3.1	<1.5	<1.5	52	<1.5	<1.5	440	4.1	<1.5	200	<1.5
	12/14/2009	<1.5	<1.5	<1.5	<1.5	54	<1.5	16	360	6.9	<1.5	2,400	62	<1.5	1,000	2.6
	3/16/2010	<7	<7	<7	<7	16	<7	<7	140	<7	<7	1,800	19	<7	810	<7
	6/14/2010	<25	<25	<25	<25	72	<25	41	1,400	<25	<25	6,400	68	<25	1,500	43
	9/21/2010	<2.5	<2.5	<2.5	<2.5	35	<2.5	17	480	9	<2.5	3,500	48	<2.5	1,500	5.4
12/7/2010	<15	<15	<15	<15	69	<15	26	700	<15	<15	4,100	83	<15	1,600	<15	
3/7/2011	<15	<15	<15	<15	88	<15	30	930	<15	<15	3,700	91	<15	1,600	<15	
6/7/2011	<15	<15	<15	<15	65	<15	30	1,600	17	<15	4,400	57	<15	1,400	48	
9/12/2011	<15	<15	<15	<15	44	<15	28	7,400	20	<15	790	48	<15	380	58	
12/7/2011	<15	<15	<15	<15	35	<15	<15	5,300	<15	<15	61	<15	<15	39	460	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS2-4(40) (continued)	3/8/2012	<2	<2	<2	<2	38	<2	2.3	470	2.8	<2	9.9	5.2	<2	5.4	260
	6/19/2012	<0.5	3.9	<0.5	<0.5	53	<0.5	<0.5	20	1.3	<0.5	7.2	<0.5	<0.5	2.5	63
	9/13/2012	<1.5	1.8	<1.5	<1.5	39	<1.5	2.8	310	3.2	<1.5	89	5	<1.5	80	440
	12/11/2012	<0.50	30	<0.50	<0.50	4.8	<0.50	<0.50	33	1.3	<0.50	10	<0.50	<0.50	3.4	4
	3/12/2013	<0.50	8.2	<0.50	<0.50	28	<0.50	1.9	300	2	<0.50	5.6	2.5	<0.50	2.2	270
	6/11/2013	<0.50	15	<0.50	<0.50	8.3	<0.50	<0.50	7.9	<0.50	<0.50	0.94	<0.50	<0.50	<0.50	4.8
	9/17/2013	<0.50	9.4	<0.50	<0.50	28	<0.50	4.8	290	1.4	<0.50	16	1.6	<0.50	17	330
	12/16/2013	<0.50	6.9	<0.50	<0.50	9.7	<0.50	<0.50	8.4	<0.50	<0.50	2.4	<0.50	<0.50	1.4	3.4
	3/24/2014	<0.50	2.4	<0.50	<0.50	45	<0.50	2.9	84	<0.50	<0.50	2.6	<0.50	<0.50	1.8	270
	6/26/2014	<0.50	6.1	<0.50	<0.50	31	<0.50	10	88	0.84	<0.50	21	<0.50	<0.50	22	90
	9/23/2014	<0.50	2.5	<0.50	<0.50	30	<0.50	30	590	2.4	<0.50	170	3.2	<0.50	110	800
	12/12/2014	<0.50	12	<0.50	<0.50	35	<0.50	<0.50	10	<0.50	<0.50	3.4	<0.50	<0.50	2.3	18
	3/20/2015	<0.50	<0.50	<0.50	<0.50	4.3	<0.50	3.9	47	<0.50	<0.50	30.6	<0.50	<0.50	22.1	17.3
	6/19/2015	<0.50	<0.50	<0.50	<0.50	13.8	<0.50	1.3	53.8	<0.50	<0.50	18.4	<0.50	<0.50	12.8	48.3
	9/25/2015	<0.50	<0.50	<0.50	<0.50	12.3	<0.50	4.2	105	0.61	<0.50	67.4	0.92	<0.50	45.9	57.8
	12/8/2015	<0.50	3.8	<0.50	<0.50	13.5	<0.50	<0.50	7	<0.50	<0.50	4	<0.50	<0.50	2.8	3.3
	3/9/2016	<0.50	<2	<0.50	<0.50	20.6	<0.50	1.6	36	<0.50	<0.50	6.5	<0.50	<0.50	6.2	36
	6/17/2016	<0.50	<2	<0.50	<0.50	24.9	<0.50	26.4	744	2.8	<0.50	223	3.1	<0.50	146	227
	9/29/2016	<0.50	<2	<0.50	<0.50	12.1	<0.50	<0.50	115	<0.50	<0.50	33.3	<0.50	<0.50	24.8	142
	12/16/2016	<0.50	<2	<0.50	<0.50	10.3	<0.50	<0.50	5.2	<0.50	<0.50	2.6	<0.50	<0.50	1.9	2
	3/31/2017	<0.5	<2	<0.5	<0.5	57.6	<0.5	14.3	236	0.6	<0.5	4.3	<0.5	<0.5	14.4	235
	6/15/2017	<0.50	<2.0	<0.50	<0.50	38.6	<0.50	3.5	46.2	<0.50	<0.50	5.1	<0.50	<0.50	4.9	98.9
	9/29/2017	<2.0	<2.0	<0.50	<0.50	21.7	<1.0	6.8	195.0	0.74	<0.50	41.5	0.67	<0.50	31.3	428.0
	11/9/2017	<2.0	<2.0	<0.50	<0.50	21.3	<0.50	0.9	61.6	0.52	<0.50	13.2	<0.50	<0.50	9.2	170.0
	3/22/2018	<0.500	<2.50	<0.500	<0.500	25.9	<0.500	4.2	109.0	0.57	<0.500	46.0	0.259 J	<0.500	27.3	122.0
	7/1/2018	<0.500	<2.50	<0.500	<0.500	12.7	<0.500	5.9	151.0	0.97	<0.500	62.1	1.04	<0.500	48.9	38.2
	9/28/2018	<2.00	<10.00	<2.00	<2.00	8.7	<0.800	1.4	140.0	<0.800	<1.00	66.9	<0.800	<1.00	43.3	106.0
	12/10/2018	<1.00	<5.00	<1.00	<1.00	20.9	<0.400	0.6	24.9	<0.400	<0.500	18.7	<0.400	<0.500	12.0	123.0
	3/25/2019	<1.00	<5.00	<1.00	<1.00	26.6	<0.400	2.58	136	0.752	<0.500	62.0	0.581	<0.500	35.9	155
	6/4/2019	<1.00	<5.00	<1.00	<1.00	28.2	<0.400	0.960	37.8	<0.400	<0.500	14.6	<0.400	<0.500	10.4	145
9/27/2019	<1.00	<5.00	<1.00	<1.00	11.2	<0.400	0.729	73.8	<0.400	<0.500	17	<0.400	<0.500	13.1	101	
12/4/2019	<1.00	<5.00	<1.00	<1.00	20.6	<0.400	0.778	40.5	<0.400	<0.500	32.3	<0.400	<0.500	17.9	65.4	
3/12/2020	<1.00	<5.00	<1.00	<1.00	24.1	<0.400	2.730	105	0.64	<0.500	86.3	0.45	<0.500	43.3	134	
6/16/2020	<1.00	<5.00	<1.00	<1.00	27.3	<0.400	1.250	85	<0.400	<0.500	14.8	<0.400	<0.500	9.09	138	
10/6/2020	<1.00	<5.00	<1.00	<1.00	19.1	<0.400	2.45	98.4	0.635	<0.500	101	0.593	<0.500	56.2	148	
12/8/2020	<4.00	<10.0	<2.00	<2.00	17.8	<0.800	1.85	82.6	<0.800	<1.00	41.0	<0.800	<1.00	19.4	80.2	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS2-3(60)	6/28/2000	<5	<25	<2.5	<2.5	35.6	<2.5	8.3	433	<2.5	<2.5	110	22.3	--	198	<2.5
	8/30/2000	<10	<50	<5	<5	36	<5	13	1,120	<5	<5	164	32	--	136	<5
	11/29/2000	<5	<25	<2.5	<2.5	5.08	<2.5	3.88	279	<2.5	<2.5	26.8	<5	--	38	<2.5
	2/27/2001	<2	<10	<1	<1	40.2	<1	2.65	46.6	<1	<1	20.7	12.4	--	27	173
	5/31/2001	<1	<5	<0.50	<0.50	2.47	<0.50	2.3	39.1	<0.50	<0.50	113	3.44	--	75.6	5.06
	9/24/2001	<2.5	<2.5	<2.5	<2.5	14	<2.5	11	180	3.6	<2.5	340	11	--	220	48
	12/18/2001	<1	<5	<0.50	<0.50	0.607	<0.50	1.01	15	<0.50	<0.50	64.4	2.06	--	47.7	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	5.4	<0.50	2.96	62.9	0.81	<0.50	91.9	5.78	--	80.1	15.2
	5/29/2002	<1	<0.50	<0.50	<1	2.55	<0.50	2.02	59.7	0.82	<0.50	119	4.8	--	67.6	1.06
	1/23/2003	<1	<0.50	<0.50	<1	10.1	<0.50	2.7	114	1.12	<0.50	111	6.06	--	96	22.8
	5/28/2003	<2	<1	<1	<2	15	<1	3.28	178	1.48	<1	131	9.3	--	126	15.6
	11/11/2003	<2	<2	<2	<2	21.3	<2	4.56	208	<2	<2	223	9.06	--	139	20.6
	1/27/2004	<1	<0.50	<0.50	<1	17.2	<0.50	2.83	117	1.57	<0.50	96.3	5.38	--	92.2	17.7
	5/3/2004	<1	<1	<1	<1	4.79	<1	1.96	86.4	<1	<1	121	3.31	--	84	<1
	11/15/2004	<2.5	<2.5	<2.5	<2.5	<2.5	13	4.4	220	2.8	<2.5	170	6.4	--	140	11
	2/1/2005	<1	<0.50	<0.50	<1	2.49	<0.50	1.47	92	2.46	<0.50	97.7	2.41	--	73.9	0.6
	5/16/2005	<1	<0.50	<0.50	<1	1.49	<0.50	1.51	45.2	0.59	<0.50	74.1	1.61	--	41.5	<0.50
	8/18/2005	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	27.6 B	<0.500	<0.500	23.5 B	<0.500	--	13 B	<0.500
	11/16/2005	<1	<0.500	<0.500	<1	7.5	<0.500	2.05	90.9	1.16	<0.500	107	3.1	--	78.3	2.68
	2/20/2006	<1	<0.500	<0.500	<1	3.35	<0.500	1.6	65	0.82	<0.500	99.5	1.55	--	62.3	1.27
	6/6/2006	<1	<1	<1	<1	<1	<1	<1	55	<1	<1	76.3	1.01	--	36.2	<1
	9/5/2006	<1	<0.50	<0.50	<1	2.85	<0.50	1.13	75.1	0.73	<0.50	73	1.11	--	45.6	0.83
	12/5/2006	<1	<0.50	<0.50	<1	2.58	<0.50	1.44	77	0.75	<0.50	98.7	1.27	--	61.2	0.79
	2/7/2007	<1	<0.50	<0.50	<1	3.36	<0.50	1.3	96.5	0.79	<0.50	76.3	1.64	--	55	1.51
	5/21/2007	<1	<1	<1	<1	2.45	<1	1.33	73.7	<1	<1	99.1	1.51	--	54.5	<1
	9/10/2007	<10	<5	<5	<10	31.2	<5	8.2	559	<5	<5	221	10.8	--	192	26.7
	12/12/2007	<1	<0.50	<0.50	<1	1.49	<0.50	0.88	78.6	0.56	<0.50	66.1	0.98	--	36.8	1.75
	3/4/2008	<1	<0.500	<0.500	<1	4.46	<0.500	2.19	164	1.37	<0.500	89.7	2.32	<0.500	72.2	6.88
	9/16/2008	<5	<2.50	<2.50	<5	10.4	<2.50	3.65	166	<2.50	<2.50	111	3.85	<2.50	96.4	7.15
	12/8/2008	<0.80	<0.80	<0.80	<0.80	11	<0.80	3	160	1.7	<0.80	110	3.2	<0.80	80	10
	3/24/2009	<0.50	<0.50	<0.50	<0.50	5.8	<0.50	1.6	110	1	<0.50	84	2.2	<0.50	53	3.7
	9/15/2009	<0.50	<0.50	<0.50	<0.50	6.4	<0.50	2.3	91	1.2	<0.50	110	2.4	<0.50	72	4.2
	12/14/2009	<0.50	<0.50	<0.50	<0.50	2.1	<0.50	1.1	61	0.75	<0.50	84	1.1	<0.50	54	0.96

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS2-3(60) (continued)	3/16/2010	<0.50	<0.50	<0.50	<0.50	15	<0.50	3.6	140	1.6	<0.50	160	8.2	<0.50	110	12
	6/14/2010	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	0.75	46	0.55	<0.50	73	0.86	<0.50	38	0.88
	9/21/2010	<0.5	<0.5	<0.5	<0.5	11	<0.5	3	130	1.5	<0.5	150	5.8	<0.5	100	6.8
	12/7/2010	<0.5	<0.5	<0.5	<0.5	4.1	<0.5	1.8	86	1.2	<0.5	120	1.7	<0.5	77	1.6
	3/7/2011	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	0.86	73	0.62	<0.50	61	1.2	<0.50	34	1.4
	6/6/2011	<0.5	<0.5	<0.5	<0.5	0.64	<0.5	<0.5	22	<0.5	<0.5	64	0.54	<0.5	27	<0.5
	9/12/2011	<0.50	<0.50	<0.50	<0.50	10	<0.50	3.2	110	1.4	<0.50	170	6	<0.50	100	2
	12/5/2011	<0.50	<0.50	<0.50	<0.50	2.6	<0.50	0.95	51	0.54	<0.50	84	1	<0.50	41	<0.50
	3/8/2012	<0.50	<0.50	<0.50	<0.50	10	<0.50	2.9	300	1.9	<0.50	71	1.5	<0.50	45	43
	6/19/2012	<0.5	<0.5	<0.5	<0.5	2	<0.5	1	79	0.87	<0.5	78	0.78	<0.5	45	5.3
	9/12/2012	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	0.56	48	<0.50	<0.50	44	<0.50	<0.50	20	2.7
	12/11/2012	<0.50	<0.50	<0.50	<0.50	2.6	<0.50	2.5	59	1.5	<0.50	57	0.62	<0.50	36	16
	3/12/2013	<0.50	<0.50	<0.50	<0.50	0.74	<0.50	<0.50	22	<0.50	<0.50	16	<0.50	<0.50	9	<0.50
	6/11/2013	<0.50	<0.50	<0.50	<0.50	2.4	<0.50	1.5	53	0.58	<0.50	29	0.55	<0.50	21	12
	9/17/2013	<0.50	<0.50	<0.50	<0.50	5.4	<0.50	0.98	73	0.66	<0.50	24	0.6	<0.50	13	29
	12/10/2013	<0.50	<0.50	<0.50	<0.50	3	<0.50	1	88	0.88	<0.50	23	0.6	<0.50	18	13
	3/18/2014	<0.50	<0.50	<0.50	<0.50	0.96	<0.50	<0.50	28	<0.50	<0.50	33	<0.50	<0.50	13	1.7
	9/23/2014	Insufficient air pressure to inflate dedicated bladder; no sample collected.														
	12/12/2014	Insufficient air pressure to inflate dedicated bladder; no sample collected.														
	3/20/2015	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	29.4	<0.50	<0.50	41.4	<0.50	<0.50	24.3	5.2
	6/19/2015	<0.50	<0.50	<0.50	<0.50	2	<0.50	0.56	38.1	<0.50	<0.50	35.1	<0.50	<0.50	23.5	7.9
	9/25/2015	<0.50	<0.50	<0.50	<0.50	2.5	<0.50	0.5	51.6	<0.50	<0.50	18.4	<0.50	<0.50	15.8	9.7
	12/8/2015	Well Damaged, Unable to Sample														
	6/17/2016	<0.50	<2	<0.50	<0.50	1.1	<0.50	<0.50	19.4	<0.50	<0.50	17.2	<0.50	<0.50	11.8	3.4
	9/30/2016	<0.50	<2	<0.50	<0.50	2	<0.50	<0.50	40	<0.50	<0.50	9.6	<0.50	<0.50	11.5	9.6
	12/16/2016	<0.50	<2	<0.50	<0.50	1.7	<0.50	<0.50	35.3	<0.50	<0.50	40.7	<0.50	<0.50	24.8	1.4
	3/31/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	18.5	<0.5	<0.5	26	<0.5	<0.5	11.2	0.75
	6/15/2017	<2.0	<2.0	<0.50	<0.50	0.88	<1.0	<0.50	20.7	<0.50	<0.50	40.4	<0.50	<0.50	17.3	1.3
9/29/2017	<2.0	<2.0	<0.50	<0.50	2.30	<1.0	<0.50	30.4	<0.50	<0.50	17.5	<0.50	<0.50	12.0	6.7	
11/9/2017	<2.0	<2.0	<0.50	<0.50	1.80	<0.50	<0.50	30.2	<0.50	<0.50	34.2	<0.50	<0.50	20.1	1.1	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS2-3(60) (continued)	3/22/2018	<0.500	<2.50	<0.500	<0.500	0.82	<0.500	0.244 J	17.3	0.164 J	<0.500	20.6	0.205 J	<0.500	11.6	1.2
	7/1/2018	<0.500	<2.50	<0.500	<0.500	0.73	<0.500	<0.500	14.1	<0.500	<0.500	19.6	0.20	<0.500	10.1	1.6
	12/10/2018	<0.500	<2.50	<0.500	<0.500	2.26	<0.500	0.43	41.7	0.43	<0.500	36.1	<0.400	<0.500	20.7	4.4
	3/25/2019	<1.00	<5.00	<1.00	<1.00	1.86	<0.400	<0.400	36.8	0.415	<0.500	40.1	<0.400	<0.500	23.3	0.773
	6/4/2019	<1.00	<5.00	<1.00	<1.00	0.580	<0.400	<0.400	18.00	<0.400	<0.500	32.3	<0.400	<0.500	15.7	0.420
	9/27/2019	<1.00	<5.00	<1.00	<1.00	1.590	<0.400	<0.400	35.20	0.47	<0.500	25	<0.400	<0.500	13.8	3.080
	12/4/2019	<1.00	<5.00	<1.00	<1.00	2.030	<0.400	0.427	54.50	0.42	<0.500	28.9	<0.400	<0.500	19.4	2.850
	3/12/2020	<1.00	<5.00	<1.00	<1.00	0.541	<0.400	<0.400	12.30	<0.400	<0.500	21.7	<0.400	<0.500	9.24	0.642
	6/16/2020	<1.00	<5.00	<1.00	<1.00	0.820	<0.400	<0.400	16.50	<0.400	<0.500	23.7	<0.400	<0.500	10.4	0.850
	10/6/2020	<1.00	<5.00	<1.00	<1.00	1.21	<0.400	<0.400	28.9	<0.400	<0.500	32.3	<0.400	<0.500	17.9	1.38
12/8/2020	<2.00	<5.00	<1.00	<1.00	0.860	<0.400	<0.400	20.2	<0.400	<0.500	21.8	<0.400	<0.500	10.5	0.757	
MGMS2-2(110)	6/28/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	12.2	<0.50	<0.50	6.04	<1	--	17.1	<0.50
	8/30/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	4.41	<0.50	<0.50	16.4	<1	--	14.7	<0.50
	11/29/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	0.717	8.23	<0.50	<0.50	13	<1	--	19.3	<0.50
	2/27/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	0.756	7.31	<0.50	<0.50	15.2	<1	--	21.6	<0.50
	5/31/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	0.938	10.7	<0.50	<0.50	24.4	1.14	--	29.1	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.6	6.8	<0.50	<0.50	37	1.1	--	34	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	0.62	4.91	<0.50	<0.50	35.1	<1	--	27.5	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	0.61	9.97	<0.50	<0.50	35.6	1.23	--	24.6	<0.50
	5/29/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	1.21	31.9	<0.50	<0.50	114	2.39	--	51	0.61
	1/23/2003	<1	<0.50	<0.50	<1	<0.50	<0.50	1.01	57.1	<0.50	<0.50	47.8	2.79	--	44.1	2.98
	5/28/2003	<1	<0.50	<0.50	<1	0.61	<0.50	0.73	63.9	<0.50	<0.50	54.6	1.98	--	43.1	1.13
	11/11/2003	<1	<1	<1	<1	1.14	<1	<1	76.7	1.07	<1	32.4	2.19	--	30.8	2.03
	1/27/2004	<1	<0.50	<0.50	<1	0.63	<0.50	<0.50	49	<0.50	<0.50	67.9	1.17	--	30	1
	5/3/2004	<1	<1	<1	<1	<1	<1	<1	14	<1	<1	28	<1	--	13.6	<1
	11/15/2004	<0.50	<0.50	<0.50	<0.50	<0.50	0.7	0.62	60	<0.50	<0.50	50	1.6	--	30	<0.50
	5/16/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	27.9	<0.50	<0.50	21.5	0.52	--	10.9	<0.50
	11/16/2005	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	15.1	<0.500	<0.500	18	<0.500	--	8.42	<0.500
	6/6/2006	<1	<1	<1	<1	<1	<1	<1	30.9	<1	<1	13.9	<1	--	6.59	<1
	12/5/2006	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	36.2	<0.50	<0.50	17.9	<0.50	--	8.27	<0.50
	9/10/2007	<5	<2.50	<2.50	<5	<2.50	<2.50	3.2	512	<2.50	<2.50	146	5.65	--	94.4	14.9
3/4/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	59.5	<0.500	<0.500	33.4	0.75	<0.500	16.7	2.82	
9/16/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	0.71	77	<0.500	<0.500	44	1.18	<0.500	23.8	3.45	
3/24/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	40	<0.50	<0.50	27	<0.50	<0.50	11	2.5	
6/15/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	31	<0.50	<0.50	20	0.57	<0.50	8.9	2.3	
9/15/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	26	<0.50	<0.50	16	<0.50		6.7	1.8	
3/15/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	28	<0.50	<0.50	21	<0.50	<0.50	8.1	1.6	
9/21/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	33	<0.5	<0.5	34	0.6	<0.5	14	1.3	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS2-2(110) (continued)	3/7/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	24	<0.50	<0.50	26	<0.50	<0.50	8.6	1
	9/12/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	15	<0.50	<0.50	22	<0.50	<0.50	8.3	<0.50
	3/8/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	31	<0.50	<0.50	23	<0.50	<0.50	9.3	2.4
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	18	<0.50	<0.50	20	<0.50	<0.50	8.3	1.4
	3/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	34	<0.50	<0.50	23	0.52	<0.50	10	2.7
	9/17/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	30	<0.50	<0.50	18	<0.50	<0.50	8.7	2.2
	3/18/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	21	<0.50	<0.50	13	<0.50	<0.50	6.2	2.5
	9/23/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	25	<0.50	<0.50	12	<0.50	<0.50	7.3	4.9
	3/19/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	18.3	<0.50	<0.50	7.9	<0.50	<0.50	4.8	4.6
	9/25/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	15.3	<0.50	<0.50	9.4	<0.50	<0.50	5.9	4.1
	3/9/2016	<0.50	<2	<0.50	<0.50	0.73	<0.50	<0.50	22.6	<0.50	<0.50	7.1	<0.50	<0.50	8	10
	9/29/2016	<0.50	<2	<0.50	<0.50	0.62	<0.50	<0.50	16.8	<0.50	<0.50	6.5	<0.50	<0.50	6.3	5.8
	3/31/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	19.5	<0.5	<0.5	6.4	<0.5	<0.5	6.6	6.4
	9/29/2017	<2.0	<2.0	<0.50	<0.50	2.8	<1.0	<0.50	63.5	<0.50	<0.50	2.2	<0.50	<0.50	5.3	25.0
	11/9/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	6.3	<0.50	<0.50	3.9	<0.50	<0.50	3.1	1.9
	7/1/2018	<0.500	<2.50	<0.500	<0.500	0.446 J	<0.500	<0.500	<0.500	6.7	<0.500	4.4	0.175 J	<0.500	3.4	3.87
	9/28/2018	<1.00	<5.00	<1.00	<1.00	0.4	<0.400	<0.400	11.3	<0.400	<0.500	5.0	<0.400	<0.500	4.3	4.63
	6/4/2019	<4.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.37	<0.400	<0.500	3.44	<0.400	<0.500	2.04	0.770
	12/4/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	5.49	<0.400	<0.500	4.29	<0.400	<0.500	2.73	2.320
6/16/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.91	<0.400	<0.500	4.19	<0.400	<0.500	2.5	1.170	
12/8/2020	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	4.63	<0.400	<0.500	3.21	<0.400	<0.500	2.52	1.560	
MGMS2-1(132)	6/28/2000	<1	<5	<0.50	<0.50	1.25	<0.50	1.77	27.6	<0.50	<0.50	27.5	2.06	--	54.3	<0.50
	8/30/2000	<1	<5	<0.50	<0.50	0.903	<0.50	<0.50	23	<0.50	<0.50	77.8	2.47	--	52.9	<0.50
	11/29/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	0.569	12.4	<0.50	<0.50	25.3	<1	--	27.8	<0.50
	2/27/2001	<1	<5	<0.50	<0.50	0.537	<0.50	0.605	11.4	<0.50	<0.50	25.2	<1	--	24.4	2.6
	5/31/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	8.86	<0.50	<0.50	25.5	<1	--	24.4	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.76	7.6	<0.50	<0.50	29	1.1	--	30	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	0.773	6.81	<0.50	<0.50	26.8	1.36	--	23.8	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	0.53	8.62	<0.50	<0.50	33.5	0.77	--	24.2	<0.50
	5/29/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	1.29	35.4	0.52	<0.50	117	2.5	--	53.6	0.62
	1/23/2003	<1	<0.50	<0.50	<1	<0.50	<0.50	0.96	57.4	<0.50	<0.50	49.9	2.35	--	46.2	3.19
	5/28/2003	<1	<0.50	<0.50	<1	<0.50	<0.50	0.53	27.2	<0.50	<0.50	29.3	0.98	--	24	1.07
	11/11/2003	<1	<1	<1	<1	<1	<1	<1	46.3	<1	<1	28.8	1.56	--	29.7	1.49

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS2-1(132) (continued)	1/27/2004	<1	<0.50	<0.50	<1	0.63	<0.50	0.56	37.6	<0.50	<0.50	28	0.96	--	22.2	1.51
	5/4/2004	<1	<1	<1	<1	<1	<1	<1	38.2	<1	<1	7.55	<1	--	5.22	<1
	11/15/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.58	62	<0.50	<0.50	38	1.1	--	26	0.85
	5/16/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	29.5	<0.50	<0.50	23.7	0.56	--	15.2	0.86
	11/16/2005	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	8.85	<0.500	<0.500	13	<0.500	--	6.06	<0.500
	6/6/2006	<1	<1	<1	<1	<1	<1	<1	23.1	<1	<1	14.8	<1	--	6.71	<1
	12/5/2006	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	27.6	<0.50	<0.50	14.9	<0.50	--	7.89	<0.50
	9/10/2007	<5	<2.50	<2.50	<5	4.55	<2.50	3	615	<2.50	<2.50	93.2	5.5	--	61	21.5
	3/4/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	37.3 J	<0.500	<0.500	22.6 J	0.59	<0.500	12.9 J	2.4
	9/16/2008	<1	<0.500	<0.500	<1	0.53	<0.500	1	101	0.56	<0.500	38.3	1.37	<0.500	26.1	6.11
	3/24/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	32	<0.50	<0.50	24	0.57	<0.50	11	1.5
	6/15/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	32	<0.50	<0.50	24	<0.50	<0.50	12	1.6
	9/15/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	26	<0.50	<0.50	18	<0.50		8	1.5
	3/15/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	28	<0.50	<0.50	23	<0.50	<0.50	9.9	1.6
	9/21/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	28	<0.5	<0.5	31	<0.5	<0.5	12	1.1
	3/7/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	30	<0.50	<0.50	41	0.56	<0.50	13	0.97
	3/8/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	26	<0.50	<0.50	24	<0.50	<0.50	9.4	1.8
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	22	<0.50	<0.50	22	<0.50	<0.50	9	2
	3/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	24	<0.50	<0.50	19	<0.50	<0.50	8.3	1.9
	9/17/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	35	<0.50	<0.50	15	<0.50	<0.50	8.1	2.7
	3/18/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	22	<0.50	<0.50	12	<0.50	<0.50	5.4	2.6
	9/23/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	32	<0.50	<0.50	9.8	<0.50	<0.50	6	5.5
	3/19/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10.5	<0.50	<0.50	9.4	<0.50	<0.50	4.4	0.75
	3/9/2016	<0.50	<0.50	<0.50	<0.50	0.860	<0.50	<0.50	36.8	<0.50	<0.50	7.9	0.69	<0.50	10.7	12.4
	9/29/2016	<0.50	<0.50	<0.50	<0.50	0.700	<0.50	<0.50	31.4	<0.50	<0.50	6.4	<0.50	<0.50	7.9	8.2
	3/31/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	15.6	<0.5	<0.5	5.2	<0.5	<0.5	4.7	4.8
	9/29/2017	<2.0	<2.0	<0.50	<0.50	2.20	<1.0	<0.50	64.9	<0.50	<0.50	2.4	0.6	<0.50	6.3	19.4
11/9/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	14.3	<0.50	<0.50	3.6	<0.50	<0.50	4.5	5.0	
7/1/2018	<0.500	<2.50	<0.500	<0.500	0.531	<0.500	<0.500	13.8	<0.500	<0.500	4.5	0.191 J	<0.500	4.9	4.6	
9/28/2018	<1.00	<5.00	<1.00	<1.00	0.520	<0.400	<0.400	17.8	<0.400	<0.500	4.8	<0.400	<0.500	5.6	6.7	
6/4/2019	<4.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	5.43	<0.400	<0.500	2.76	<0.400	<0.500	2.13	2.07	
12/4/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	7.96	<0.400	<0.500	3.66	<0.400	<0.500	3.07	3.29	
6/16/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	4.37	<0.400	<0.500	3.79	<0.400	<0.500	2.50	1.99	
12/8/2020	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	7.82	<0.400	<0.500	3.34	<0.400	<0.500	3.14	2.84	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS3-4(40)	8/30/2000	<10	<50	<5	<5	13.2	<5	5.01	858	14.1	<5	580	10.8	--	205	6.65
	11/29/2000	<20	<100	<10	<10	<10	<10	<10	820	10.6	<10	2,810	<20	--	395	<10
	2/27/2001	<50	<250	<25	<25	39.4	<25	29.2	4,570	<25	<25	2,970	<50	--	756	79.3
	5/31/2001	<50	<250	<25	<25	<25	<25	<25	2,920	38.5	<25	3,960	<50	--	716	<25
	9/24/2001	<2.5	<2.5	<2.5	<2.5	5.8	<2.5	<2.5	730	5.4	<2.5	1,400	9.2	--	230	3.5
	12/18/2001	<50	<250	<25	<25	<25	<25	<25	2,550	<25	<25	3,310	<50	--	631	31
	3/19/2002	<20	<10	<10	<20	34.6	<10	15.4	3,370	30.2	<10	3,560	23.8	--	707	57
	5/29/2002	<50	<25	<25	<50	71.5	<25	26	5,180	38.5	<25	2,470	33.5	--	728	86
	11/11/2002	<50	<25	<25	<50	<25	<25	<25	1,520	<25	<25	2,750	<25	--	309	<25
	1/23/2003	<20	<10	<10	<20	137	<10	38.4	3,530	32.6	<10	2,380	118	--	1,400	83.6
	5/28/2003	<50	<25	<25	<50	56	<25	28.5	1,720	<25	<25	3,560	<25	--	1,470	<25
	11/11/2003	<10	<10	<10	<10	<10	<10	<10	672	<10	<10	58.3	<10	--	32.4	<10
	1/27/2004	<20	<10	<10	<20	20	<10	<10	1,900	19.4	<10	1,350	10	--	246	20
	5/3/2004	<20	<20	<20	<20	50	<20	<20	1,420	<20	<20	2,700	34.2	--	913	24.8
	8/17/2004	<20	<10	<10	<20	71.6	<10	17	3,300	31	<10	1,360	29.2	--	569	45.2
	11/15/2004	<25	<25	<25	<25	<25	<25	<25	1,400	<25	<25	1,600	<25	--	290	<25
	3/24/2005	<20	<10	<10	<20	79.4	<10	30	3,440	34.2	<10	2,330	43.8	--	1,080	60.2
	03/24/2005 DUP	<20	<10	<10	<20	83.2	<10	29.2	3,450	34	<10	2,150	44	--	1,040	58.6
	5/16/2005	<10	<5	<5	<10	7	<5	<5	657	11.3	<5	1,130	8.1	--	224	<5
	11/16/2005	<10	<5	<5	<10	5.8	<5	<5	794	8.4	<5	1,180	7.6	--	210	<5
	3/14/2006	<50	<50	<50	<50	51	<50	<50	4,130	<50	<50	1,410	<50	--	484	<50
	6/6/2006	<20	<20	<20	<20	20.4	<20	<20	2,290	32.2	<20	1,410	<20	--	401	23.6
	12/5/2006	<20	<10	<10	<20	29.8	<10	<10	3,570	29	<10	1,020	<10	--	360	95.4
	5/22/2007	<20	<20	<20	<20	20.8	<20	<20	2,640	20.2	<20	952	<20	--	349	22.6
	9/10/2007	<50	<25	<25	<50	<25	<25	<25	2,340	<25	<25	499	<25	--	215	25.5
	12/12/2007	<50	<25	<25	<50	<25	<25	<25	723	<25	<25	536	<25	--	133	<25
	3/4/2008	<1	<0.500	<0.500	<1	32.4	3.08	22	2,280	25.4	3.86	1,580	27.5	<0.500	972	85.1
9/16/2008	<50	<25	<25	<50	64.5	<25	<25	2,700	<25	<25	714	<25	<25	462	47	
12/8/2008	<9	<9	<9	<9	24	<9	<9	1,800	20	<9	350	<9	<9	160	90	
3/24/2009	<7	<7	<7	<7	36	<7	7.9	1,600	12	<7	600	11	<7	280	33	
9/15/2009	<5	<5	<5	<5	15	<5	<5	1,500	13	<5	550	<5	<5	180	8.2	
09/15/2009 DUP	<5	<5	<5	<5	15	<5	<5	1,400	13	<5	540	<5	<5	170	9.8	

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Historical Groundwater Analytical Results
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Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS3-4(40) (continued)	12/14/2009	<2.5	<2.5	<2.5	<2.5	8.1	<2.5	<2.5	750	5.3	<2.5	180	<2.5	<2.5	74	19
	3/17/2010	<2.5	<2.5	<2.5	<2.5	52	<2.5	14	1,800	18	2.9	810	16	<2.5	490	41
	03/17/2010 DUP	<5	<5	<5	<5	51	<5	14	1,600	18	<5	780	16	<5	470	39
	6/14/2010	<0.90	<0.90	<0.90	<0.90	2.4	<0.90	<0.90	230	2.3	<0.90	300	2.2	<0.90	88	1.5
	9/20/2010	<7	<7	<7	<7	32	<7	8.6	1,800	16	<7	530	7.9	<7	230	31
	09/20/2010 DUP	<6	<6	<6	<6	31	<6	7.4	1,700	15	<6	510	7.4	<6	220	29
	12/7/2010	<2	<2	<2	<2	5.3	<2	<2	460	3.9	<2	330	2.2	<2	95	3.2
	3/7/2011	<2	<2	<2	<2	20	<2	4.7	1,300	10	<2	330	4	<2	140	53
	03/07/2011 DUP	<4	<4	<4	<4	19	<4	4.9	1,200	10	<4	320	<4	<4	140	46
	6/6/2011	<3	<3	<3	<3	6.5	<3	4.1	780	7	<3	370	5.4	<3	150	8.5
	9/13/2011	<5	<5	<5	<5	45	<5	13	1,800	19	<5	560	15	<5	380	29
	09/13/2011 DUP	<7	<7	<7	<7	40	<7	12	1,700	16	<7	570	12	<7	330	23
	12/6/2011	<5	<5	<5	<5	14	<5	<5	1,000	9.3	<5	140	<5	<5	64	44
	3/8/2012	<5	<5	<5	<5	33	<5	13	1,400	14	<5	930	17	<5	450	28
	03/08/2012 DUP	<6	<6	<6	<6	35	<6	14	1,400	14	<6	990	18	<6	480	30
	06/21/2012	<5	<5	<5	<5	22	<5	5.6	1,300	11	<5	220	<5	<5	140	44
	9/12/2012	<5	<5	<5	<5	23	<5	6.2	1,400	13	<5	220	<5	<5	120	85
	09/12/2012 DUP	<5	<5	<5	<5	23	<5	5.3	1,400	13	<5	230	<5	<5	120	86
	12/11/2012	<2	<2	<2	<2	7.1	<2	<2	510	6.5	<2	180	<2	<2	72	6.5
	3/12/2013	<2	<2	<2	<2	30	<2	8.4	1,400	12	<2	510	8.7	<2	260	35
	03/12/2013 DUP	<2	<2	<2	<2	29	<2	8.8	1,300	12	<2	470	8.4	<2	250	35
	6/11/2013	<2.5	<2.5	<2.5	<2.5	11	<2.5	<2.5	740	7.1	<2.5	110	<2.5	<2.5	58	34
	9/16/2013	<2	<2	<2	<2	7.7	<2	<2	360	4.6	<2	100	<2	<2	48	24
	09/16/2013 DUP	<2	<2	<2	<2	8.5	<2	<2	380	5.1	<2	100	<2	<2	49	25
	12/10/2013	<0.90	<0.90	<0.90	<0.90	4.7	<0.90	<0.90	230	2.8	<0.90	60	<0.90	<0.90	29	2
	12/10/2013 DUP	<0.90	<0.90	<0.90	<0.90	4.6	<0.90	<0.90	230	2.7	<0.90	61	<0.90	<0.90	29	1.9
3/18/2014	<0.90	<0.90	<0.90	<0.90	2.7	<0.90	0.98	280	1.8	0.91	84	<0.90	<0.90	38	<0.90	
3/18/2014 DUP	<0.90	<0.90	<0.90	<0.90	2.6	<0.90	<0.90	280	1.9	0.93	86	<0.90	<0.90	39	<0.90	
6/26/2014	<0.90	<0.90	<0.90	<0.90	12	<0.90	3.5	690	5.7	<0.90	180	1.3	<0.90	100	20	
6/26/2014 DUP	<0.90	<0.90	<0.90	<0.90	11	<0.90	2.8	490	5	<0.90	160	1.1	<0.90	930	14	
9/23/2014	<0.90	<0.90	<0.90	<0.90	10	<0.90	1.7	410	5.8	<0.90	72	<0.90	<0.90	55	74	
9/23/2014 DUP	<0.20	<0.20	<0.20	<0.20	11	<0.20	<0.20	430	5.5	<0.20	70	<0.20	<0.20	53	75	

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Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS3-4(40)	12/12/2014	<2	<2	<2	<2	7.9	<2	<2	490	4.2	<2	36	<2	<2	28	20
(continued)	3/18/2015	<1.6	<1.6	<1.6	<1.6	20	<1.6	3.2	896	7.3	<1.6	249	<1.6	<1.6	159	21.7
	3/18/2015 DUP	<0.50	<0.50	<0.50	<0.50	17	<0.50	2.4	713	5.5	<0.50	194	<0.50	<0.50	124	16.8
	6/19/2015	<0.84	<0.84	<0.84	<0.84	7.2	<0.84	<0.84	339	3.2	<0.84	34.4	<0.84	<0.84	32.8	73.3
	9/22/2015	<0.50	<0.50	<0.50	<0.50	2.8	<0.50	<0.50	164	<0.50	<0.50	2.5	<0.50	<0.50	8.6	61.9
	9/22/2015 DUP	<0.50	<0.50	<0.50	<0.50	2.5	<0.50	<0.50	151	1.2	<0.50	2.3	<0.50	<0.50	7.8	51.9
	12/7/2015	<0.50	<0.50	<0.50	<0.50	9.1	<0.50	2	370	3.1	<0.50	109	<0.50	<0.50	94.8	4
	3/9/2016	<2.5	<10	<2.5	<2.5	11.6	<2.5	<2.5	610	4	<2.5	86.7	<2.5	<2.5	89.7	22.9
	3/8/2016 DUP	<2.5	<10	<2.5	<2.5	12.4	<2.5	<2.5	643	5.4	<2.5	97.4	<2.5	<2.5	102	28
	6/17/2016	<1.2	<5	<1.2	<1.2	24.5	<1.2	6	955	9.1	<1.2	232	<1.2	<1.2	209	85.9
	9/30/2016	<0.50	<2	<0.50	<0.50	4.1	<0.50	0.54	226	1.8	<0.50	1.7	<0.50	<0.50	1.3	45.8
	9/30/2016 DUP	<0.50	<2	<0.50	<0.50	4.5	<0.50	0.6	219	2	<0.50	1.5	<0.50	<0.50	1.4	52.1
	12/16/2016	<0.50	<2	<0.50	<0.50	1	<0.50	<0.50	1.3	0.97	<0.50	0.63	<0.50	<0.50	<0.50	0.88
	3/28/2017	<0.5	<2	<0.5	<0.5	22.5	0.68	2.8	979	5.5	<0.5	1.4	<0.5	<0.5	0.6	257
	3/28/2017 DUP	<2.5	<10	<2.5	<2.5	20.7	<2.5	3.3	1,050	6	<2.5	<2.5	<2.5	<2.5	<2.5	323
	6/12/2017	<0.50	<2.0	<0.50	<0.50	3.3	<0.50	<0.50	1.7	<0.50	<0.50	0.97	<0.50	<0.50	<0.50	<0.50
	9/26/2017	<2.0	<2.0	<0.50	<0.50	1.1	<1.0	<0.50	0.7	<0.50	<0.50	0.79	<0.50	<0.50	<0.50	<0.50
	9/26/2017 DUP	<2.0	<2.0	<0.50	<0.50	1.1	<1.0	<0.50	0.8	<0.50	<0.50	0.86	<0.50	<0.50	<0.50	<0.50
	11/10/2017	<2.0	<2.0	<0.50	<0.50	4.2	<0.50	<0.50	7.6	<0.50	<0.50	0.85	<0.50	<0.50	<0.50	12.80
	11/10/2017 DUP	<2.0	<2.0	<0.50	<0.50	4.3	<0.50	<0.50	8.0	<0.50	<0.50	0.71	<0.50	<0.50	<0.50	15.80
	3/22/2018	<0.500	<2.50	<0.500	<0.500	8.6	<0.500	<0.500	9.8	0.179 J	0.63	1.45	<0.500	<0.500	0.53	39.80
	7/1/2018	<0.500	<2.50	<0.500	<0.500	1.4	<0.500	<0.500	7.6	<0.500	0.279 J	0.498 J	<0.500	<0.500	0.169 J	8.98
	7/1/2018 DUP	<0.500	<2.50	<0.500	<0.500	2.0	<0.500	<0.500	9.4	<0.500	0.318 J	0.63	<0.500	<0.500	0.163 J	17.30
	9/28/2018	<1.00	<5.00	<1.00	<1.00	6.7	<0.400	<0.400	116.0	<0.400	<0.500	0.97	<0.400	<0.500	<0.400	129.0
	9/28/2018 DUP	<1.00	<5.00	<1.00	<1.00	9.1	<0.400	0.56	143.0	<0.400	<0.500	0.69	<0.400	<0.500	<0.400	129.0
	12/10/2018	<1.00	<5.00	<1.00	<1.00	1.5	<0.400	<0.400	1.8	<0.400	<0.500	0.60	<0.400	<0.500	<0.400	5.44
	3/26/2019	<2.00	<5.00	<1.00	<1.00	8.36	<0.400	0.709	117	<0.400	<0.500	0.680	<0.400	<0.500	<0.400	151
	6/3/2019	<2	<5	<0.5	<0.5	7.22	<0.400	0.440	74.7	<0.400	0.520	0.530	<0.400	<0.500	<0.400	157
	6/3/2019 DUP	<2	<5	<0.5	<0.5	7.40	<0.400	0.420	75.6	<0.400	0.610	0.560	<0.400	<0.500	<0.400	144
	9/27/2019	<1.00	<5.00	<1.00	<1.00	5.09	<0.400	<0.400	80.5	<0.400	<0.500	0.497	<0.400	<0.500	<0.400	106
	9/27/2019 DUP	<1.00	<5.00	<1.00	<1.00	5.09	<0.400	0.413	80.4	<0.400	<0.500	0.578	<0.400	<0.500	<0.400	104
	12/4/2019	<1.00	<5.00	<1.00	<1.00	1.63	<0.400	<0.400	2.57	<0.400	<0.500	1.350	<0.400	<0.500	0.45	4.5
	12/4/2019 DUP	<1.00	<5.00	<1.00	<1.00	1.67	<0.400	<0.400	2.66	<0.400	<0.500	1.130	<0.400	<0.500	<0.400	5.79
	3/12/2020	<1.00	<5.00	<1.00	<1.00	12.80	<0.400	2.430	418	0.64	<0.500	0.529	<0.400	<0.500	0.44	330
	6/16/2020	<1.00	<5.00	<1.00	<1.00	3.54	<0.400	<0.400	135	<0.400	0.670	0.660	<0.400	<0.500	<0.400	129
	6/16/2020 DUP	<1.00	<5.00	<1.00	<1.00	3.71	<0.400	<0.400	138	<0.400	0.700	0.600	<0.400	<0.500	<0.400	134

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS3-3(60)	8/30/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	7.7	<0.50	<0.50	7.03	<1	--	3.31	<0.50
	11/29/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	3.11	<0.50	<0.50	2.8	<1	--	1.28	<0.50
	2/27/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	21.5	<0.50	<0.50	14.9	<1	--	7.32	<0.50
	5/31/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	10.1	<0.50	<0.50	9.84	<1	--	4.76	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	7.1	<0.50	<0.50	9.7	<0.50	--	3.7	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	3.26	<0.50	<0.50	17	<1	--	3.84	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	0.68	<0.50	<0.50	17.6	<0.50	<0.50	32.3	0.5	--	14	<0.50
	5/29/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	40.5	<0.50	<0.50	20.8	<0.50	--	7.92	<0.50
	1/23/2003	<1	<0.50	<0.50	<1	0.5	<0.50	<0.50	33.9	<0.50	<0.50	20.3	<0.50	--	12.7	<0.50
	5/28/2003	<1	<0.50	<0.50	<1	0.58	<0.50	<0.50	88.3	0.53	<0.50	16.9	<0.50	--	11.9	0.7
	11/11/2003	<2	<2	<2	<2	<2	<2	<2	298	<2	<2	36.1	<2	--	23	<2
	1/27/2004	<2	<1	<1	<2	1.2	<1	<1	274	1.24	<1	25.2	<1	--	23.4	1.28
	5/3/2004	<2	<2	<2	<2	<2	<2	<2	274	<2	<2	46.6	<2	--	27	<2
	11/15/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	43	<0.50	<0.50	8.8	<0.50	--	3.4	<0.50
	2/1/2005	<2	<1	<1	<2	<1	<1	<1	179	1.72	<1	15.6	<1	--	7.9	<1
	5/16/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	33.8	<0.50	<0.50	5.7	<0.50	--	2.39	<0.50
	8/18/2005	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	47.9	<0.500	<0.500	4.39	<0.500	--	1.96	0.66
	11/16/2005	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	8.39	<0.500	<0.500	2.59	<0.500	--	0.83	<0.500
	2/21/2006	<5	<2.50	<2.50	<5	2.65	<2.50	<2.50	558	<2.50	<2.50	25	<2.50	--	14.4	21.6
	3/14/2006	<1	<1	<1	<1	2.92	<1	1.37	97.1	<1	<1	50.6	<1	--	39.2	<1
	6/6/2006	<1	<1	<1	<1	<1	<1	<1	7.97	<1	<1	2.84	<1	--	1.04	<1
	9/5/2006	<1	<0.50	<0.50	<1	2.75	<0.50	1.17	108	0.78	<0.50	47.3	0.93	--	34.2	0.65
	12/5/2006	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	19.8	<0.50	<0.50	10.5	<0.50	--	5.57	<0.50
	2/7/2007	<1	<0.50	<0.50	<1	1.08	<0.50	<0.50	44.3	<0.50	<0.50	21.5	<0.50	--	15.4	<0.50
	5/22/2007	<1	<1	<1	<1	<1	<1	<1	32.5	<1	<1	45.2	<1	--	18.2	<1
	9/10/2007	<2	<1	<1	<2	2.98	<1	<1	148	<1	<1	28.8	<1	--	31.6	1.67
	12/12/2007	<2	<1	<1	<2	<1	<1	<1	11.5	<1	<1	4.22	<1	--	1.9	1.18
	3/4/2008	<1	<0.500	<0.500	<1	1.58	<0.500	0.68	72.1	0.6	<0.500	27.2	0.5	<0.500	22.7	2.33
	12/8/2008	<0.50	<0.50	<0.50	<0.50	0.73	<0.50	<0.50	44	<0.50	<0.50	12	<0.50	<0.50	9.2	1.3
	3/24/2009	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	42	<0.50	<0.50	21	<0.50	<0.50	14	0.91
	9/15/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	15	<0.50	<0.50	8.5	<0.50	<0.50	4.3	0.84
	12/14/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.8	<0.50	<0.50	2	<0.50	<0.50	0.85	<0.50

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS3-3(60) (continued)	3/17/2010	<0.50	<0.50	<0.50	<0.50	0.69	<0.50	<0.50	25	<0.50	<0.50	17	<0.50	<0.50	10	0.57
	6/14/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.8	<0.50	<0.50	2.4	<0.50	<0.50	1.1	0.69
	9/20/2010	<0.5	<0.5	<0.5	<0.5	0.81	<0.5	<0.5	28	<0.5	<0.5	18	<0.5	<0.5	11	0.52
	12/7/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	9	<0.5	<0.5	3.4	<0.5	<0.5	1.5	0.94
	3/7/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	17	<0.50	<0.50	10	<0.50	<0.50	4.6	0.67
	6/6/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.9	<0.5	<0.5	2	<0.5	<0.5	0.73	<0.5
	9/13/2011	<0.50	<0.50	<0.50	<0.50	0.94	<0.50	<0.50	34	<0.50	<0.50	17	<0.50	<0.50	12	<0.50
	12/5/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	14	<0.50	<0.50	14	<0.50	<0.50	7.3	<0.50
	3/8/2012	<0.50	<0.50	<0.50	<0.50	0.58	<0.50	<0.50	21	<0.50	<0.50	15	<0.50	<0.50	9	<0.50
	6/21/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.9	<0.5	<0.5	3	<0.5	<0.5	1.2	<0.5
	9/12/2012	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	39	<0.50	<0.50	18	<0.50	<0.50	12	<0.50
	12/11/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.1	<0.50	<0.50	2.3	<0.50	<0.50	0.9	<0.50
	3/12/2013	<0.50	<0.50	<0.50	<0.50	0.74	<0.50	<0.50	22	<0.50	<0.50	16	<0.50	<0.50	9	<0.50
	6/11/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	16	<0.50	<0.50	11	<0.50	<0.50	5.4	<0.50
	9/16/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	11	<0.50	<0.50	6.8	<0.50	<0.50	3.3	<0.50
	12/10/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.1	<0.50	<0.50	3.6	<0.50	<0.50	1.5	<0.50
	3/18/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4	<0.50	<0.50	2.5	<0.50	<0.50	0.89	<0.50
	6/26/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.5	<0.50	<0.50	3.4	<0.50	<0.50	1.4	<0.50
	9/23/2014	<0.50	<0.50	<0.50	<0.50	0.71	<0.50	<0.50	2	<0.50	<0.50	8.8	<0.50	<0.50	4.7	<0.50
	12/12/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.9	<0.50	<0.50	2.2	<0.50	<0.50	0.72	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	12.2	<0.50	<0.50	6	<0.50	<0.50	3.7	<0.50
	6/19/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6	<0.50	<0.50	3.5	<0.50	<0.50	1.6	<0.50
	9/22/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	7.7	<0.50	<0.50	3.9	<0.50	<0.50	2	0.6
	12/7/2015	<0.50	<0.50	<0.50	<0.50	0.75	<0.50	<0.50	13.9	<0.50	<0.50	4.2	<0.50	<0.50	2.5	16.7
	3/9/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	2.8	<0.50	<0.50	0.78	<0.50
	6/17/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	17.4	<0.50	<0.50	5.8	<0.50	<0.50	5	<0.50
	9/30/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	7.7	<0.50	<0.50	3.7	<0.50	<0.50	1.9	<0.50
	12/16/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	1.7	<0.50	<0.50	0.68	<0.50
	3/28/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	0.62	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5
	6/12/2017	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	2.3	<0.50	<0.50	1.3	<0.50	<0.50	0.64	<0.50
9/26/2017	<2.0	<2.0	<0.50	<0.50	1.20	<1.0	<0.50	34.2	<0.50	<0.50	8.6	<0.50	<0.50	7.80	<0.50	
11/10/2017	<2.0	<2.0	<0.50	<0.50	1.70	<0.50	<0.50	37.6	<0.50	<0.50	0.8	<0.50	<0.50	1.50	13.90	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS3-3(60) (continued)	3/22/2018	<0.500	<2.50	<0.500	<0.500	0.76	<0.500	<0.500	15.6	<0.500	<0.500	2.2	<0.500	<0.500	1.76	5.89
	7/2/2018	<0.500	<2.50 J3	<0.500	<0.500	0.67	<0.500	<0.500	12.7	<0.500	<0.500	2.7	<0.500	<0.500	1.92	3.36
	9/28/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	9.3	<0.400	<0.500	3.3	<0.400	<0.500	2.31	<0.400
	12/10/2018	<1.00	<5.00	<1.00	<1.00	1.21	<0.400	<0.400	17.7	<0.400	<0.500	0.9	<0.400	<0.500	1.16	0.86
	3/26/2019	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.23	<0.400	<0.500	1.04	<0.400	<0.500	0.420	<0.400
	6/3/2019	<4.00	<5.00	<1.00	<1.00	0.420	<0.400	<0.400	8.52	<0.400	<0.500	0.790	<0.400	<0.500	0.730	<0.400
	9/27/2019	<1.00	<5.00	<1.00	<1.00	1.130	<0.4	<0.4	21.8	<0.400	<0.500	1.030	<0.400	<0.500	1.230	3.980
	12/4/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	3.62	<0.400	<0.500	1.170	<0.400	<0.500	0.634	<0.400
	3/12/2020	<1.00	<5.00	<1.00	<1.00	0.761	<0.400	<0.400	14.7	<0.400	<0.500	1.660	<0.400	<0.500	1.720	0.659
	6/16/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	3.92	<0.400	<0.500	1.170	<0.400	<0.500	0.510	<0.400
	10/6/2020															
MGMS3-2(101)	8/30/2000	<10	<50	<5	<5	7.28	<5	<5	120	<5	<5	154	12.1	--	98.2	<5
	11/29/2000	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	11.4	<2.5	<2.5	11.5	<5	--	13	<2.5
	2/27/2001	<2	<10	<1	<1	<1	<1	<1	2.4	<1	<1	3.36	<2	--	1.98	<1
	5/31/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	4.24	<0.50	<0.50	3.07	<1	--	1.85	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.6	<0.50	<0.50	5.3	<0.50	--	2.4	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	0.864	<0.50	0.913	10.3	<0.50	<0.50	50.9	2.98	--	23.9	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	4.02	<0.50	<0.50	6.88	<0.50	--	2.54	<0.50
	5/29/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	8.19	<0.50	<0.50	11.5	<0.50	--	3.9	<0.50
	1/23/2003	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	21.2	<0.50	<0.50	17.2	<0.50	--	8.38	<0.50
	5/28/2003	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	28.6	<0.50	<0.50	18.4	<0.50	--	8.76	<0.50
	11/11/2003	<1	<1	<1	<1	<1	<1	<1	53.7	<1	<1	18.3	<1	--	9.3	<1
	1/27/2004	<1	<0.50	<0.50	<1	0.53	<0.50	<0.50	114	0.8	<0.50	24	<0.50	--	15.1	<0.50
	5/3/2004	<1	<1	<1	<1	<1	<1	<1	22.1	<1	<1	6.74	<1	--	4.21	<1
	11/15/2004	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	47	<0.50	<0.50	6.3	<0.50	--	2.9	<0.50
	5/16/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	66.5	<0.50	<0.50	3.59	<0.50	--	1.48	0.77
	11/16/2005	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	25.3	<0.500	<0.500	4.93	<0.500	--	1.66	0.66
	3/14/2006	<1	<1	<1	<1	<1	<1	<1	23.1	<1	<1	2.91	<1	--	1.14	1.06
	6/6/2006	<1	<1	<1	<1	<1	<1	<1	15.9	<1	<1	3.56	<1	--	1.88	1.06
	12/5/2006	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	32.6	<0.50	<0.50	2.84	<0.50	--	1.17	2.85
	9/10/2007	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	40.4	<0.50	<0.50	6.32	<0.50	--	3.7	13.2
3/4/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	18.1	<0.500	<0.500	3.4	<0.500	<0.500	1.47	5.64	
9/16/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	20.4	<0.500	<0.500	6.34	<0.500	<0.500	3.5	4.24	
3/24/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	15	<0.50	<0.50	3	<0.50	<0.50	1.5	2.3	
6/15/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.8	<0.50	<0.50	2.4	<0.50	<0.50	1.2	2.2	
9/15/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	14	<0.50	<0.50	3.8	<0.50	<0.50	2.1	3.2	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS3-2(101) (continued)	3/17/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	7	<0.50	<0.50	3.1	<0.50	<0.50	1.8	1.2
	9/20/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.5	<0.5	<0.5	3	<0.5	<0.5	1.4	1.2
	3/7/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.8	<0.50	<0.50	3.7	<0.50	<0.50	2.2	0.86
	3/8/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.9	<0.50	<0.50	5.9	<0.50	<0.50	4.5	<0.50
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.1	<0.50	<0.50	2.7	<0.50	<0.50	1.3	<0.50
	3/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.9	<0.50	<0.50	5.6	<0.50	<0.50	4.4	0.59
	9/16/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.9	<0.50	<0.50	3.6	<0.50	<0.50	2.1	<0.50
	3/18/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.8	<0.50	<0.50	9.1	<0.50	<0.50	6.5	<0.50
	9/23/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.7	<0.50	<0.50	3	<0.50	<0.50	1.5	<0.50
	3/18/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.1	<0.50	<0.50	4.4	<0.50	<0.50	2.8	<0.50
	9/22/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.3	<0.50	<0.50	3.8	<0.50	<0.50	2.6	1.2
	3/9/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	7.3	<0.50	<0.50	7.5	<0.50	<0.50	6.1	<0.50
	9/30/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	6.5	<0.50	<0.50	4.4	<0.50	<0.50	3	<0.50
	3/28/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	7	<0.5	<0.5	7	<0.5	<0.5	6	<0.5
	9/26/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	5	<0.50	<0.50	0.96	<0.50	<0.50	1	0.9
	11/10/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	2	<0.50	<0.50	2.50	<0.50	<0.50	2	<0.50
	7/1/2018	<0.500	<2.50	<0.500	<0.500	<0.500	<0.500	<0.500	2	<0.500	<0.500	1.82	<0.500	<0.500	1	0.359 J
	9/28/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2	<0.400	<0.500	1.98	<0.400	<0.500	1	<0.400
	6/3/2019	<4.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.930	<0.400	<0.500	1.89	<0.400	<0.500	1.11	<0.400
12/4/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.852	<0.400	<0.500	1.84	<0.400	<0.500	0.958	<0.400	
6/16/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.000	<0.400	<0.500	3.01	<0.400	<0.500	1.33	<0.400	
MGMS3-1(132)	8/30/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	0.53	<0.50	<0.50	5.58	<1	--	0.746	<0.50
	11/29/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	2.04	<0.50	<0.50	0.754	<1	--	<0.50	<0.50
	2/27/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	1.08	<0.50	<0.50	2.62	<1	--	0.722	<0.50
	5/31/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	6.67	<0.50	<0.50	3.13	<1	--	1.44	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.8	<0.50	<0.50	6.1	<0.50	--	1.9	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	4.11	<0.50	<0.50	8.75	<1	--	2.24	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	4.88	<0.50	<0.50	9.63	<0.50	--	3.02	<0.50
	5/29/2002	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	11.8	<0.50	<0.50	14.6	<0.50	--	4.28	<0.50
	1/23/2003	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	16.8	<0.50	<0.50	11.4	<0.50	--	6.04	<0.50
	5/28/2003	<1	<0.50	<0.50	<1	0.59	<0.50	<0.50	93.3	0.76	<0.50	16.3	<0.50	--	10.1	0.83
	11/11/2003	<1	<1	<1	<1	<1	<1	<1	72.4	<1	<1	12.2	<1	--	8	<1

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS3-1(132) (continued)	1/27/2004	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	34.9	0.61	<0.50	12.7	<0.50	--	9.47	<0.50
	5/3/2004	<1	<1	<1	<1	<1	<1	<1	11.9	<1	<1	<1	<1	--	14.2	<1
	11/15/2004	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	200	<2.5	<2.5	6.2	<2.5	--	3.4	<2.5
	5/16/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	42.6	0.79	<0.50	4.42	<0.50	--	2.23	<0.50
	11/16/2005	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	19.9	<0.500	<0.500	2.41	<0.500	--	0.8	<0.500
	3/14/2006	<1	<1	<1	<1	<1	<1	<1	20.3	<1	<1	2.13	<1	--	<1	<1
	6/6/2006	<1	<1	<1	<1	<1	<1	<1	18.6	<1	<1	1.57	<1	--	<1	1.36
	12/5/2006	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	24.1	<0.50	<0.50	3.05	<0.50	--	1.08	4.68
	9/10/2007	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	36.5	<0.50	<0.50	4.69	<0.50	--	3.17	16.8
	3/4/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	21.8	<0.500	<0.500	3.37	<0.500	<0.500	1.64	6.83
	9/16/2008	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	26	<0.500	<0.500	4.86	<0.500	<0.500	3.52	4.96
	3/24/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.3	<0.50	<0.50	1.8	<0.50	<0.50	0.79	2.4
	03/24/2009 DUP	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.8	<0.50	<0.50	1.6	<0.50	<0.50	0.78	2.3
	6/15/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	12	<0.50	<0.50	4.3	<0.50	<0.50	1.9	1.6
	9/15/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	7.7	<0.50	<0.50	2.1	<0.50	<0.50	1.2	2
	3/17/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	7.2	<0.50	<0.50	2.6	<0.50	<0.50	1.9	0.92
	9/20/2010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6.5	<0.5	<0.5	2.9	<0.5	<0.5	2.3	1.3
	3/7/2011	<0.50	<0.50	<0.50	<0.50	0.64	<0.50	<0.50	18	<0.50	<0.50	4	<0.50	<0.50	3.8	4.3
	9/13/2011	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.6	<0.50	<0.50	3.8	<0.50	<0.50	3.4	0.55
	3/8/2012	<0.50	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	9.3	<0.50	<0.50	7	<0.50	<0.50	6.9	0.67
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6	<0.50	<0.50	4.9	<0.50	<0.50	4	<0.50
	3/12/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	9.4	<0.50	<0.50	8.1	<0.50	<0.50	7.2	0.98
	9/16/2013	<0.50	<0.50	<0.50	<0.50	0.58	<0.50	<0.50	9.8	<0.50	<0.50	7.9	<0.50	<0.50	8.1	0.84
3/18/2014	<0.50	<0.50	<0.50	<0.50	0.62	<0.50	0.51	11	<0.50	<0.50	13	<0.50	<0.50	11	0.76	
9/23/2014	<0.50	<0.50	<0.50	<0.50	0.54	<0.50	<0.50	8.9	<0.50	<0.50	9	<0.50	<0.50	7.9	<0.50	
3/18/2015	<0.50	<0.50	<0.50	<0.50	0.53	<0.50	<0.50	9.3	<0.50	<0.50	6.3	<0.50	<0.50	6	0.56	
9/22/2015	<0.50	<0.50	<0.50	<0.50	0.74	<0.50	<0.50	13.3	<0.50	<0.50	8.1	<0.50	<0.50	8.2	1.2	
3/9/2016	<0.50	<2	<0.50	<0.50	1	<0.50	0.56	14.4	<0.50	<0.50	13.5	0.56	<0.50	12.7	0.8	
9/30/2016	<0.50	<2	<0.50	<0.50	0.84	<0.50	0.54	12.9	<0.50	<0.50	13.8	<0.50	<0.50	11.9	<0.50	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
MGMS3-1(132) (continued)	3/28/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	7.9	<0.5	<0.5	13.8	<0.5	<0.5	9.6	<0.5
	9/26/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	3.4	<0.50	<0.50	3.0	<0.50	<0.50	2.8	<0.50
	11/10/2017	<2.0	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	3.3	<0.50	<0.50	5.1	<0.50	<0.50	3.8	<0.50
	7/1/2018	<0.500	<2.50	<0.500	<0.500	0.247 J	<0.500	<0.500	4.0	<0.500	<0.500	5.6	<0.500	<0.500	4.1	0.359 J
	9/28/2018	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	3.5	<0.400	<0.500	3.8	<0.400	<0.500	3.2	<0.400
	6/5/2019	<4.00	<5.00	<1.00	<1.00	0.412	<0.400	<0.400	5.97	<0.400	<0.500	9.45	<0.400	<0.500	6.79	<0.400
	12/4/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	5.34	<0.400	<0.500	8.69	<0.400	<0.500	6.21	<0.400
	6/16/2020	<1.00	<5.00	<1.00	<1.00	0.43	<0.400	<0.400	4.61	<0.400	<0.500	9.87	<0.400	<0.500	6.01	<0.400
CMT1-1	11/11/2003	<1	<1	2.87	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	<1	<1
	1/26/2004	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	5/3/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	<1	<1
	8/19/2004	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	11/17/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	--	<5	<5
	3/23/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	5/17/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	11/17/2005	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	--	<0.500	<0.500
5/26/2006	Well Abandoned															
CMT1-2	11/11/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	<1	<1
	1/26/2004	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.75	<0.50	--	1.03	<0.50
	5/3/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	<1	<1
	8/19/2004	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	11/17/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.7	<0.50	--	0.88	<0.50
	2/1/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.37	<0.50	--	0.99	<0.50
	5/16/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.77	<0.50	--	0.69	<0.50
	11/17/2005	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.6	<0.500	--	<0.500	<0.500
5/26/2006	Well Abandoned															
CMT1-3	11/11/2003	<2	<2	3.56	<2	<2	<2	<2	<2	<2	<2	<2	<2	--	<2	<2
	1/26/2004	<1	<0.50	1.1	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	5/3/2004	<1	<1	2.97	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	<1	<1
	8/19/2004	<1	<0.50	2.16	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	11/17/2004	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	--	<25	<25
	5/16/2005	<1	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.6	<0.50	--	<0.50	<0.50
	11/17/2005	<1	<0.500	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	--	<0.500	<0.500
	5/26/2006	Well Abandoned														

Please refer to notes at end of table.

Appendix B
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NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo- form	Chloro- ethane	Chloro- form	Dibromo- chloro- methane	1,1- Dichloro- ethane	1,2- Dichloro- ethane	1,1- Dichloro- ethene	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	1,2- Dichloro- propane	Tetra- chloro- ethene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- ethene	Vinyl Chloride
EX	3/23/2009	<5	<5	<5	<5	<5	<5	<5	50	<5	<5	1,400	43	<5	420	<5
	6/18/2009	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.2	<0.50	<0.50	24	1.1	<0.50	11	<0.50
	9/18/2009	<0.50	<0.50	<0.50	<0.50	4.1	<0.50	3.3	120	0.76	<0.50	2,100	38	<0.50	380	1.1
	12/18/2009	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	5.6	<2.5	<2.5	700	3.7	<2.5	56	<2.5
	3/16/2010	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	20	<0.50	<0.50	150	3.2	<0.50	33	<0.50
	6/17/2010	<0.50	<0.50	<0.50	<0.50	0.97	<0.50	<0.50	92	<0.50	<0.50	150	2.3	<0.50	39	2.2
	9/23/2010	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	1.6	90	0.53	<0.5	2,400	20	<0.5	220	1.8
	12/21/2010	<0.5	<0.5	<0.5	<0.5	0.83	<0.5	0.59	30	<0.50	<0.5	900	6.7	<0.5	99	0.71
	3/31/2011	<4	<4	<4	<4	8.2	<4	8.1	240	<4	<4	6,800	110	<4	910	5.1
	6/7/2011	<4	<4	<4	<4	<4	<4	<4	140	<4	<4	1,400	15	<4	170	<4
	9/19/2011	<5	<5	<5	<5	7.9	<5	11	290	<5	<5	4,100	73	<5	460	14
	12/7/2011	<5	<5	<5	<5	16	<5	19	12,000	9.3	<5	<50	17	<5	<50	140
	3/9/2012	<4	<4	<4	<4	5	<4	<4	1,400	8.6	<4	33	<4	<4	10	290
	6/22/2012	<0.5	5.5	<0.5	<0.5	3.4	<0.5	0.68	170	1.3	<0.5	3	0.59	<0.5	1.1	120
	9/14/2012	<1.5	2.7	<1.5	<1.5	1.5	<1.5	<1.5	320	<1.5	<1.5	3	<1.5	<1.5	<1.5	42
	12/14/2012	<0.50	1.4	<0.50	<0.50	<0.50	<0.50	<0.50	26	<0.50	<0.50	0.87	<0.50	<0.50	<0.50	12
	3/15/2013	<0.50	2.8	<0.50	<0.50	<0.50	<0.50	<0.50	9.5	<0.50	<0.50	1.2	<0.50	<0.50	<0.50	4.4
	6/14/2013	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	0.79	<0.50	<0.50	<0.50	<0.50
	9/20/2013	<0.50	1.9	<0.50	<0.50	1.9	<0.50	0.54	71	0.68	<0.50	4.1	<0.50	<0.50	2.6	30
	12/16/2013	<0.50	1.4	<0.50	<0.50	3.8	<0.50	<0.50	34	<0.50	<0.50	2	<0.50	<0.50	1.4	28
	3/24/2014	<0.50	<0.50	<0.50	<0.50	0.8	<0.50	<0.50	30	<0.50	<0.50	20	<0.50	<0.50	7.5	11
	6/23/2014	<0.50	<0.50	<0.50	<0.50	2.9	<0.50	1.1	160	0.97	<0.50	29	<0.50	<0.50	15	38
	9/30/2014	Insufficient water for sampling .														
	12/15/2014	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10	<0.50	<0.50	22	<0.50	<0.50	2.7	<0.50
	3/19/2015	<0.50	<0.50	<0.50	<0.50	3.5	<0.50	2.1	688	1.9	<0.50	168	2.5	<0.50	55.8	2.8
	6/18/2015	<0.50	<0.50	<0.50	<0.50	2.6	<0.50	2.6	420	1.6	<0.50	186	0.88	<0.50	42	3.2
	9/22/2015	<0.50	<0.50	<0.50	<0.50	2.9	<0.50	3.7	543	2.6	<0.50	302	0.65	<0.50	61.9	24.4
	12/8/2015	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	427	<0.50	<0.50	94	<0.50	<0.50	21.3	2.1
	3/8/2016	<1.2	<5	<1.2	<1.2	4	<1.2	2.9	1,160	3.6	<1.2	274	5	<1.2	71.1	13.3
	6/17/2016	<5	<20	<5	<5	<5	<5	<5	1,040	<5	<5	592	<5	<5	90.8	<5
	9/28/2016	<1.7	<6.7	<1.7	<1.7	4.6	<1.7	3.5	2,230	3.8	<1.7	39.4	2.5	<1.7	549	128
	12/12/2016	<0.50	3.7	<0.50	<0.50	<0.50	<0.50	<0.50	8.1	<0.50	<0.50	4.3	<0.50	<0.50	0.96	51.9

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
EX (continued)	3/28/2017	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	5.2	<0.5	<0.5	6.1	<0.5	<0.5	1.9	<0.5
	6/14/2017	<2.0	10.2	<0.50	<0.50	10.7	<1.0	<0.50	11.7	0.56	<0.50	9.5	<0.50	<0.50	3.0	1.3
	9/26/2017	<2.0	3.4	<0.50	<0.50	8.8	<1.0	<0.50	6.9	<0.50	<0.50	0.8	<0.50	<0.50	0.6	10.1
	3/21/2018	<0.500	1.45 J	<0.500	<0.500	1.3	<0.500	<0.500	22.6	<0.500	<0.500	1.5	<0.500	<0.500	2.7	10.8
	6/28/2018	<0.500	42.9	<0.500	<0.500	4.6	<0.500	1.11	722.0	8.72	<0.500	1.9	<0.500	<0.500	0.8	424.0
	9/24/2018	<1.00	<5.00	<1.00	<1.00	1.4	<0.400	<0.400	3.4	0.75	<0.500	3.1	<0.400	<0.500	2.4	7.6
	12/4/2018	<1.00	<5.00	<1.00	<1.00	0.9	<0.400	<0.400	8.2	<0.400	<0.500	6.4	<0.400	<0.500	3.6	1.9
	MP-1	3/23/2009	<4	<4	<4	<4	6	<4	<4	89	<4	<4	1,200	10	<4	180
6/18/2009		<4	<4	<4	<4	4.3	<4	<4	43	<4	<4	1,500	12	<4	180	<4
9/18/2009		<4	<4	<4	<4	14	<4	<4	240	8.9	<4	1,100	8.2	<4	310	7.3
12/18/2009		<4	<4	<4	<4	<4	<4	<4	58	<4	<4	1,000	7.1	<4	180	<4
3/16/2010		<3	<3	<3	<3	22	<3	4.7	410	13	<3	1,500	8.6	<3	400	10
6/17/2010		<3	<3	<3	<3	3.2	<3	<3	120	<3	<3	800	5.4	<3	140	<3
9/23/2010		<3	<3	<3	<3	<3	<3	<3	41	<3	<3	730	4	<3	120	<3
12/10/2010		<3	<3	<3	<3	<3	<3	<3	27	<3	<3	1,000	4.5	<3	150	<3
3/14/2011		<3	<3	<3	<3	7.1	<3	<3	150	<3	<3	1,200	6.4	<3	180	5.9
6/7/2011		<2.5	<2.5	<2.5	<2.5	4.9	<2.5	<2.5	75	<2.5	<2.5	640	3.3	<2.5	130	<2.5
9/19/2011		<1.5	<1.5	<1.5	<1.5	2.4	<1.5	<1.5	41	<1.5	<1.5	300	1.9	<1.5	72	1.6
12/7/2011		<2.5	<2.5	<2.5	<2.5	2.6	<2.5	<2.5	49	3.1	<2.5	640	3.1	<2.5	120	<2.5
3/9/2012		<1.5	<1.5	<1.5	<1.5	9.4	<1.5	2.8	440	6.3	<1.5	490	3.5	<1.5	140	21
6/22/2012		<2.5	<2.5	<2.5	<2.5	5.6	<2.5	2.8	530	2.9	<2.5	690	12	<2.5	120	48
9/14/2012		<1.5	<1.5	<1.5	<1.5	4	<1.5	<1.5	170	2.2	<1.5	340	2	<1.5	83	4.5
12/14/2012		<0.90	<0.90	<0.90	<0.90	2	<0.90	<0.90	170	1.7	<0.90	230	1	<0.90	48	1.8
3/15/2013		<0.90	<0.90	<0.90	<0.90	5.1	<0.90	0.94	140	2.5	<0.90	230	1	<0.90	69	1.8
6/14/2013		<0.90	<0.90	<0.90	<0.90	4.5	<0.90	1.4	190	1.6	<0.90	330	1.4	<0.90	70	1.8
9/20/2013		<0.90	<0.90	<0.90	<0.90	2.9	<0.90	<0.90	77	1.5	<0.90	260	0.95	<0.90	66	<0.90
12/16/2013		<0.90	<0.90	<0.90	<0.90	1.7	<0.90	1.1	67	0.92	<0.90	290	1.2	<0.90	70	<0.90
3/24/2014	<1.5	<1.5	<1.5	<1.5	2.2	<1.5	<1.5	240	<1.5	<1.5	360	1.8	<1.5	54	<1.5	
6/23/2014	<1.5	<1.5	<1.5	<1.5	4.9	<1.5	2.3	290	1.7	<1.5	1,200	9.5	<1.5	130	5	
9/30/2014	<2	<2	<2	<2	2.8	<2	<2	110	<2	<2	360	<2	<2	63	16	
12/15/2014	<1.5	<1.5	<1.5	<1.5	1.7	<1.5	<1.5	58	<1.5	<1.5	320	<1.5	<1.5	59	<1.5	

Please refer to notes at end of table.

Appendix B
Historical Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)														
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MP-1 (continued)	3/20/2015	<1	<1	<1	<1	3.6	<1	1.5	188	1.5	<1	565	1	<1	95.6	24.8
	6/18/2015	<0.84	<0.84	<0.84	<0.84	2.9	<0.84	1.5	91	0.87	<0.84	376	<0.84	<0.84	80.8	<0.84
	9/22/2015	<1.2	<1.2	<1.2	<1.2	1.8	<1.2	1.4	38.3	<1.2	<1.2	343	<1.2	<1.2	68.3	<1.2
	12/8/2015	<1.2	<1.2	<1.2	<1.2	1.8	<1.2	1.5	50.9	<1.2	<1.2	308	<1.2	<1.2	62.6	<1.2
	3/8/2016	<0.84	<3.3	<0.84	<0.84	7.5	<0.84	2.1	148	1.2	<0.84	433	<0.84	<0.84	100	<0.84
	6/17/2016	<0.50	<2	<0.50	<0.50	5	<0.50	1.5	125	0.97	<0.50	206	<0.50	<0.50	67.3	<0.50
	9/28/2016	<0.50	<2	<0.50	<0.50	1.3	<0.50	3.1	40.5	<0.50	<0.50	99.4	<0.50	<0.50	35.5	3.3
	12/13/2016	<0.50	<2	<0.50	<0.50	0.64	<0.50	0.92	209	0.55	<0.50	2.9	<0.50	<0.50	1	4.3
	3/30/2017	<0.5	71.4	<0.5	<0.5	7.5	<0.5	<0.5	177	6	<0.5	<0.5	<0.5	<0.5	0.79	186
	6/14/2017	<2.0	4.0	<0.50	<0.50	2.3	<1.0	<0.50	143	1.9	<0.50	16.2	<0.50	<0.50	8.5	29.4
	9/26/2017	<2.0	<2.0	<0.50	<0.50	3.4	<1.0	4.50	83	0.8	<0.50	307.0	<0.50	<0.50	65.9	2.3
	11/9/2017	<2.0	<2.0	<0.50	<0.50	3.3	<0.50	4.30	105	0.9	<0.50	198.0	<0.50	<0.50	74.0	2.6
	3/21/2018	<0.500	<2.50	<0.500	<0.500	3.2	<0.500	4.04	151	1.0	<0.500	245.0	<0.500	<0.500	64.5	1.6
	6/28/2018	<0.500	<2.50	<0.500	<0.500	10.2	<0.500	9.34	353	1.7	<0.500	747.0	0.56	<0.500	140.0	5.3
	9/26/2018	<20.0	<100	<20.0	<20.0	<8.00	<8.00	<8.00	60	<8.00	<10.0	322.0	<8.00	<10.0	57.0	<8.00
	12/4/2018	<1.00	<5.00	<1.00	<1.00	<0.400	2.79	6.59	130	0.8	<0.500	355.0	<0.400	<0.500	76.7	1.2
	3/20/2019	<2.00	<5.00	<1.00	<1.00	1.43	<0.400	3.08	69.0	<0.400	<0.500	146	<0.400	<0.500	36.6	1.55
	6/7/2019	<10	<100	<10	<10	<8.00	<8.00	<8.00	205	<8.00	<10.0	769	<8.00	<10.0	111	<8.00
	9/26/2019	<2.00	<5.00	<2.00	<2.00	1.36	<0.800	1.14	37.1	<0.800	<1.00	176	<0.800	<1.00	26.8	<0.800
	12/3/2019	<2.00	<10.0	<2.00	<2.00	1.57	<0.800	1.8	40.6	<0.800	<1.00	306	<0.800	<1.00	57.8	<0.800
3/11/2020	<2.00	<10.0	<2.00	<2.00	3.94	<0.800	5.63	177	1.14	<1.00	1370	1.77	<1.00	190	<0.800	
6/17/2020	<10.0	<50.0	<10.0	<10.0	<4.00	<4.00	<4.00	72	<4.00	<5.00	427	<4.00	<5.00	61.2	<4.00	
10/8/2020	<5.00	<25.0	<5.00	<5.00	<2.00	<2.00	<2.00	36.7	<2.00	<2.50	510	<2.00	<2.50	52.3	<2.00	
12/9/2020					1.15	<0.800	<0.800	29.5	<0.800	<1.00	362	<0.800	<1.00	41.3	<0.800	
MP-3	6/28/2018	<0.500	<2.50	<0.500	<0.500	5.24	<0.500	1.78	203	1.31	<0.500	398	1.82	<0.500	65.1	8.96
	9/27/2018	<1.00	<5.00	<1.00	<1.00	4.06	<0.400	3.52	187	1.60	<0.500	721	0.950	<0.500	148	0.730

- Notes:**
- HVOCs = Halogenated volatile organic compounds analysis by U.S. Environmental Protection Agency (EPA) Method 8260B; results reported in micrograms per liter (µg/L).
 - TPH = Total petroleum hydrocarbons in the diesel and heavy oil range analysis by Washington Department of Ecology (WDOE) Method TPH-418.1 Results reported in milligrams per liter (mg/L).
 - = Not sampled or not analyzed.
 - < = Not detected at or above the specified laboratory method reporting limit (MRL).
 - B = Estimated concentration based on data quality review - similar detection in associated field blank/equipment blanks (less than 5x difference).
 - J = Estimated concentration based on data quality review.
 - n-Propylbenzene, 1,1,1,2-Tetrachloro-ethane, and 1,1,2-Trichloroethane were detected during the first semi-annual 2008 monitoring event. Refer to Table 3 of the *First Semi-Annual 2008 Groundwater Monitoring Report* for detection concentrations.
 - ND = Not detected and no reporting limit specified.
 - E = Chloroform was detected in the equipment blank during the March 2010 and September 2010 sampling events. Chloroform was flagged with an "E" in samples where the concentration was five times or less than the maximum detection in the equipment blank.

APPENDIX C
LABORATORY ANALYTICAL REPORTS AND
DATA QUALITY REVIEW (ON CD)

1.0 INTRODUCTION

This appendix documents the results of a quality assurance/quality control (QA/QC) review of the analytical data for groundwater samples collected during the October and December 2020 groundwater sampling events, and air samples collected during the December 2020 soil vapor extraction (SVE) effluent sampling events. The samples were collected at the NuStar Terminals Services, Inc. (NuStar) Vancouver Facility (Facility) in Vancouver, Washington, and submitted to Eurofins Air Toxics in Folsom, California, and Apex Labs in Tigard, Oregon. A list of the laboratory reports is presented below. A copy of each analytical laboratory report is included in this appendix.

Report	Report Date	Sample Date	Sampling Event
A0J0177	10/28/2020	10/6/2020	Third Quarter Groundwater Monitoring Event
A0J0228	10/29/2020	10/7/2020	Third Quarter Groundwater Monitoring Event
A0J0279	10/29/2020	10/8/2020	Third Quarter Groundwater Monitoring Event
A0J0329	10/29/2020	10/9/2020	Third Quarter Groundwater Monitoring Event
A0L0273	12/29/2020	12/8/2020	Fourth Quarter Groundwater Monitoring Event
A0L0311	12/29/2020	12/9/2020	Fourth Quarter Groundwater Monitoring Event
A0L0354	1/5/2021	12/10/2020	Fourth Quarter Groundwater Monitoring Event
2012440	12/31/2020	12/14/2020	Soil Vapor Extraction System Monitoring

2.0 DATA VALIDATION

The QA review outlines the applicable QC criteria utilized during the data review process, as well as any deviations from those criteria. Examination and validation of the laboratory summary reports include:

- Analytical preparation and quantitation methods;
- Analytical method holding times;
- Sample handling;
- Chain-of-custody handling;
- Detection and reporting limits;
- Method blank, field blank, equipment blank and trip blank detections;

- Laboratory control samples, matrix spikes and surrogates to assess laboratory accuracy;
- Laboratory control sample duplicates, matrix spike duplicates and laboratory duplicates to assess laboratory precision; and
- Field duplicates to assess sampling and laboratory precision.

The QA review did not include a review of raw data.

3.0 ANALYTICAL METHODS

Chemical analyses for water samples consisted of volatile organic compounds (VOCs) by U.S. Environmental Protection Agency (EPA) Method 8260C. Select groundwater samples were also analyzed for total organic carbon (TOC) by EPA Method 5310, ethene by Method RSK-175, ammonia as nitrogen by EPA Method 4500-NH₃ G and nitrate as nitrogen and nitrite as nitrogen by EPA Method 300.0. SVE effluent vapor samples were analyzed for VOCs using EPA Method TO-15.

4.0 QUALITY ASSURANCE OBJECTIVES AND REVIEW

The general QA objectives for this project were to develop and implement procedures for obtaining, evaluating, and confirming the usability of data of a specified quality for monitoring groundwater quality trends and SVE monitoring data at the Facility. To collect such information, analytical data must have an appropriate degree of accuracy and reproducibility, samples collected must be representative of actual field conditions, and samples must be collected and analyzed using unbroken chain-of-custody procedures.

Reporting limits and analytical results were compared to action levels for each parameter in the media of concern. Precision, accuracy, representativeness, completeness, and comparability parameters used to indicate data quality are defined below.

Sample Receipt. Groundwater samples were received by the laboratory in good condition and on ice. Volatile Organic Analysis (VOA) containers for VOC analysis arrived without headspace with the exceptions of 1 of 3 bottles from sample MW-7 DUP (report A0J0279), 4 of 5 bottles from samples MW-12/MW-12 duplicate (report A0J0228), 1 of 5 bottles from sample MW-13 (report A0J0228), and 1 of 5 bottles from MW-7 DUP (report A0L0311). Sediment was noted by the laboratory in sample 3 of 4 bottles from MW-2 (report A0J0279). Water samples containing significant amounts of sediment are decanted or separated by the laboratory prior to extraction, and only the water portion is analyzed.

Reporting Limits. Detection limits are set by the laboratory and are based on instrumentation abilities, sample matrix, and suggested detection limits by the EPA or the Washington State Department of Ecology (Ecology). In some cases, the detection limits may be raised due to high concentrations of analytes in the samples or matrix interferences. Detection limits were generally

consistent with industry standards and below promulgated regulatory standards when possible (if not raised, as previously discussed). Reporting limits were reviewed and are generally acceptable for this project. Reporting limits for individual samples are varied based on the magnitude of the chemical impact. It is not expected that any of the raised detection limits compromise the usability of the data.

Holding Times. Samples were analyzed within the recommended method holding time, except for analysis of nitrate in sample MW-8 (3Q/lab report A0J0177). The hold time for nitrate is 48 hours and the initial analysis of the sample was made within the recommended hold time. Based on the results of the first analysis, the sample was reanalyzed with 50x dilution. The analysis of the diluted sample was conducted after the method recommended hold time.

Calibration and Analysis. Calibration verification was outside of acceptable limits for select VOCs in each sample batch. As the corresponding sample results are below method reporting limits and are not considered chemicals of concern for this project, no data were flagged. All other calibrations were within the control limits for analytes presented in Table 3.

Method Blanks. A method, or laboratory, blank is a sample prepared in the laboratory along with the actual samples and analyzed for the same parameters at the same time. It is used to assess if detected contaminants may have been the result of contamination of the samples in the laboratory. No analytes were detected in the laboratory method blanks for the water analyses, with the exceptions of bromomethane detected in the method blank above the reporting limit in lab report A0L0311 (4Q) and ammonia in lab report A0L0273 (4Q). The detected concentrations in the blanks are not considered biased (high) as the corresponding sample results are not less than 10 times the level found in the blank (or not less than 5 times the level found in the blank for organic analyses).

Laboratory Control Samples and Laboratory Control Sample Duplicate. Laboratory Control Samples (LCS) and Laboratory Control Sample Duplicates (LCSD) were analyzed to assess the accuracy of the analytical equipment and methods. LCS are prepared from an analyte-free matrix that is then spiked with known levels of the constituents of interest (COI; i.e., a standard). The concentrations are measured, and the results compared to the known spiked levels. This comparison is expressed as percent recovery. The LCS and LCSD recovery for each QC batch were within acceptable recovery limits, with the following exceptions:

- Report A0J0177. The LCS recovery of bromoform, bromomethane, chloromethane, dibromochloromethane, and trichlorofluoromethane was above acceptable limits. No associated sample data were detected; therefore, no sample data were flagged.
- Report A0J0228. The LCS recovery of bromoform, bromomethane, chloromethane, dibromochloromethane, 2,2-dichloropropane, and trichlorofluoromethane was above acceptable limits. No associated sample data were detected; therefore, no sample data were flagged.

- Report A0J0279. The LCS recovery of bromoform, bromomethane, chloromethane, 1,2,4-trichlorobenzene, and trichlorofluoromethane was outside acceptable limits. No associated sample data were detected; therefore, no sample data were flagged.
- Report A0J0329. The LCS recovery of bromoform, bromomethane, chloromethane, and trichlorofluoromethane was outside acceptable limits. No associated sample data were detected; therefore, no sample data were flagged.
- Report A0L0273. The LCS recovery of chloromethane, 2,2-dichloropropane, and trichlorofluoromethane was outside acceptable limits. No associated sample data were detected; therefore, no sample data were flagged.
- Report A0L0311. The LCS recovery of 2,2-dichloropropane and trichlorofluoromethane was outside acceptable limits. No associated sample data were detected; therefore, no sample data were flagged.
- Report A0L0354. The LCS recovery of chloromethane, 2,2-dichloropropane, and trichlorofluoromethane was outside acceptable limits. No associated sample data were detected; therefore, no sample data were flagged.

The LCS is then compared to the LCSD of the same batch and expressed as a relative percent difference (RPD) value. The percent recovery and RPD values are then compared to control limits to assess data quality. The RPDs between the LCS and LCSD were within an acceptable range.

Matrix Spike Analyses. A matrix spike QC sample is used to assess the performance of the analytical method by determining potential matrix interferences. Matrix spike (MS) and matrix spike duplicate (MSD) analyses are performed on one environmental sample per analytical batch. An MS sample uses an environmental sample that is spiked with known concentrations of analytes of interest. The MS is then prepared and analyzed with the same analytical procedures as environmental samples in the analytical batch. The resulting concentration of the MS is then compared to the known—or true—values plus the non-spiked environmental sample concentration. This comparison is expressed as a percent recovery. The MSD is then compared to the MS of the same batch and expressed as an RPD value. The percent recovery and RPD values are then compared to control limits to assess data quality.

The recovery from the following MS and MSD samples were outside of control limits:

- Report A0J0177. The MS recovery percentage (using sample MW-5) was outside acceptable limits for bromomethane and trichlorofluoromethane. No associated sample data were detected; therefore, no sample data were flagged.
- Report A0J0228. The MS and MSD recovery percentage (using sample MW-19 Dup) was outside acceptable limits for bromomethane. The MS and MSD recovery percentage (using sample MW-19 Dup) was outside of acceptable limits for tetrachloroethene,

trichloroethene, and trichlorofluoromethane due to high concentration of the analyte in the sample. No associated sample data were detected for bromomethane and trichlorofluoromethane; therefore, these analytes were not flagged in sample data. The LCS recoveries of tetrachloroethene and trichloroethene were within acceptable limits; therefore, these analytes were not flagged in sample data.

- Report A0J0329. The MS recovery percentage (using sample MW-32s) of chloromethane and trichlorofluoromethane was outside acceptable recovery limits. No associated sample data were detected; therefore, no sample data were flagged.
- Report A0L0273. The MS recovery percentage (using sample MGMS2-60) of chloromethane and trichlorofluoromethane was outside acceptable recovery limits. No associated sample data were detected; therefore, no sample data were flagged.
- Report A0L0311. The MS recovery percentage (using source samples MW-26 and EW-1) of trichlorofluoromethane was outside acceptable recovery limits. No associated sample data were detected; therefore, no sample data were flagged.
- Report A0L0354. The MS recovery percentage (using sample MGMS1-60) of ammonia was outside acceptable recovery limits. The LCS recovery of ammonia was within acceptable recovery limits; therefore, no sample data were flagged.

The RPD between the corresponding MS and MSD samples was within an acceptable range, indicating that the precision of the analysis process was acceptable.

No MS or MSD samples were analyzed as part of the air sample QC batch.

Surrogate Recovery. Surrogates are organic compounds that are similar in chemical composition to the COI and are spiked into environmental and batch QC samples prior to sample preparation and analysis. Surrogate recoveries for environmental samples are used to evaluate matrix interference on a sample-specific basis. Surrogate recoveries were within acceptable control limits.

Laboratory Duplicate. A laboratory duplicate is a second analysis of an environmental sample received by the laboratory, which serves as an internal check on laboratory quality as well as potential variability of the sample matrix. The laboratory duplicate concentration is compared to the primary sample concentration to assess the precision of the analytical method. This comparison can be expressed by the RPD between the original and duplicate samples. The laboratory duplicate sample RPD values were within the recommended RPD range, with the exception of nitrate from sample MW-6 (4Q; lab report A0L0311). The analysis was not considered “controlled” since the sample and duplicate concentrations were below 5 times the reporting limit.

Field Duplicate. A field duplicate is a second field sample collected from a selected monitoring point. Field duplicate samples serve as a check on laboratory quality as well as potential variability of the sample matrix. The field duplicate is analyzed and compared with the primary sample to

assess the precision of the analytical method. This comparison can be expressed by the RPD between the primary and duplicate samples. The field duplicate sample RPD values were within the recommended limit of +/- 30%.

Accuracy. Due to matrix interference, nitrate as nitrogen in samples MGMS1-60, MW-1, MW-19, and MW-19 DUP could not be accurately quantified. The reported result is estimated and given a “M-02” flag to reflect this.

Conclusion. In conclusion, the overall QA objectives have been met and the data are of adequate quality for use in this project with appropriate lab qualifiers.



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Thursday, October 29, 2020

Stephanie Salisbury
Cascadia Associates
5820 SW Kelly Ave Unit B
Portland, OR 97239

RE: A0J0279 - Shore Terminal-Vancouver - Nustar Vanc 3Q20

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A0J0279, which was received by the laboratory on 10/8/2020 at 3:53:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1 1.3 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates

5820 SW Kelly Ave Unit B
Portland, OR 97239

Project: **Shore Terminal-Vancouver**

Project Number: **Nustar Vanc 3Q20**
Project Manager: **Stephanie Salisbury**

Report ID:
A0J0279 - 10 29 20 0909

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-6	A0J0279-01	Water	10/08/20 08:18	10/08/20 15:53
MW-2	A0J0279-02	Water	10/08/20 08:56	10/08/20 15:53
MW-2li-105	A0J0279-03	Water	10/08/20 09:35	10/08/20 15:53
MW-22i	A0J0279-04	Water	10/08/20 10:20	10/08/20 15:53
MW-10	A0J0279-05	Water	10/08/20 11:03	10/08/20 15:53
MW-14	A0J0279-06	Water	10/08/20 11:44	10/08/20 15:53
MW-9	A0J0279-07	Water	10/08/20 12:33	10/08/20 15:53
MW-7	A0J0279-08	Water	10/08/20 13:15	10/08/20 15:53
MW-7 Dup	A0J0279-09	Water	10/08/20 13:15	10/08/20 15:53
MP-1	A0J0279-10	Water	10/08/20 14:25	10/08/20 15:53
Trip Blank	A0J0279-11	Water	10/08/20 00:00	10/08/20 15:53

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Lisa Domenighini, Client Services Manager



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503-718-2323
ORELAP ID: OR100062

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <u>Shore Terminal-Vancouver</u> Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	<u>Report ID:</u> A0J0279 - 10 29 20 0909
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ANALYTICAL CASE NARRATIVE

Work Order: A0J0279

Subcontract

This report is not complete without the attached subcontract laboratory report for RSK 175 from Air Technology

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-6 (A0J0279-01)				Matrix: Water		Batch: 0100356		
Bromobenzene	ND	---	0.500	ug/L	1	10/10/20 19:00	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/10/20 19:00	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/10/20 19:00	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/10/20 19:00	EPA 8260D	ESTa
Chloroform	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/10/20 19:00	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/10/20 19:00	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/10/20 19:00	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 19:00	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 19:00	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 19:00	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/10/20 19:00	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/10/20 19:00	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 19:00	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 19:00	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 19:00	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/10/20 19:00	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/10/20 19:00	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/10/20 19:00	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/10/20 19:00	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/10/20 19:00	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	10/10/20 19:00	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 19:00	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 19:00	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/10/20 19:00	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-6 (A0J0279-01)				Matrix: Water		Batch: 0100356		
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/10/20 19:00	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/10/20 19:00	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/10/20 19:00	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/10/20 19:00	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/10/20 19:00	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 111 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/10/20 19:00</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 19:00</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 19:00</i>	<i>EPA 8260D</i>

MW-2 (A0J0279-02)				Matrix: Water		Batch: 0100356		
Bromobenzene	ND	---	0.500	ug/L	1	10/10/20 19:55	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/10/20 19:55	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/10/20 19:55	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/10/20 19:55	EPA 8260D	ESTa
Chloroform	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/10/20 19:55	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/10/20 19:55	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/10/20 19:55	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 19:55	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 19:55	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 19:55	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/10/20 19:55	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/10/20 19:55	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 19:55	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 19:55	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 19:55	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/10/20 19:55	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-2 (A0J0279-02)				Matrix: Water		Batch: 0100356		
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/10/20 19:55	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/10/20 19:55	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/10/20 19:55	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/10/20 19:55	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	10/10/20 19:55	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 19:55	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 19:55	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/10/20 19:55	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/10/20 19:55	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/10/20 19:55	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/10/20 19:55	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/10/20 19:55	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/10/20 19:55	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 111 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/10/20 19:55</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 19:55</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 19:55</i>	<i>EPA 8260D</i>

MW-2li-105 (A0J0279-03)				Matrix: Water		Batch: 0100356		
Bromobenzene	ND	---	0.500	ug/L	1	10/10/20 20:22	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/10/20 20:22	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/10/20 20:22	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/10/20 20:22	EPA 8260D	ESTa
Chloroform	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/10/20 20:22	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/10/20 20:22	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/10/20 20:22	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 20:22	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-21i-105 (A0J0279-03)				Matrix: Water		Batch: 0100356		
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 20:22	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 20:22	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/10/20 20:22	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/10/20 20:22	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 20:22	EPA 8260D	
cis-1,2-Dichloroethene	1.76	---	0.400	ug/L	1	10/10/20 20:22	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 20:22	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/10/20 20:22	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/10/20 20:22	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/10/20 20:22	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/10/20 20:22	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/10/20 20:22	EPA 8260D	
Tetrachloroethene (PCE)	4.60	---	0.400	ug/L	1	10/10/20 20:22	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 20:22	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 20:22	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/10/20 20:22	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/10/20 20:22	EPA 8260D	
Trichloroethene (TCE)	1.96	---	0.400	ug/L	1	10/10/20 20:22	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/10/20 20:22	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/10/20 20:22	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/10/20 20:22	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 114 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>10/10/20 20:22</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>	<i>1</i>	<i>10/10/20 20:22</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>	<i>1</i>	<i>10/10/20 20:22</i>	<i>EPA 8260D</i>	

MW-22i (A0J0279-04)				Matrix: Water		Batch: 0100356		
Bromobenzene	ND	---	0.500	ug/L	1	10/10/20 20:49	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/10/20 20:49	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-22i (A0J0279-04)				Matrix: Water		Batch: 0100356		
Chlorobenzene	ND	---	0.500	ug/L	1	10/10/20 20:49	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/10/20 20:49	EPA 8260D	ESTa
Chloroform	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/10/20 20:49	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/10/20 20:49	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/10/20 20:49	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 20:49	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 20:49	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 20:49	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
1,1-Dichloroethane	0.502	---	0.400	ug/L	1	10/10/20 20:49	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/10/20 20:49	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 20:49	EPA 8260D	
cis-1,2-Dichloroethene	16.0	---	0.400	ug/L	1	10/10/20 20:49	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 20:49	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/10/20 20:49	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/10/20 20:49	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/10/20 20:49	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/10/20 20:49	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/10/20 20:49	EPA 8260D	
Tetrachloroethene (PCE)	3.68	---	0.400	ug/L	1	10/10/20 20:49	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 20:49	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 20:49	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/10/20 20:49	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/10/20 20:49	EPA 8260D	
Trichloroethene (TCE)	8.02	---	0.400	ug/L	1	10/10/20 20:49	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/10/20 20:49	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/10/20 20:49	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/10/20 20:49	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-22i (A0J0279-04)				Matrix: Water		Batch: 0100356		
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 110 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>		<i>10/10/20 20:49</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>	<i>80-120 %</i>	<i>1</i>		<i>10/10/20 20:49</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>	<i>80-120 %</i>	<i>1</i>		<i>10/10/20 20:49</i>	<i>EPA 8260D</i>	

MW-10 (A0J0279-05)				Matrix: Water		Batch: 0100356		
Bromobenzene	ND	---	0.500	ug/L	1	10/10/20 21:16	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/10/20 21:16	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/10/20 21:16	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/10/20 21:16	EPA 8260D	ESTa
Chloroform	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/10/20 21:16	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/10/20 21:16	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/10/20 21:16	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 21:16	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 21:16	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 21:16	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/10/20 21:16	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/10/20 21:16	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 21:16	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 21:16	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 21:16	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/10/20 21:16	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/10/20 21:16	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/10/20 21:16	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/10/20 21:16	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-10 (A0J0279-05)				Matrix: Water		Batch: 0100356		
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/10/20 21:16	EPA 8260D	
Tetrachloroethene (PCE)	2.34	---	0.400	ug/L	1	10/10/20 21:16	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 21:16	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 21:16	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/10/20 21:16	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/10/20 21:16	EPA 8260D	
Trichloroethene (TCE)	1.81	---	0.400	ug/L	1	10/10/20 21:16	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/10/20 21:16	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/10/20 21:16	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/10/20 21:16	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 111 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/10/20 21:16</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 21:16</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>108 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 21:16</i>	<i>EPA 8260D</i>

MW-14 (A0J0279-06)				Matrix: Water		Batch: 0100356		
Bromobenzene	ND	---	2.50	ug/L	5	10/10/20 22:10	EPA 8260D	
Bromochloromethane	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
Bromodichloromethane	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
Bromoform	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
Bromomethane	ND	---	25.0	ug/L	5	10/10/20 22:10	EPA 8260D	
Carbon tetrachloride	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
Chlorobenzene	ND	---	2.50	ug/L	5	10/10/20 22:10	EPA 8260D	
Chloroethane	ND	---	25.0	ug/L	5	10/10/20 22:10	EPA 8260D	ESTa
Chloroform	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
Chloromethane	ND	---	25.0	ug/L	5	10/10/20 22:10	EPA 8260D	
2-Chlorotoluene	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
4-Chlorotoluene	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
Dibromochloromethane	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	25.0	ug/L	5	10/10/20 22:10	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	2.50	ug/L	5	10/10/20 22:10	EPA 8260D	
Dibromomethane	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
1,2-Dichlorobenzene	ND	---	2.50	ug/L	5	10/10/20 22:10	EPA 8260D	
1,3-Dichlorobenzene	ND	---	2.50	ug/L	5	10/10/20 22:10	EPA 8260D	
1,4-Dichlorobenzene	ND	---	2.50	ug/L	5	10/10/20 22:10	EPA 8260D	
Dichlorodifluoromethane	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
1,1-Dichloroethane	14.6	---	2.00	ug/L	5	10/10/20 22:10	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	2.00	ug/L	5	10/10/20 22:10	EPA 8260D	
1,1-Dichloroethene	4.79	---	2.00	ug/L	5	10/10/20 22:10	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-14 (A0J0279-06)				Matrix: Water		Batch: 0100356		
cis-1,2-Dichloroethene	207	---	2.00	ug/L	5	10/10/20 22:10	EPA 8260D	
trans-1,2-Dichloroethene	2.53	---	2.00	ug/L	5	10/10/20 22:10	EPA 8260D	
1,2-Dichloropropane	ND	---	2.50	ug/L	5	10/10/20 22:10	EPA 8260D	
1,3-Dichloropropane	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
2,2-Dichloropropane	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
1,1-Dichloropropene	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
Hexachlorobutadiene	ND	---	25.0	ug/L	5	10/10/20 22:10	EPA 8260D	
Methylene chloride	ND	---	50.0	ug/L	5	10/10/20 22:10	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	2.00	ug/L	5	10/10/20 22:10	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	2.50	ug/L	5	10/10/20 22:10	EPA 8260D	
Tetrachloroethene (PCE)	124	---	2.00	ug/L	5	10/10/20 22:10	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	10.0	ug/L	5	10/10/20 22:10	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	10.0	ug/L	5	10/10/20 22:10	EPA 8260D	
1,1,1-Trichloroethane	ND	---	2.00	ug/L	5	10/10/20 22:10	EPA 8260D	
1,1,2-Trichloroethane	ND	---	2.50	ug/L	5	10/10/20 22:10	EPA 8260D	
Trichloroethene (TCE)	680	---	2.00	ug/L	5	10/10/20 22:10	EPA 8260D	
Trichlorofluoromethane	ND	---	10.0	ug/L	5	10/10/20 22:10	EPA 8260D	
1,2,3-Trichloropropane	ND	---	5.00	ug/L	5	10/10/20 22:10	EPA 8260D	
Vinyl chloride	ND	---	2.00	ug/L	5	10/10/20 22:10	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 117 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/10/20 22:10</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 22:10</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>109 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 22:10</i>	<i>EPA 8260D</i>

MW-9 (A0J0279-07)				Matrix: Water		Batch: 0100356		
Bromobenzene	ND	---	0.500	ug/L	1	10/10/20 21:43	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/10/20 21:43	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/10/20 21:43	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/10/20 21:43	EPA 8260D	ESTa
Chloroform	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/10/20 21:43	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-9 (A0J0279-07)				Matrix: Water		Batch: 0100356		
Dibromochloromethane	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/10/20 21:43	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/10/20 21:43	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 21:43	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 21:43	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 21:43	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
1,1-Dichloroethane	1.78	---	0.400	ug/L	1	10/10/20 21:43	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/10/20 21:43	EPA 8260D	
1,1-Dichloroethene	0.817	---	0.400	ug/L	1	10/10/20 21:43	EPA 8260D	
cis-1,2-Dichloroethene	39.0	---	0.400	ug/L	1	10/10/20 21:43	EPA 8260D	
trans-1,2-Dichloroethene	1.28	---	0.400	ug/L	1	10/10/20 21:43	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/10/20 21:43	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/10/20 21:43	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/10/20 21:43	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/10/20 21:43	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/10/20 21:43	EPA 8260D	
Tetrachloroethene (PCE)	191	---	0.400	ug/L	1	10/10/20 21:43	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 21:43	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 21:43	EPA 8260D	
1,1,1-Trichloroethane	2.95	---	0.400	ug/L	1	10/10/20 21:43	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/10/20 21:43	EPA 8260D	
Trichloroethene (TCE)	72.2	---	0.400	ug/L	1	10/10/20 21:43	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/10/20 21:43	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/10/20 21:43	EPA 8260D	
Vinyl chloride	1.55	---	0.400	ug/L	1	10/10/20 21:43	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 117 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/10/20 21:43</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 21:43</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 21:43</i>	<i>EPA 8260D</i>

MW-7 (A0J0279-08RE1)				Matrix: Water		Batch: 0100407		
Bromobenzene	ND	---	0.500	ug/L	1	10/13/20 11:03	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 (A0J0279-08RE1)				Matrix: Water		Batch: 0100407		
Bromochloromethane	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/13/20 11:03	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/13/20 11:03	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/13/20 11:03	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/13/20 11:03	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/13/20 11:03	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/13/20 11:03	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 11:03	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 11:03	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 11:03	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
1,1-Dichloroethane	1.97	---	0.400	ug/L	1	10/13/20 11:03	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/13/20 11:03	EPA 8260D	
1,1-Dichloroethene	0.481	---	0.400	ug/L	1	10/13/20 11:03	EPA 8260D	
cis-1,2-Dichloroethene	23.1	---	0.400	ug/L	1	10/13/20 11:03	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/13/20 11:03	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/13/20 11:03	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/13/20 11:03	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/13/20 11:03	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/13/20 11:03	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/13/20 11:03	EPA 8260D	
Tetrachloroethene (PCE)	49.5	---	0.400	ug/L	1	10/13/20 11:03	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/13/20 11:03	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/13/20 11:03	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/13/20 11:03	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/13/20 11:03	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 (A0J0279-08RE1)			Matrix: Water		Batch: 0100407			
Trichloroethene (TCE)	19.7	---	0.400	ug/L	1	10/13/20 11:03	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/13/20 11:03	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/13/20 11:03	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/13/20 11:03	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 113 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/13/20 11:03</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/13/20 11:03</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/13/20 11:03</i>	<i>EPA 8260D</i>

MW-7 Dup (A0J0279-09RE1)			Matrix: Water		Batch: 0100407			
Bromobenzene	ND	---	0.500	ug/L	1	10/13/20 11:30	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/13/20 11:30	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/13/20 11:30	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/13/20 11:30	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/13/20 11:30	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/13/20 11:30	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/13/20 11:30	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 11:30	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 11:30	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 11:30	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
1,1-Dichloroethane	1.96	---	0.400	ug/L	1	10/13/20 11:30	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/13/20 11:30	EPA 8260D	
1,1-Dichloroethene	0.431	---	0.400	ug/L	1	10/13/20 11:30	EPA 8260D	
cis-1,2-Dichloroethene	23.6	---	0.400	ug/L	1	10/13/20 11:30	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/13/20 11:30	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/13/20 11:30	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 Dup (A0J0279-09RE1)				Matrix: Water		Batch: 0100407		
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/13/20 11:30	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/13/20 11:30	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/13/20 11:30	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/13/20 11:30	EPA 8260D	
Tetrachloroethene (PCE)	50.2	---	0.400	ug/L	1	10/13/20 11:30	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/13/20 11:30	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/13/20 11:30	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/13/20 11:30	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/13/20 11:30	EPA 8260D	
Trichloroethene (TCE)	19.6	---	0.400	ug/L	1	10/13/20 11:30	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/13/20 11:30	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/13/20 11:30	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/13/20 11:30	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 114 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/13/20 11:30</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/13/20 11:30</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/13/20 11:30</i>	<i>EPA 8260D</i>

MP-1 (A0J0279-10)				Matrix: Water		Batch: 0100356		
Bromobenzene	ND	---	2.50	ug/L	5	10/10/20 23:32	EPA 8260D	
Bromochloromethane	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
Bromodichloromethane	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
Bromoform	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
Bromomethane	ND	---	25.0	ug/L	5	10/10/20 23:32	EPA 8260D	
Carbon tetrachloride	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
Chlorobenzene	ND	---	2.50	ug/L	5	10/10/20 23:32	EPA 8260D	
Chloroethane	ND	---	25.0	ug/L	5	10/10/20 23:32	EPA 8260D	ESTa
Chloroform	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
Chloromethane	ND	---	25.0	ug/L	5	10/10/20 23:32	EPA 8260D	
2-Chlorotoluene	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
4-Chlorotoluene	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
Dibromochloromethane	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	25.0	ug/L	5	10/10/20 23:32	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	2.50	ug/L	5	10/10/20 23:32	EPA 8260D	
Dibromomethane	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
1,2-Dichlorobenzene	ND	---	2.50	ug/L	5	10/10/20 23:32	EPA 8260D	
1,3-Dichlorobenzene	ND	---	2.50	ug/L	5	10/10/20 23:32	EPA 8260D	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MP-1 (A0J0279-10)				Matrix: Water		Batch: 0100356		
1,4-Dichlorobenzene	ND	---	2.50	ug/L	5	10/10/20 23:32	EPA 8260D	
Dichlorodifluoromethane	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
1,1-Dichloroethane	ND	---	2.00	ug/L	5	10/10/20 23:32	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	2.00	ug/L	5	10/10/20 23:32	EPA 8260D	
1,1-Dichloroethene	ND	---	2.00	ug/L	5	10/10/20 23:32	EPA 8260D	
cis-1,2-Dichloroethene	36.7	---	2.00	ug/L	5	10/10/20 23:32	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	2.00	ug/L	5	10/10/20 23:32	EPA 8260D	
1,2-Dichloropropane	ND	---	2.50	ug/L	5	10/10/20 23:32	EPA 8260D	
1,3-Dichloropropane	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
2,2-Dichloropropane	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
1,1-Dichloropropene	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
Hexachlorobutadiene	ND	---	25.0	ug/L	5	10/10/20 23:32	EPA 8260D	
Methylene chloride	ND	---	50.0	ug/L	5	10/10/20 23:32	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	2.00	ug/L	5	10/10/20 23:32	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	2.50	ug/L	5	10/10/20 23:32	EPA 8260D	
Tetrachloroethene (PCE)	510	---	2.00	ug/L	5	10/10/20 23:32	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	10.0	ug/L	5	10/10/20 23:32	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	10.0	ug/L	5	10/10/20 23:32	EPA 8260D	
1,1,1-Trichloroethane	ND	---	2.00	ug/L	5	10/10/20 23:32	EPA 8260D	
1,1,2-Trichloroethane	ND	---	2.50	ug/L	5	10/10/20 23:32	EPA 8260D	
Trichloroethene (TCE)	52.3	---	2.00	ug/L	5	10/10/20 23:32	EPA 8260D	
Trichlorofluoromethane	ND	---	10.0	ug/L	5	10/10/20 23:32	EPA 8260D	
1,2,3-Trichloropropane	ND	---	5.00	ug/L	5	10/10/20 23:32	EPA 8260D	
Vinyl chloride	ND	---	2.00	ug/L	5	10/10/20 23:32	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 112 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/10/20 23:32</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 23:32</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>108 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 23:32</i>	<i>EPA 8260D</i>

Trip Blank (A0J0279-11)				Matrix: Water		Batch: 0100356		
Bromobenzene	ND	---	0.500	ug/L	1	10/10/20 15:23	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/10/20 15:23	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/10/20 15:23	EPA 8260D	

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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Trip Blank (A0J0279-11)				Matrix: Water		Batch: 0100356		
Chloroethane	ND	---	5.00	ug/L	1	10/10/20 15:23	EPA 8260D	ESTa
Chloroform	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/10/20 15:23	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/10/20 15:23	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/10/20 15:23	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 15:23	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 15:23	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 15:23	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/10/20 15:23	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/10/20 15:23	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 15:23	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 15:23	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 15:23	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/10/20 15:23	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/10/20 15:23	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/10/20 15:23	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/10/20 15:23	EPA 8260D	
1,1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/10/20 15:23	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	10/10/20 15:23	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 15:23	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 15:23	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/10/20 15:23	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/10/20 15:23	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/10/20 15:23	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/10/20 15:23	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/10/20 15:23	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/10/20 15:23	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 113 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/10/20 15:23</i>	<i>EPA 8260D</i>

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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Trip Blank (A0J0279-11)				Matrix: Water		Batch: 0100356		
<i>Surrogate: Toluene-d8 (Surr)</i>		<i>Recovery: 101 %</i>	<i>Limits: 80-120 %</i>	<i>80-120 %</i>	<i>1</i>	<i>10/10/20 15:23</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>108 %</i>	<i>80-120 %</i>	<i>80-120 %</i>	<i>1</i>	<i>10/10/20 15:23</i>	<i>EPA 8260D</i>	

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ANALYTICAL SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-6 (A0J0279-01)				Matrix: Water		Batch: 0100338		
Ammonia as N	3.14	---	0.0200	mg/L	1	10/09/20 16:59	SM 4500-NH3 G	
MW-2 (A0J0279-02)				Matrix: Water		Batch: 0100338		
Ammonia as N	9.48	---	0.100	mg/L	5	10/09/20 17:01	SM 4500-NH3 G	
MW-2li-105 (A0J0279-03)				Matrix: Water		Batch: 0100338		
Ammonia as N	45.6	---	0.200	mg/L	10	10/09/20 17:02	SM 4500-NH3 G	
MW-22i (A0J0279-04)				Matrix: Water		Batch: 0100338		
Ammonia as N	0.325	---	0.0200	mg/L	1	10/09/20 17:17	SM 4500-NH3 G	
MW-10 (A0J0279-05)				Matrix: Water		Batch: 0100338		
Ammonia as N	34.8	---	0.200	mg/L	10	10/09/20 17:18	SM 4500-NH3 G	
MW-14 (A0J0279-06)				Matrix: Water		Batch: 0100338		
Ammonia as N	32.5	---	0.200	mg/L	10	10/09/20 17:20	SM 4500-NH3 G	
MW-9 (A0J0279-07RE1)				Matrix: Water		Batch: 0100338		
Ammonia as N	5.76	---	0.0400	mg/L	2	10/09/20 17:58	SM 4500-NH3 G	
MW-7 (A0J0279-08RE1)				Matrix: Water		Batch: 0100338		
Ammonia as N	14.5	---	0.0800	mg/L	4	10/09/20 18:00	SM 4500-NH3 G	
MW-7 Dup (A0J0279-09RE1)				Matrix: Water		Batch: 0100338		
Ammonia as N	14.3	---	0.0800	mg/L	4	10/09/20 18:01	SM 4500-NH3 G	
MP-1 (A0J0279-10RE1)				Matrix: Water		Batch: 0100498		
Ammonia as N	5.22	---	0.0400	mg/L	2	10/15/20 12:31	SM 4500-NH3 G	

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
MW-6 (A0J0279-01)				Matrix: Water					
Batch: 0100313									
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/09/20 14:26	EPA 300.0		
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/09/20 14:26	EPA 300.0		
MW-2 (A0J0279-02)				Matrix: Water					
Batch: 0100313									
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/09/20 16:14	EPA 300.0		
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/09/20 16:14	EPA 300.0		
MW-2li-105 (A0J0279-03)				Matrix: Water					
Batch: 0100313									
Nitrite-Nitrogen	10.6	---	0.500	mg/L	2	10/09/20 16:36	EPA 300.0		
MW-2li-105 (A0J0279-03RE1)				Matrix: Water					
Batch: 0100313									
Nitrate-Nitrogen	5.85	---	0.250	mg/L	1	10/09/20 16:57	EPA 300.0		
MW-22i (A0J0279-04)				Matrix: Water					
Batch: 0100313									
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/09/20 17:19	EPA 300.0		
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/09/20 17:19	EPA 300.0		
MW-10 (A0J0279-05RE1)				Matrix: Water					
Batch: 0100313									
Nitrate-Nitrogen	541	---	25.0	mg/L	100	10/10/20 01:35	EPA 300.0		
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/09/20 18:45	EPA 300.0		
MW-14 (A0J0279-06RE1)				Matrix: Water					
Batch: 0100313									
Nitrate-Nitrogen	305	---	25.0	mg/L	100	10/10/20 01:56	EPA 300.0		
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/09/20 19:28	EPA 300.0		
MW-9 (A0J0279-07)				Matrix: Water					
Batch: 0100313									
Nitrate-Nitrogen	172	---	5.00	mg/L	20	10/09/20 20:33	EPA 300.0		

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-9 (A0J0279-07RE1)				Matrix: Water				
Batch: 0100313								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/09/20 20:54	EPA 300.0	
MW-7 (A0J0279-08RE1)				Matrix: Water				
Batch: 0100313								
Nitrate-Nitrogen	1.92	---	0.250	mg/L	1	10/09/20 21:38	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/09/20 21:38	EPA 300.0	
MW-7 Dup (A0J0279-09RE1)				Matrix: Water				
Batch: 0100313								
Nitrate-Nitrogen	1.83	---	0.250	mg/L	1	10/09/20 22:21	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/09/20 22:21	EPA 300.0	
MP-1 (A0J0279-10)				Matrix: Water				
Batch: 0100313								
Nitrate-Nitrogen	115	---	12.5	mg/L	50	10/09/20 22:42	EPA 300.0	
MP-1 (A0J0279-10RE1)				Matrix: Water				
Batch: 0100313								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/09/20 23:04	EPA 300.0	



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ANALYTICAL SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-14 (A0J0279-06)				Matrix: Water		Batch: 0100370		
Total Organic Carbon	2.79	---	1.00	mg/L	1	10/13/20 04:04	SM 5310 C	
MW-7 (A0J0279-08)				Matrix: Water		Batch: 0100370		
Total Organic Carbon	15.1	---	1.00	mg/L	1	10/13/20 04:36	SM 5310 C	
MW-7 Dup (A0J0279-09)				Matrix: Water		Batch: 0100370		
Total Organic Carbon	15.4	---	1.00	mg/L	1	10/13/20 05:07	SM 5310 C	
MP-1 (A0J0279-10)				Matrix: Water		Batch: 0100370		
Total Organic Carbon	1.74	---	1.00	mg/L	1	10/13/20 05:40	SM 5310 C	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100356 - EPA 5030B						Water						
Blank (0100356-BLK1)		Prepared: 10/10/20 13:00			Analyzed: 10/10/20 14:29							
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromoform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	ESTa
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100356 - EPA 5030B												
Water												
Blank (0100356-BLK1)	Prepared: 10/10/20 13:00 Analyzed: 10/10/20 14:29											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)	Recovery: 111 %		Limits: 80-120 %		Dilution: 1x							
Toluene-d8 (Surr)	101 %		80-120 %		"							
4-Bromofluorobenzene (Surr)	109 %		80-120 %		"							

LCS (0100356-BS1)												
Prepared: 10/10/20 13:00 Analyzed: 10/10/20 13:35												
EPA 8260D												
Bromobenzene	19.4	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
Bromochloromethane	22.6	---	1.00	ug/L	1	20.0	---	113	80 - 120%	---	---	
Bromodichloromethane	21.5	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
Bromoform	23.3	---	1.00	ug/L	1	20.0	---	116	80 - 120%	---	---	
Bromomethane	27.1	---	5.00	ug/L	1	20.0	---	136	80 - 120%	---	---	Q-56
Carbon tetrachloride	22.6	---	1.00	ug/L	1	20.0	---	113	80 - 120%	---	---	
Chlorobenzene	19.5	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
Chloroethane	19.4	---	5.00	ug/L	1	20.0	---	97	80 - 120%	---	---	ESTa
Chloroform	20.6	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
Chloromethane	17.0	---	5.00	ug/L	1	20.0	---	85	80 - 120%	---	---	
2-Chlorotoluene	19.2	---	1.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
4-Chlorotoluene	17.6	---	1.00	ug/L	1	20.0	---	88	80 - 120%	---	---	
Dibromochloromethane	22.7	---	1.00	ug/L	1	20.0	---	114	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	18.6	---	5.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	19.2	---	0.500	ug/L	1	20.0	---	96	80 - 120%	---	---	
Dibromomethane	21.5	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
1,2-Dichlorobenzene	19.2	---	0.500	ug/L	1	20.0	---	96	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100356 - EPA 5030B												
						Water						
LCS (0100356-BS1)	Prepared: 10/10/20 13:00 Analyzed: 10/10/20 13:35											
1,3-Dichlorobenzene	19.5	---	0.500	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,4-Dichlorobenzene	19.3	---	0.500	ug/L	1	20.0	---	96	80 - 120%	---	---	
Dichlorodifluoromethane	17.5	---	1.00	ug/L	1	20.0	---	88	80 - 120%	---	---	
1,1-Dichloroethane	19.0	---	0.400	ug/L	1	20.0	---	95	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	18.8	---	0.400	ug/L	1	20.0	---	94	80 - 120%	---	---	
1,1-Dichloroethene	19.7	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
cis-1,2-Dichloroethene	19.1	---	0.400	ug/L	1	20.0	---	95	80 - 120%	---	---	
trans-1,2-Dichloroethene	19.3	---	0.400	ug/L	1	20.0	---	96	80 - 120%	---	---	
1,2-Dichloropropane	19.4	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,3-Dichloropropane	18.4	---	1.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
2,2-Dichloropropane	16.8	---	1.00	ug/L	1	20.0	---	84	80 - 120%	---	---	
1,1-Dichloropropene	19.4	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
cis-1,3-Dichloropropene	17.0	---	1.00	ug/L	1	20.0	---	85	80 - 120%	---	---	
trans-1,3-Dichloropropene	17.0	---	1.00	ug/L	1	20.0	---	85	80 - 120%	---	---	
Hexachlorobutadiene	18.9	---	5.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
Methylene chloride	21.0	---	10.0	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	21.6	---	0.400	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	18.8	---	0.500	ug/L	1	20.0	---	94	80 - 120%	---	---	
Tetrachloroethene (PCE)	20.0	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,2,3-Trichlorobenzene	16.2	---	2.00	ug/L	1	20.0	---	81	80 - 120%	---	---	
1,2,4-Trichlorobenzene	15.7	---	2.00	ug/L	1	20.0	---	78	80 - 120%	---	---	Q-55
1,1,1-Trichloroethane	19.3	---	0.400	ug/L	1	20.0	---	96	80 - 120%	---	---	
1,1,2-Trichloroethane	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Trichloroethene (TCE)	22.7	---	0.400	ug/L	1	20.0	---	113	80 - 120%	---	---	
Trichlorofluoromethane	28.0	---	2.00	ug/L	1	20.0	---	140	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	19.5	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
Vinyl chloride	19.2	---	0.400	ug/L	1	20.0	---	96	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr) Recovery: 107 % Limits: 80-120 % Dilution: 1x												
Toluene-d8 (Surr) 95 % 80-120 % "												
4-Bromofluorobenzene (Surr) 96 % 80-120 % "												

Duplicate (0100356-DUP1) Prepared: 10/10/20 14:14 Analyzed: 10/10/20 19:27

QC Source Sample: MW-6 (A0J0279-01)

EPA 8260D

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100356 - EPA 5030B												
Water												
Duplicate (0100356-DUP1)			Prepared: 10/10/20 14:14 Analyzed: 10/10/20 19:27									
QC Source Sample: MW-6 (A0J0279-01)												
Bromobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	ESTa
Chloroform	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Chloromethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Dibromomethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Methylene chloride	ND	---	10.0	ug/L	1	---	ND	---	---	---	30%	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100356 - EPA 5030B						Water						
Duplicate (0100356-DUP1)			Prepared: 10/10/20 14:14 Analyzed: 10/10/20 19:27									
QC Source Sample: MW-6 (A0J0279-01)												
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 113 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>		<i>"</i>						



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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100407 - EPA 5030B						Water						
Blank (0100407-BLK1)		Prepared: 10/13/20 08:35		Analyzed: 10/13/20 10:09								
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromoform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	EST
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100407 - EPA 5030B												
Water												
Blank (0100407-BLK1)	Prepared: 10/13/20 08:35 Analyzed: 10/13/20 10:09											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 112 %</i>			<i>Limits: 80-120 %</i>			<i>Dilution: 1x</i>			
<i>Toluene-d8 (Surr)</i>			<i>100 %</i>			<i>80-120 %</i>			<i>"</i>			
<i>4-Bromofluorobenzene (Surr)</i>			<i>107 %</i>			<i>80-120 %</i>			<i>"</i>			

LCS (0100407-BS1)												
Prepared: 10/13/20 08:35 Analyzed: 10/13/20 09:14												
EPA 8260D												
Bromobenzene	20.5	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Bromochloromethane	23.9	---	1.00	ug/L	1	20.0	---	119	80 - 120%	---	---	
Bromodichloromethane	22.7	---	1.00	ug/L	1	20.0	---	113	80 - 120%	---	---	
Bromoform	24.1	---	1.00	ug/L	1	20.0	---	121	80 - 120%	---	---	Q-56
Bromomethane	25.9	---	5.00	ug/L	1	20.0	---	129	80 - 120%	---	---	Q-56
Carbon tetrachloride	24.0	---	1.00	ug/L	1	20.0	---	120	80 - 120%	---	---	
Chlorobenzene	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Chloroethane	18.5	---	5.00	ug/L	1	20.0	---	92	80 - 120%	---	---	EST
Chloroform	21.8	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Chloromethane	24.3	---	5.00	ug/L	1	20.0	---	122	80 - 120%	---	---	Q-56
2-Chlorotoluene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
4-Chlorotoluene	18.4	---	1.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
Dibromochloromethane	24.0	---	1.00	ug/L	1	20.0	---	120	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	18.7	---	5.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.2	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
Dibromomethane	22.2	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,2-Dichlorobenzene	19.9	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100407 - EPA 5030B						Water						
LCS (0100407-BS1)	Prepared: 10/13/20 08:35		Analyzed: 10/13/20 09:14									
1,3-Dichlorobenzene	20.7	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
1,4-Dichlorobenzene	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Dichlorodifluoromethane	18.6	---	1.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
1,1-Dichloroethane	20.1	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	19.8	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,1-Dichloroethene	21.0	---	0.400	ug/L	1	20.0	---	105	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.1	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
trans-1,2-Dichloroethene	20.4	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2-Dichloropropane	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,3-Dichloropropane	19.5	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
2,2-Dichloropropane	17.8	---	1.00	ug/L	1	20.0	---	89	80 - 120%	---	---	
1,1-Dichloropropene	20.4	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
cis-1,3-Dichloropropene	18.0	---	1.00	ug/L	1	20.0	---	90	80 - 120%	---	---	
trans-1,3-Dichloropropene	17.5	---	1.00	ug/L	1	20.0	---	88	80 - 120%	---	---	
Hexachlorobutadiene	19.0	---	5.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
Methylene chloride	21.2	---	10.0	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	22.2	---	0.400	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	20.9	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
Tetrachloroethene (PCE)	21.2	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,2,3-Trichlorobenzene	16.6	---	2.00	ug/L	1	20.0	---	83	80 - 120%	---	---	
1,2,4-Trichlorobenzene	16.1	---	2.00	ug/L	1	20.0	---	80	80 - 120%	---	---	
1,1,1-Trichloroethane	20.4	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,1,2-Trichloroethane	20.7	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
Trichloroethene (TCE)	23.2	---	0.400	ug/L	1	20.0	---	116	80 - 120%	---	---	
Trichlorofluoromethane	29.8	---	2.00	ug/L	1	20.0	---	149	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Vinyl chloride	20.5	---	0.400	ug/L	1	20.0	---	103	80 - 120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 108 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>94 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>95 %</i>		<i>80-120 %</i>		<i>"</i>						



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 ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100338 - Method Prep: Aq						Water						
Blank (0100338-BLK1)		Prepared: 10/09/20 16:00 Analyzed: 10/09/20 16:28										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	
LCS (0100338-BS1)		Prepared: 10/09/20 16:00 Analyzed: 10/09/20 16:29										
SM 4500-NH3 G												
Ammonia as N	2.05	---	0.0200	mg/L	1	2.00	---	103	87 - 116%	---	---	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100498 - Method Prep: Aq						Water						
Blank (0100498-BLK1)		Prepared: 10/15/20 09:51 Analyzed: 10/15/20 11:42										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	---
LCS (0100498-BS1)		Prepared: 10/15/20 09:51 Analyzed: 10/15/20 11:44										
SM 4500-NH3 G												
Ammonia as N	1.95	---	0.0200	mg/L	1	2.00	---	97	87 - 116%	---	---	---

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QUALITY CONTROL (QC) SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100313 - Method Prep: Aq						Water						
Blank (0100313-BLK1)		Prepared: 10/09/20 09:38		Analyzed: 10/09/20 11:55								
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
LCS (0100313-BS1)		Prepared: 10/09/20 09:38		Analyzed: 10/09/20 12:17								
EPA 300.0												
Nitrate-Nitrogen	2.03	---	0.250	mg/L	1	2.00	---	101	90 - 110%	---	---	---
Nitrite-Nitrogen	2.05	---	0.250	mg/L	1	2.00	---	102	90 - 110%	---	---	---
Duplicate (0100313-DUP1)		Prepared: 10/09/20 09:38		Analyzed: 10/09/20 14:48								
QC Source Sample: MW-6 (A0J0279-01)												
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	5%	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	---
Duplicate (0100313-DUP2)		Prepared: 10/09/20 09:38		Analyzed: 10/09/20 17:40								
QC Source Sample: MW-22i (A0J0279-04)												
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	5%	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	---
Matrix Spike (0100313-MS1)		Prepared: 10/09/20 09:38		Analyzed: 10/09/20 15:09								
QC Source Sample: MW-6 (A0J0279-01)												
EPA 300.0												
Nitrate-Nitrogen	2.43	---	0.312	mg/L	1	2.50	ND	97	86 - 118%	---	---	---
Nitrite-Nitrogen	2.54	---	0.312	mg/L	1	2.50	ND	102	82 - 117%	---	---	---
Matrix Spike (0100313-MS2)		Prepared: 10/09/20 09:38		Analyzed: 10/09/20 18:02								
QC Source Sample: MW-22i (A0J0279-04)												
EPA 300.0												
Nitrate-Nitrogen	2.55	---	0.312	mg/L	1	2.50	ND	102	86 - 118%	---	---	---
Nitrite-Nitrogen	2.55	---	0.312	mg/L	1	2.50	ND	102	82 - 117%	---	---	---

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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100370 - Method Prep: Aq						Water						
Blank (0100370-BLK1)		Prepared: 10/12/20 09:17 Analyzed: 10/12/20 14:51										
<u>SM 5310 C</u>												
Total Organic Carbon	ND	---	1.00	mg/L	1	---	---	---	---	---	---	---
LCS (0100370-BS1)		Prepared: 10/12/20 09:17 Analyzed: 10/12/20 15:23										
<u>SM 5310 C</u>												
Total Organic Carbon	10.3	---	1.00	mg/L	1	10.0	---	103	90 - 114%	---	---	---



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SAMPLE PREPARATION INFORMATION

Halogenated Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100356</u>							
A0J0279-01	Water	EPA 8260D	10/08/20 08:18	10/10/20 14:14	5mL/5mL	5mL/5mL	1.00
A0J0279-02	Water	EPA 8260D	10/08/20 08:56	10/10/20 14:14	5mL/5mL	5mL/5mL	1.00
A0J0279-03	Water	EPA 8260D	10/08/20 09:35	10/10/20 14:14	5mL/5mL	5mL/5mL	1.00
A0J0279-04	Water	EPA 8260D	10/08/20 10:20	10/10/20 14:14	5mL/5mL	5mL/5mL	1.00
A0J0279-05	Water	EPA 8260D	10/08/20 11:03	10/10/20 14:14	5mL/5mL	5mL/5mL	1.00
A0J0279-06	Water	EPA 8260D	10/08/20 11:44	10/10/20 14:14	5mL/5mL	5mL/5mL	1.00
A0J0279-07	Water	EPA 8260D	10/08/20 12:33	10/10/20 14:14	5mL/5mL	5mL/5mL	1.00
A0J0279-10	Water	EPA 8260D	10/08/20 14:25	10/10/20 14:14	5mL/5mL	5mL/5mL	1.00
A0J0279-11	Water	EPA 8260D	10/08/20 00:00	10/10/20 14:14	5mL/5mL	5mL/5mL	1.00
<u>Batch: 0100407</u>							
A0J0279-08RE1	Water	EPA 8260D	10/08/20 13:15	10/13/20 09:00	5mL/5mL	5mL/5mL	1.00
A0J0279-09RE1	Water	EPA 8260D	10/08/20 13:15	10/13/20 09:00	5mL/5mL	5mL/5mL	1.00

Ammonia by Gas Diffusion and Colorimetric Detection

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100338</u>							
A0J0279-01	Water	SM 4500-NH3 G	10/08/20 08:18	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0279-02	Water	SM 4500-NH3 G	10/08/20 08:56	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0279-03	Water	SM 4500-NH3 G	10/08/20 09:35	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0279-04	Water	SM 4500-NH3 G	10/08/20 10:20	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0279-05	Water	SM 4500-NH3 G	10/08/20 11:03	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0279-06	Water	SM 4500-NH3 G	10/08/20 11:44	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0279-07RE1	Water	SM 4500-NH3 G	10/08/20 12:33	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0279-08RE1	Water	SM 4500-NH3 G	10/08/20 13:15	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0279-09RE1	Water	SM 4500-NH3 G	10/08/20 13:15	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
<u>Batch: 0100498</u>							
A0J0279-10RE1	Water	SM 4500-NH3 G	10/08/20 14:25	10/15/20 09:51	10mL/10mL	10mL/10mL	1.00

Anions by Ion Chromatography

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100313</u>							

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SAMPLE PREPARATION INFORMATION

Anions by Ion Chromatography

<u>Prep: Method Prep: Aq</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
A0J0279-01	Water	EPA 300.0	10/08/20 08:18	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0279-02	Water	EPA 300.0	10/08/20 08:56	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0279-03	Water	EPA 300.0	10/08/20 09:35	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0279-03RE1	Water	EPA 300.0	10/08/20 09:35	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0279-04	Water	EPA 300.0	10/08/20 10:20	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0279-05RE1	Water	EPA 300.0	10/08/20 11:03	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0279-06RE1	Water	EPA 300.0	10/08/20 11:44	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0279-07	Water	EPA 300.0	10/08/20 12:33	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0279-07RE1	Water	EPA 300.0	10/08/20 12:33	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0279-08RE1	Water	EPA 300.0	10/08/20 13:15	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0279-09RE1	Water	EPA 300.0	10/08/20 13:15	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0279-10	Water	EPA 300.0	10/08/20 14:25	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0279-10RE1	Water	EPA 300.0	10/08/20 14:25	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

<u>Prep: Method Prep: Aq</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 0100370</u>							
A0J0279-06	Water	SM 5310 C	10/08/20 11:44	10/12/20 09:17	40mL/40mL	40mL/40mL	1.00
A0J0279-08	Water	SM 5310 C	10/08/20 13:15	10/12/20 09:17	40mL/40mL	40mL/40mL	1.00
A0J0279-09	Water	SM 5310 C	10/08/20 13:15	10/12/20 09:17	40mL/40mL	40mL/40mL	1.00
A0J0279-10	Water	SM 5310 C	10/08/20 14:25	10/12/20 09:17	40mL/40mL	40mL/40mL	1.00



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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- EST** Result reported as an Estimated Value. Result estimated. Initial Calibration Verification Standard (ICV) failed low.
- ESTa** Result reported as an Estimated Value. Results Estimated. Initial Calibration Verification (ICV) failed low.
- Q-55** Daily CCV/LCS recovery for this analyte was below the +/-20% criteria listed in EPA 8260, however there is adequate sensitivity to ensure detection at the reporting level.
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260

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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported.
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis. The Result Basis is listed following the units as "dry", "wet", or "" (blank) designation.
 - "dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
 - "wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
 - "" Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) are not included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation)
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
<u>All reported analytes are included in Apex Laboratories' current ORELAP scope.</u>					

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Lisa Domenighini, Client Services Manager

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Cascadia Associates Project: **Shore Terminal-Vancouver**
 5820 SW Kelly Ave Unit B Project Number: **Nustar Vanc 3Q20**
 Portland, OR 97239 Project Manager: **Stephanie Salisbury** **Report ID:**
A0J0279 - 10 29 20 0909

CHAIN OF CUSTODY

Lab # A0J0279 COC 1 of 1

APEX LABS 6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323	Company: Cascadia Assoc. Address: 5820 S Kelly Ave Ste B, Portland Phone: 503 906 6577 Email: sb.salisbury@cascadiaassociates.com	Project Mgr: Stephanie Salisbury Project Name: Nu Star Vanc GWM 2020	Project #:	
Sampled by: J. Weatherford	LAB ID #	DATE	TIME	MATRIX
Site Location: OR WA CA AK ID	SAMPLE ID	# OF CONTAINERS	NWTPH-CD	NWTPH-DX
			NWTPH-GX	8260 REX
			8260 RBDM VOCs	8260 Halo VOCs
			8260 VOCs Full List	8270 SIM PAHs
			8270 Semi-Volat Full List	8081 Pest
			8082 PCBs	RCRA Metals (8)
			Priority Metals (13)	AL, SB, AS, BA, BR, CA, CD, CE, CH, CO, CU, FE, PB, PH, HG, NI, MN, MO, NR, NN, K, SE, AS, NA, TL, V, ZN
			TCLP Metals (8)	TOTAL DISS. TCLP
				ARCHIVE

RELINQUISHED BY: Signature: <u>[Signature]</u> Date: <u>10/18/20</u>	RECEIVED BY: Signature: <u>[Signature]</u> Date: <u>10/18/20</u>
Printed Name: Jon Weatherford 1553 Company: Cascadia Assoc	Printed Name: Hannah Sings 1553 Company: Apex

SPECIAL INSTRUCTIONS:
 VOC same list as Nu Star Vanc GWM 2020
 Ethane / Ethane Methane by RSK-175

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: _____

SAMPLES ARE HELD FOR 30 DAYS

Apex Laboratories

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Lisa Domenighini

Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0279 - 10 29 20 0909
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APEX LABS COOLER RECEIPT FORM

Client: Cascadia Assoc. Element WO#: A0 J0279

Project/Project #: Nu Star Vanc GUM 3Q20

Delivery Info:
Date/time received: 10/8/20 @ 15:53 By: HAS
Delivered by: Apex Client ESS FedEx UPS Swift Senvoy SDS Other

Cooler Inspection Date/time inspected: HAS @ 11:30 By: HAS
Chain of Custody included? Yes No ^{10/8/20} Custody seals? Yes No
Signed/dated by client? Yes No
Signed/dated by Apex? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>1.3°</u>						
Received on ice? (Y/N)	<u>Y</u>						
Temp. blanks? (Y/N)	<u>Y</u>						
Ice type: (Gel/Real/Other)	<u>Real</u>						
Condition:	<u>good</u>						

Cooler out of temp? (Y/N) Possible reason why: _____
If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No NA
Out of temperature samples form initiated? Yes/No NA

Samples Inspection: Date/time inspected: 10/8/20 @ 17:07 By: KS
All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: T on MP-1 vials read 1429

COC/container discrepancies form initiated? Yes No
Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA
Comments 16 vials have HS on MW-7 DUP. sed in #3 MW-2

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA
Comments: _____

Additional information: TB # 2417

Labeled by: KS Witness: TBA Cooler Inspected by: KS See Project Contact Form: Y

October 28, 2020

Apex Laboratories
ATTN: Lisa Domenighini
6700 S.W. Sandburg St.
Tigard, OR 97223



LA Cert #04140
EPA Methods TO3, TO14A, TO15, 25C/3C,
RSK-175

TX Cert T104704450-14-6
EPA Methods TO14A, TO15

UT Cert CA0133332015-3
EPA Methods TO3, TO14A, TO15, RSK-175

LABORATORY TEST RESULTS

Project Reference: A0J0279
Lab Number: L101303-01/03

Enclosed are results for sample(s) received 10/13/20 by Air Technology Laboratories. Sample was received intact and chilled to 3° C. Analyses were performed according to specifications on the chain of custody provided with the sample(s).

Report Narrative:

- Unless otherwise noted in the report, sample analyses were performed within method performance criteria and meet all requirements of the TNI Standards.
- The enclosed results relate only to the sample(s).

ATL appreciates the opportunity to provide testing services to your company. If you have any questions regarding these results, please call me at (626) 964-4032.

Sincerely,

A handwritten signature in blue ink, appearing to read "Mark Johnson".

Mark Johnson
Operations Manager
MJohnson@AirTechLabs.com

Note: The cover letter is an integral part of this analytical report.

SUBCONTRACT ORDER

Apex Laboratories

A0J0279

OB 10/18/20

TAM

4/10/303-8/1/23

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Lisa Domenighini

RECEIVING LABORATORY:

Air Technology Laboratories, Inc
18501 E. Gale Ave Suite 130
City of Industry, CA 91748
Phone : (626) 964-4032
Fax: (626) 964-5832

Sample Name: MW-7 Water Sampled: 10/08/20 13:15 (A0J0279-08)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	OB 10/18/20 10/21/20 17:00	10/22/20 13:15	
Containers Supplied:	10/27/20		
(D)40 mL VOA - HCL			
(E)40 mL VOA - HCL			

Sample Name: MW-7 Dup Water Sampled: 10/08/20 13:15 (A0J0279-09)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	OB 10/18/20 10/21/20 17:00	10/22/20 13:15	
Containers Supplied:	10/27/20		
(D)40 mL VOA - HCL			
(E)40 mL VOA - HCL			

Sample Name: MP-1 Water Sampled: 10/08/20 14:25 (A0J0279-10)
T on Confs Read 14:29

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	OB 10/18/20 10/21/20 17:00	10/22/20 14:25	
Containers Supplied:	10/27/20		
(D)40 mL VOA - HCL			
(E)40 mL VOA - HCL			

Standard TAT

30°C

Released By: [Signature] Date: 10/12/20
 Received By: [Signature] Date: 10/13/20
 Released By: [Signature] Date: []
 Received By: [Signature] Date: []

UPS (Shipper)

UPS (Shipper)


1803

Client: Apex Laboratories
Attn: Lisa Domenighini
Project Name: NA
Project No.: A0J0279
Date Received: 10/13/20
Matrix: Water
Reporting Units: ug/L

RSK175

Lab No.:	L101303-01	L101303-02	L101303-03				
Client Sample I.D.:	MW-7 (A0J0279-08)	MW-7 Dup (A0J0279-09)	MP-1 (A0J0279-10)				
Date/Time Sampled:	10/8/20 13:15	10/8/20 13:15	10/8/20 14:25				
Date/Time Analyzed:	10/19/20 15:15	10/19/20 15:27	10/19/20 15:40				
QC Batch No.:	201019GC8A2	201019GC8A2	201019GC8A2				
Analyst Initials:	CM	CM	CM				
Dilution Factor:	1.0	1.0	1.0				
ANALYTE	Result ug/L	RL ug/L	Result ug/L	RL ug/L	Result ug/L	RL ug/L	
Ethene	ND	1.0	ND	1.0	ND	1.0	
Ethane	ND	1.0	ND	1.0	3.8	1.0	
Methane	3,400	1.0	3,600	1.0	460	1.0	

ND = Not Detected (below RL)
 RL = Reporting Limit

Reviewed/Approved By: 
 Mark Johnson
 Operations Manager

Date 10-28-20

The cover letter is an integral part of this analytical report



QC Batch No: 201019GC8A2

Matrix: Water


Reporting Units: ug/L

RSK 175
LABORATORY CONTROL SAMPLE SUMMARY

Lab No.:	METHOD BLANK			LCS		LCSD					
Date/Time Analyzed:	10/19/20 14:30			10/19/20 14:44		10/19/20 14:58					
Analyst Initials:	CM			CM		CM					
Dilution Factor:	1.1			1.0		1.0					
								Limits			
ANALYTE	Result ug/L	RL ug/L	SPIKE AMT. ug/L	Result ug/L	% Rec.	Result ug/L	% Rec.	RPD %	Low %Rec	High %Rec	Max. RPD
Ethene	ND	1.0	1,150	1,130	99	1,140	99	0.1	70	130	30
Ethane	ND	1.0	1,200	1,270	103	1,260	103	0.7	70	130	30
Methane	ND	1.0	650	651	100	643	98	1.3	70	130	30

ND = Not Detected (below RL)

RL = Reporting Limit

Reviewed/Approved By: 
Mark Johnson
Operations Manager

Date: 10-28-20

The cover letter is an integral part of this analytical report





Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Wednesday, October 28, 2020

Stephanie Salisbury
Cascadia Associates
5820 SW Kelly Ave Unit B
Portland, OR 97239

RE: A0J0177 - Shore Terminal-Vancouver - Nustar Vanc GWM 3Q20

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A0J0177, which was received by the laboratory on 10/6/2020 at 4:18:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1 0.8 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <u>Shore Terminal-Vancouver</u> Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MGMS1-43	A0J0177-01	Water	10/06/20 08:01	10/06/20 16:18
MGMS1-60	A0J0177-02	Water	10/06/20 08:29	10/06/20 16:18
MGMS2-60	A0J0177-03	Water	10/06/20 09:17	10/06/20 16:18
MGMS2-40	A0J0177-04	Water	10/06/20 09:43	10/06/20 16:18
MGMS3-60	A0J0177-05	Water	10/06/20 10:22	10/06/20 16:18
MGMS3-40	A0J0177-06	Water	10/06/20 10:48	10/06/20 16:18
MGMS3-40 Dup	A0J0177-07	Water	10/06/20 10:48	10/06/20 16:18
MW-8	A0J0177-08	Water	10/06/20 11:55	10/06/20 16:18
MW-5	A0J0177-09	Water	10/06/20 14:11	10/06/20 16:18

Apex Laboratories

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Lisa Domenighini, Client Services Manager



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6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates

5820 SW Kelly Ave Unit B
Portland, OR 97239

Project: Shore Terminal-Vancouver

Project Number: Nustar Vanc GWM 3Q20

Project Manager: Stephanie Salisbury

Report ID:

A0J0177 - 10 28 20 0952

ANALYTICAL CASE NARRATIVE

Work Order: A0J0177

Subcontract

This report is not complete without the attached subcontract laboratory report for RSK 175 from Air Technology.

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS1-43 (A0J0177-01)				Matrix: Water		Batch: 0100282		
Bromobenzene	ND	---	12.5	ug/L	25	10/08/20 18:59	EPA 8260D	
Bromochloromethane	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
Bromodichloromethane	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
Bromoform	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
Bromomethane	ND	---	125	ug/L	25	10/08/20 18:59	EPA 8260D	
Carbon tetrachloride	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
Chlorobenzene	ND	---	12.5	ug/L	25	10/08/20 18:59	EPA 8260D	
Chloroethane	ND	---	125	ug/L	25	10/08/20 18:59	EPA 8260D	EST
Chloroform	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
Chloromethane	ND	---	125	ug/L	25	10/08/20 18:59	EPA 8260D	
2-Chlorotoluene	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
4-Chlorotoluene	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
Dibromochloromethane	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	125	ug/L	25	10/08/20 18:59	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	12.5	ug/L	25	10/08/20 18:59	EPA 8260D	
Dibromomethane	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
1,2-Dichlorobenzene	ND	---	12.5	ug/L	25	10/08/20 18:59	EPA 8260D	
1,3-Dichlorobenzene	ND	---	12.5	ug/L	25	10/08/20 18:59	EPA 8260D	
1,4-Dichlorobenzene	ND	---	12.5	ug/L	25	10/08/20 18:59	EPA 8260D	
Dichlorodifluoromethane	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
1,1-Dichloroethane	124	---	10.0	ug/L	25	10/08/20 18:59	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	10.0	ug/L	25	10/08/20 18:59	EPA 8260D	
1,1-Dichloroethene	26.0	---	10.0	ug/L	25	10/08/20 18:59	EPA 8260D	
cis-1,2-Dichloroethene	2980	---	10.0	ug/L	25	10/08/20 18:59	EPA 8260D	
trans-1,2-Dichloroethene	45.5	---	10.0	ug/L	25	10/08/20 18:59	EPA 8260D	
1,2-Dichloropropane	ND	---	12.5	ug/L	25	10/08/20 18:59	EPA 8260D	
1,3-Dichloropropane	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
2,2-Dichloropropane	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
1,1-Dichloropropene	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
Hexachlorobutadiene	ND	---	125	ug/L	25	10/08/20 18:59	EPA 8260D	
Methylene chloride	ND	---	250	ug/L	25	10/08/20 18:59	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	10.0	ug/L	25	10/08/20 18:59	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	12.5	ug/L	25	10/08/20 18:59	EPA 8260D	
Tetrachloroethene (PCE)	219	---	10.0	ug/L	25	10/08/20 18:59	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	50.0	ug/L	25	10/08/20 18:59	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	50.0	ug/L	25	10/08/20 18:59	EPA 8260D	
1,1,1-Trichloroethane	ND	---	10.0	ug/L	25	10/08/20 18:59	EPA 8260D	

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS1-43 (A0J0177-01)			Matrix: Water		Batch: 0100282			
1,1,2-Trichloroethane	ND	---	12.5	ug/L	25	10/08/20 18:59	EPA 8260D	
Trichloroethene (TCE)	507	---	10.0	ug/L	25	10/08/20 18:59	EPA 8260D	
Trichlorofluoromethane	ND	---	50.0	ug/L	25	10/08/20 18:59	EPA 8260D	
1,2,3-Trichloropropane	ND	---	25.0	ug/L	25	10/08/20 18:59	EPA 8260D	
Vinyl chloride	48.2	---	10.0	ug/L	25	10/08/20 18:59	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 111 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/08/20 18:59</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/08/20 18:59</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>108 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/08/20 18:59</i>	<i>EPA 8260D</i>

MGMS1-60 (A0J0177-02)			Matrix: Water		Batch: 0100282			
Bromobenzene	ND	---	0.500	ug/L	1	10/08/20 19:53	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/08/20 19:53	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/08/20 19:53	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/08/20 19:53	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/08/20 19:53	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/08/20 19:53	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/08/20 19:53	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 19:53	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 19:53	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 19:53	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
1,1-Dichloroethane	1.16	---	0.400	ug/L	1	10/08/20 19:53	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/08/20 19:53	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/08/20 19:53	EPA 8260D	
cis-1,2-Dichloroethene	16.5	---	0.400	ug/L	1	10/08/20 19:53	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/08/20 19:53	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/08/20 19:53	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS1-60 (A0J0177-02)				Matrix: Water		Batch: 0100282		
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/08/20 19:53	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/08/20 19:53	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/08/20 19:53	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/08/20 19:53	EPA 8260D	
Tetrachloroethene (PCE)	24.0	---	0.400	ug/L	1	10/08/20 19:53	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/08/20 19:53	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/08/20 19:53	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/08/20 19:53	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/08/20 19:53	EPA 8260D	
Trichloroethene (TCE)	15.3	---	0.400	ug/L	1	10/08/20 19:53	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/08/20 19:53	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/08/20 19:53	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/08/20 19:53	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 112 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/08/20 19:53</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/08/20 19:53</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/08/20 19:53</i>	<i>EPA 8260D</i>

MGMS2-60 (A0J0177-03)				Matrix: Water		Batch: 0100282		
Bromobenzene	ND	---	0.500	ug/L	1	10/08/20 20:20	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/08/20 20:20	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/08/20 20:20	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/08/20 20:20	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/08/20 20:20	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/08/20 20:20	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/08/20 20:20	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 20:20	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS2-60 (A0J0177-03)				Matrix: Water		Batch: 0100282		
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 20:20	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 20:20	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
1,1-Dichloroethane	1.21	---	0.400	ug/L	1	10/08/20 20:20	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/08/20 20:20	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/08/20 20:20	EPA 8260D	
cis-1,2-Dichloroethene	28.9	---	0.400	ug/L	1	10/08/20 20:20	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/08/20 20:20	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/08/20 20:20	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/08/20 20:20	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/08/20 20:20	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/08/20 20:20	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/08/20 20:20	EPA 8260D	
Tetrachloroethene (PCE)	32.3	---	0.400	ug/L	1	10/08/20 20:20	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/08/20 20:20	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/08/20 20:20	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/08/20 20:20	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/08/20 20:20	EPA 8260D	
Trichloroethene (TCE)	17.9	---	0.400	ug/L	1	10/08/20 20:20	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/08/20 20:20	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/08/20 20:20	EPA 8260D	
Vinyl chloride	1.38	---	0.400	ug/L	1	10/08/20 20:20	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 111 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/08/20 20:20</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/08/20 20:20</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/08/20 20:20</i>	<i>EPA 8260D</i>

MGMS2-40 (A0J0177-04)				Matrix: Water		Batch: 0100282		
Bromobenzene	ND	---	0.500	ug/L	1	10/08/20 20:47	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/08/20 20:47	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS2-40 (A0J0177-04)				Matrix: Water		Batch: 0100282		
Chlorobenzene	ND	---	0.500	ug/L	1	10/08/20 20:47	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/08/20 20:47	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/08/20 20:47	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/08/20 20:47	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/08/20 20:47	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 20:47	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 20:47	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 20:47	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
1,1-Dichloroethane	19.1	---	0.400	ug/L	1	10/08/20 20:47	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/08/20 20:47	EPA 8260D	
1,1-Dichloroethene	2.45	---	0.400	ug/L	1	10/08/20 20:47	EPA 8260D	
cis-1,2-Dichloroethene	98.4	---	0.400	ug/L	1	10/08/20 20:47	EPA 8260D	
trans-1,2-Dichloroethene	0.635	---	0.400	ug/L	1	10/08/20 20:47	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/08/20 20:47	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/08/20 20:47	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/08/20 20:47	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/08/20 20:47	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/08/20 20:47	EPA 8260D	
Tetrachloroethene (PCE)	101	---	0.400	ug/L	1	10/08/20 20:47	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/08/20 20:47	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/08/20 20:47	EPA 8260D	
1,1,1-Trichloroethane	0.593	---	0.400	ug/L	1	10/08/20 20:47	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/08/20 20:47	EPA 8260D	
Trichloroethene (TCE)	56.2	---	0.400	ug/L	1	10/08/20 20:47	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/08/20 20:47	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/08/20 20:47	EPA 8260D	
Vinyl chloride	148	---	0.400	ug/L	1	10/08/20 20:47	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS2-40 (A0J0177-04)			Matrix: Water		Batch: 0100282			
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 115 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>		<i>10/08/20 20:47</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>	<i>80-120 %</i>	<i>1</i>		<i>10/08/20 20:47</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>110 %</i>	<i>80-120 %</i>	<i>1</i>		<i>10/08/20 20:47</i>	<i>EPA 8260D</i>	

MGMS3-60 (A0J0177-05)			Matrix: Water		Batch: 0100282			
Bromobenzene	ND	---	0.500	ug/L	1	10/08/20 21:15	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/08/20 21:15	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/08/20 21:15	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/08/20 21:15	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/08/20 21:15	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/08/20 21:15	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/08/20 21:15	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 21:15	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 21:15	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 21:15	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
1,1-Dichloroethane	0.444	---	0.400	ug/L	1	10/08/20 21:15	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/08/20 21:15	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/08/20 21:15	EPA 8260D	
cis-1,2-Dichloroethene	10.9	---	0.400	ug/L	1	10/08/20 21:15	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/08/20 21:15	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/08/20 21:15	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/08/20 21:15	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/08/20 21:15	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS3-60 (A0J0177-05)				Matrix: Water		Batch: 0100282		
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/08/20 21:15	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/08/20 21:15	EPA 8260D	
Tetrachloroethene (PCE)	2.36	---	0.400	ug/L	1	10/08/20 21:15	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/08/20 21:15	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/08/20 21:15	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/08/20 21:15	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/08/20 21:15	EPA 8260D	
Trichloroethene (TCE)	2.03	---	0.400	ug/L	1	10/08/20 21:15	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/08/20 21:15	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/08/20 21:15	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/08/20 21:15	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 112 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/08/20 21:15</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/08/20 21:15</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/08/20 21:15</i>	<i>EPA 8260D</i>

MGMS3-40 (A0J0177-06RE1)				Matrix: Water		Batch: 0100336		
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 18:17	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 18:17	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 18:17	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/09/20 18:17	EPA 8260D	ESTa
Chloroform	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 18:17	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 18:17	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 18:17	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 18:17	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 18:17	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 18:17	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
1,1-Dichloroethane	4.23	---	0.400	ug/L	1	10/09/20 18:17	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 18:17	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS3-40 (A0J0177-06RE1)				Matrix: Water		Batch: 0100336		
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 18:17	EPA 8260D	
cis-1,2-Dichloroethene	67.2	---	0.400	ug/L	1	10/09/20 18:17	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 18:17	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 18:17	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 18:17	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 18:17	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 18:17	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 18:17	EPA 8260D	
Tetrachloroethene (PCE)	0.850	---	0.400	ug/L	1	10/09/20 18:17	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 18:17	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 18:17	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/09/20 18:17	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 18:17	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/09/20 18:17	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 18:17	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 18:17	EPA 8260D	
Vinyl chloride	83.9	---	0.400	ug/L	1	10/09/20 18:17	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 113 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/09/20 18:17</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 18:17</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>108 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 18:17</i>	<i>EPA 8260D</i>

MGMS3-40 Dup (A0J0177-07)				Matrix: Water		Batch: 0100282		
Bromobenzene	ND	---	0.500	ug/L	1	10/08/20 21:42	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/08/20 21:42	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/08/20 21:42	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/08/20 21:42	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/08/20 21:42	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS3-40 Dup (A0J0177-07)				Matrix: Water		Batch: 0100282		
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/08/20 21:42	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/08/20 21:42	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 21:42	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 21:42	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 21:42	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
1,1-Dichloroethane	4.38	---	0.400	ug/L	1	10/08/20 21:42	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/08/20 21:42	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/08/20 21:42	EPA 8260D	
cis-1,2-Dichloroethene	66.9	---	0.400	ug/L	1	10/08/20 21:42	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/08/20 21:42	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/08/20 21:42	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/08/20 21:42	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/08/20 21:42	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/08/20 21:42	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/08/20 21:42	EPA 8260D	
Tetrachloroethene (PCE)	0.828	---	0.400	ug/L	1	10/08/20 21:42	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/08/20 21:42	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/08/20 21:42	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/08/20 21:42	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/08/20 21:42	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/08/20 21:42	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/08/20 21:42	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/08/20 21:42	EPA 8260D	
Vinyl chloride	84.0	---	0.400	ug/L	1	10/08/20 21:42	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 109 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/08/20 21:42</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/08/20 21:42</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/08/20 21:42</i>	<i>EPA 8260D</i>

MW-8 (A0J0177-08)

Matrix: Water

Batch: 0100282

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-8 (A0J0177-08)				Matrix: Water		Batch: 0100282		
Bromobenzene	ND	---	0.500	ug/L	1	10/08/20 22:09	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/08/20 22:09	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/08/20 22:09	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/08/20 22:09	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/08/20 22:09	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/08/20 22:09	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/08/20 22:09	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 22:09	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 22:09	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/08/20 22:09	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/08/20 22:09	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/08/20 22:09	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/08/20 22:09	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/08/20 22:09	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/08/20 22:09	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/08/20 22:09	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/08/20 22:09	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/08/20 22:09	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/08/20 22:09	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/08/20 22:09	EPA 8260D	
Tetrachloroethene (PCE)	4.56	---	0.400	ug/L	1	10/08/20 22:09	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/08/20 22:09	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/08/20 22:09	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/08/20 22:09	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
			Matrix: Water			Batch: 0100282		
MW-8 (A0J0177-08)								
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/08/20 22:09	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/08/20 22:09	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/08/20 22:09	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/08/20 22:09	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/08/20 22:09	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 111 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/08/20 22:09</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/08/20 22:09</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>108 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/08/20 22:09</i>	<i>EPA 8260D</i>

			Matrix: Water			Batch: 0100282		
MW-5 (A0J0177-09)								
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 00:24	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 00:24	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 00:24	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 00:24	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 00:24	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 00:24	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 00:24	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 00:24	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 00:24	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/09/20 00:24	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 00:24	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 00:24	EPA 8260D	
cis-1,2-Dichloroethene	5.74	---	0.400	ug/L	1	10/09/20 00:24	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 00:24	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 00:24	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	

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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-5 (A0J0177-09)				Matrix: Water		Batch: 0100282		
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 00:24	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 00:24	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 00:24	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 00:24	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	10/09/20 00:24	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 00:24	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 00:24	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/09/20 00:24	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 00:24	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/09/20 00:24	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 00:24	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 00:24	EPA 8260D	
Vinyl chloride	1.10	---	0.400	ug/L	1	10/09/20 00:24	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 113 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/09/20 00:24</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 00:24</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 00:24</i>	<i>EPA 8260D</i>

MW-5 (A0J0177-09RE1)				Matrix: Water		Batch: 0100357		
Chloroethane	8.79	---	5.00	ug/L	1	10/10/20 16:18	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/10/20 16:18</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 16:18</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>94 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 16:18</i>	<i>EPA 8260D</i>

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ANALYTICAL SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS1-43 (A0J0177-01)				Matrix: Water		Batch: 0100200		
Ammonia as N	214	---	1.00	mg/L	50	10/07/20 15:36	SM 4500-NH3 G	
MGMS1-60 (A0J0177-02)				Matrix: Water		Batch: 0100200		
Ammonia as N	ND	---	0.0200	mg/L	1	10/07/20 15:37	SM 4500-NH3 G	
MGMS2-60 (A0J0177-03)				Matrix: Water		Batch: 0100200		
Ammonia as N	0.306	---	0.0200	mg/L	1	10/07/20 15:39	SM 4500-NH3 G	
MGMS2-40 (A0J0177-04)				Matrix: Water		Batch: 0100200		
Ammonia as N	80.8	---	1.00	mg/L	50	10/07/20 15:40	SM 4500-NH3 G	
MGMS3-60 (A0J0177-05)				Matrix: Water		Batch: 0100200		
Ammonia as N	ND	---	0.0200	mg/L	1	10/07/20 15:42	SM 4500-NH3 G	
MGMS3-40 (A0J0177-06RE1)				Matrix: Water		Batch: 0100266		
Ammonia as N	1.68	---	0.0200	mg/L	1	10/09/20 13:37	SM 4500-NH3 G	
MGMS3-40 Dup (A0J0177-07RE1)				Matrix: Water		Batch: 0100266		
Ammonia as N	1.64	---	0.0200	mg/L	1	10/09/20 13:41	SM 4500-NH3 G	
MW-8 (A0J0177-08)				Matrix: Water		Batch: 0100200		
Ammonia as N	ND	---	0.0200	mg/L	1	10/07/20 15:09	SM 4500-NH3 G	
MW-5 (A0J0177-09RE2)				Matrix: Water		Batch: 0100266		
Ammonia as N	9.20	---	0.0400	mg/L	2	10/09/20 16:04	SM 4500-NH3 G	

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS1-43 (A0J0177-01RE1)				Matrix: Water				
Batch: 0100213								
Nitrate-Nitrogen	40.7	---	2.50	mg/L	10	10/08/20 01:58	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/07/20 15:54	EPA 300.0	
MGMS1-60 (A0J0177-02)				Matrix: Water				
Batch: 0100213								
Nitrate-Nitrogen	2.49	---	0.250	mg/L	1	10/07/20 16:15	EPA 300.0	M-02
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/07/20 16:15	EPA 300.0	
MGMS2-60 (A0J0177-03)				Matrix: Water				
Batch: 0100213								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/07/20 17:20	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/07/20 17:20	EPA 300.0	
MGMS2-40 (A0J0177-04)				Matrix: Water				
Batch: 0100213								
Nitrate-Nitrogen	6.08	---	0.250	mg/L	1	10/07/20 17:42	EPA 300.0	
Nitrite-Nitrogen	0.253	---	0.250	mg/L	1	10/07/20 17:42	EPA 300.0	
MGMS3-60 (A0J0177-05)				Matrix: Water				
Batch: 0100213								
Nitrate-Nitrogen	0.296	---	0.250	mg/L	1	10/07/20 18:03	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/07/20 18:03	EPA 300.0	
MGMS3-40 (A0J0177-06)				Matrix: Water				
Batch: 0100213								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/07/20 19:08	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/07/20 19:08	EPA 300.0	
MGMS3-40 Dup (A0J0177-07)				Matrix: Water				
Batch: 0100213								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/07/20 20:13	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/07/20 20:13	EPA 300.0	
MW-8 (A0J0177-08RE1)				Matrix: Water				
Batch: 0100213								

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-8 (A0J0177-08RE1)				Matrix: Water				
Nitrate-Nitrogen	248	---	12.5	mg/L	50	10/08/20 20:31	EPA 300.0	H-01
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/07/20 20:56	EPA 300.0	
MW-5 (A0J0177-09)				Matrix: Water				
Batch: 0100213								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/07/20 21:17	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/07/20 21:17	EPA 300.0	



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ANALYTICAL SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS1-43 (A0J0177-01)				Matrix: Water		Batch: 0100370		
Total Organic Carbon	5.30	---	1.00	mg/L	1	10/12/20 19:54	SM 5310 C	
MGMS2-40 (A0J0177-04)				Matrix: Water		Batch: 0100370		
Total Organic Carbon	5.15	---	1.00	mg/L	1	10/12/20 21:29	SM 5310 C	
MGMS3-40 (A0J0177-06)				Matrix: Water		Batch: 0100370		
Total Organic Carbon	3.15	---	1.00	mg/L	1	10/12/20 22:01	SM 5310 C	
MGMS3-40 Dup (A0J0177-07)				Matrix: Water		Batch: 0100370		
Total Organic Carbon	2.82	---	1.00	mg/L	1	10/12/20 22:33	SM 5310 C	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100282 - EPA 5030B						Water						
Blank (0100282-BLK1)		Prepared: 10/08/20 12:36		Analyzed: 10/08/20 15:21								
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromoform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	EST
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100282 - EPA 5030B						Water						
Blank (0100282-BLK1)	Prepared: 10/08/20 12:36			Analyzed: 10/08/20 15:21								
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 110 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>"</i>						

LCS (0100282-BS2)						Prepared: 10/08/20 12:36 Analyzed: 10/08/20 14:26						
EPA 8260D												
Bromobenzene	20.2	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
Bromochloromethane	23.1	---	1.00	ug/L	1	20.0	---	116	80 - 120%	---	---	
Bromodichloromethane	21.9	---	1.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
Bromoform	24.3	---	1.00	ug/L	1	20.0	---	122	80 - 120%	---	---	Q-56
Bromomethane	27.3	---	5.00	ug/L	1	20.0	---	137	80 - 120%	---	---	Q-56
Carbon tetrachloride	22.9	---	1.00	ug/L	1	20.0	---	114	80 - 120%	---	---	
Chlorobenzene	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Chloroethane	20.0	---	5.00	ug/L	1	20.0	---	100	80 - 120%	---	---	EST
Chloroform	21.1	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
Chloromethane	18.2	---	5.00	ug/L	1	20.0	---	91	80 - 120%	---	---	
2-Chlorotoluene	19.9	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
4-Chlorotoluene	18.3	---	1.00	ug/L	1	20.0	---	91	80 - 120%	---	---	
Dibromochloromethane	24.0	---	1.00	ug/L	1	20.0	---	120	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	19.0	---	5.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.5	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
Dibromomethane	21.9	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,2-Dichlorobenzene	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100282 - EPA 5030B												
						Water						
LCS (0100282-BS2)	Prepared: 10/08/20 12:36					Analyzed: 10/08/20 14:26						
1,3-Dichlorobenzene	20.7	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
1,4-Dichlorobenzene	19.9	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Dichlorodifluoromethane	19.1	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
1,1-Dichloroethane	19.6	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	19.5	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,1-Dichloroethene	20.4	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.0	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
trans-1,2-Dichloroethene	20.3	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,2-Dichloropropane	19.7	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,3-Dichloropropane	19.9	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
2,2-Dichloropropane	17.9	---	1.00	ug/L	1	20.0	---	89	80 - 120%	---	---	
1,1-Dichloropropene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
cis-1,3-Dichloropropene	18.5	---	1.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
trans-1,3-Dichloropropene	17.9	---	1.00	ug/L	1	20.0	---	89	80 - 120%	---	---	
Hexachlorobutadiene	20.3	---	5.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
Methylene chloride	20.9	---	10.0	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	22.4	---	0.400	ug/L	1	20.0	---	112	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	19.7	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Tetrachloroethene (PCE)	21.4	---	0.400	ug/L	1	20.0	---	107	80 - 120%	---	---	
1,2,3-Trichlorobenzene	17.3	---	2.00	ug/L	1	20.0	---	87	80 - 120%	---	---	
1,2,4-Trichlorobenzene	17.4	---	2.00	ug/L	1	20.0	---	87	80 - 120%	---	---	
1,1,1-Trichloroethane	20.1	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,1,2-Trichloroethane	20.9	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
Trichloroethene (TCE)	23.2	---	0.400	ug/L	1	20.0	---	116	80 - 120%	---	---	
Trichlorofluoromethane	28.2	---	2.00	ug/L	1	20.0	---	141	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	20.6	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
Vinyl chloride	20.9	---	0.400	ug/L	1	20.0	---	105	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr) Recovery: 107 % Limits: 80-120 % Dilution: 1x												
Toluene-d8 (Surr) 96 % 80-120 % "												
4-Bromofluorobenzene (Surr) 95 % 80-120 % "												

Matrix Spike (0100282-MS1) Prepared: 10/08/20 12:36 Analyzed: 10/09/20 00:51

QC Source Sample: MW-5 (A0J0177-09)

EPA 8260D

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100282 - EPA 5030B												
Water												
Matrix Spike (0100282-MS1)			Prepared: 10/08/20 12:36 Analyzed: 10/09/20 00:51									
QC Source Sample: MW-5 (A0J0177-09)												
Bromobenzene	20.8	---	0.500	ug/L	1	20.0	ND	104	80 - 120%	---	---	
Bromochloromethane	24.1	---	1.00	ug/L	1	20.0	ND	120	78 - 123%	---	---	
Bromodichloromethane	22.5	---	1.00	ug/L	1	20.0	ND	113	79 - 125%	---	---	
Bromoform	24.7	---	1.00	ug/L	1	20.0	ND	124	66 - 130%	---	---	Q-54b
Bromomethane	31.3	---	5.00	ug/L	1	20.0	ND	157	53 - 141%	---	---	Q-54a
Carbon tetrachloride	25.0	---	1.00	ug/L	1	20.0	ND	125	72 - 136%	---	---	
Chlorobenzene	21.2	---	0.500	ug/L	1	20.0	ND	106	80 - 120%	---	---	
Chloroethane	30.7	---	5.00	ug/L	1	20.0	13.7	85	60 - 138%	---	---	EST
Chloroform	22.0	---	1.00	ug/L	1	20.0	ND	110	79 - 124%	---	---	
Chloromethane	18.6	---	5.00	ug/L	1	20.0	ND	93	50 - 139%	---	---	
2-Chlorotoluene	21.0	---	1.00	ug/L	1	20.0	ND	105	79 - 122%	---	---	
4-Chlorotoluene	18.7	---	1.00	ug/L	1	20.0	ND	94	78 - 122%	---	---	
Dibromochloromethane	24.1	---	1.00	ug/L	1	20.0	ND	121	74 - 126%	---	---	
1,2-Dibromo-3-chloropropane	20.0	---	5.00	ug/L	1	20.0	ND	100	62 - 128%	---	---	
1,2-Dibromoethane (EDB)	20.4	---	0.500	ug/L	1	20.0	ND	102	77 - 121%	---	---	
Dibromomethane	22.5	---	1.00	ug/L	1	20.0	ND	113	79 - 123%	---	---	
1,2-Dichlorobenzene	20.6	---	0.500	ug/L	1	20.0	ND	103	80 - 120%	---	---	
1,3-Dichlorobenzene	21.1	---	0.500	ug/L	1	20.0	ND	106	80 - 120%	---	---	
1,4-Dichlorobenzene	20.7	---	0.500	ug/L	1	20.0	ND	104	79 - 120%	---	---	
Dichlorodifluoromethane	20.1	---	1.00	ug/L	1	20.0	ND	100	32 - 152%	---	---	
1,1-Dichloroethane	20.8	---	0.400	ug/L	1	20.0	ND	104	77 - 125%	---	---	
1,2-Dichloroethane (EDC)	20.0	---	0.400	ug/L	1	20.0	ND	100	73 - 128%	---	---	
1,1-Dichloroethene	21.9	---	0.400	ug/L	1	20.0	ND	109	71 - 131%	---	---	
cis-1,2-Dichloroethene	26.3	---	0.400	ug/L	1	20.0	5.74	103	78 - 123%	---	---	
trans-1,2-Dichloroethene	21.3	---	0.400	ug/L	1	20.0	ND	106	75 - 124%	---	---	
1,2-Dichloropropane	20.5	---	0.500	ug/L	1	20.0	ND	102	78 - 122%	---	---	
1,3-Dichloropropane	19.7	---	1.00	ug/L	1	20.0	ND	98	80 - 120%	---	---	
2,2-Dichloropropane	15.0	---	1.00	ug/L	1	20.0	ND	75	60 - 139%	---	---	
1,1-Dichloropropene	21.2	---	1.00	ug/L	1	20.0	ND	106	79 - 125%	---	---	
cis-1,3-Dichloropropene	16.8	---	1.00	ug/L	1	20.0	ND	84	75 - 124%	---	---	
trans-1,3-Dichloropropene	17.2	---	1.00	ug/L	1	20.0	ND	86	73 - 127%	---	---	
Hexachlorobutadiene	20.4	---	5.00	ug/L	1	20.0	ND	102	66 - 134%	---	---	
Methylene chloride	21.3	---	10.0	ug/L	1	20.0	ND	107	74 - 124%	---	---	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100282 - EPA 5030B						Water						
Matrix Spike (0100282-MS1)			Prepared: 10/08/20 12:36 Analyzed: 10/09/20 00:51									
QC Source Sample: MW-5 (A0J0177-09)												
1,1,1,2-Tetrachloroethane	23.1	---	0.400	ug/L	1	20.0	ND	115	78 - 124%	---	---	
1,1,2,2-Tetrachloroethane	20.8	---	0.500	ug/L	1	20.0	ND	104	71 - 121%	---	---	
Tetrachloroethene (PCE)	22.5	---	0.400	ug/L	1	20.0	ND	112	74 - 129%	---	---	
1,2,3-Trichlorobenzene	17.2	---	2.00	ug/L	1	20.0	ND	86	69 - 129%	---	---	
1,2,4-Trichlorobenzene	16.9	---	2.00	ug/L	1	20.0	ND	85	69 - 130%	---	---	
1,1,1-Trichloroethane	21.1	---	0.400	ug/L	1	20.0	ND	106	74 - 131%	---	---	
1,1,2-Trichloroethane	21.1	---	0.500	ug/L	1	20.0	ND	106	80 - 120%	---	---	
Trichloroethene (TCE)	23.9	---	0.400	ug/L	1	20.0	ND	119	79 - 123%	---	---	
Trichlorofluoromethane	31.7	---	2.00	ug/L	1	20.0	ND	158	65 - 141%	---	---	Q-54c
1,2,3-Trichloropropane	20.7	---	1.00	ug/L	1	20.0	ND	103	73 - 122%	---	---	
Vinyl chloride	22.7	---	0.400	ug/L	1	20.0	1.10	108	58 - 137%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 108 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>93 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>96 %</i>		<i>80-120 %</i>		<i>"</i>						



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100336 - EPA 5030B						Water						
Blank (0100336-BLK1)		Prepared: 10/09/20 14:00		Analyzed: 10/09/20 16:55								
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromoform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	ESTa
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100336 - EPA 5030B												
Water												
Blank (0100336-BLK1)	Prepared: 10/09/20 14:00 Analyzed: 10/09/20 16:55											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)	Recovery: 108 %		Limits: 80-120 %		Dilution: 1x							
Toluene-d8 (Surr)	102 %		80-120 %		"							
4-Bromofluorobenzene (Surr)	107 %		80-120 %		"							

LCS (0100336-BS1)												
Prepared: 10/09/20 14:00 Analyzed: 10/09/20 16:01												
EPA 8260D												
Bromobenzene	20.5	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Bromochloromethane	23.7	---	1.00	ug/L	1	20.0	---	119	80 - 120%	---	---	
Bromodichloromethane	22.4	---	1.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
Bromoform	25.9	---	1.00	ug/L	1	20.0	---	130	80 - 120%	---	---	Q-56
Bromomethane	28.9	---	5.00	ug/L	1	20.0	---	145	80 - 120%	---	---	Q-56
Carbon tetrachloride	23.3	---	1.00	ug/L	1	20.0	---	116	80 - 120%	---	---	
Chlorobenzene	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Chloroethane	21.1	---	5.00	ug/L	1	20.0	---	105	80 - 120%	---	---	ESTa
Chloroform	21.4	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
Chloromethane	18.5	---	5.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
2-Chlorotoluene	20.3	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
4-Chlorotoluene	18.4	---	1.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
Dibromochloromethane	25.2	---	1.00	ug/L	1	20.0	---	126	80 - 120%	---	---	Q-56
1,2-Dibromo-3-chloropropane	20.4	---	5.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	21.1	---	0.500	ug/L	1	20.0	---	106	80 - 120%	---	---	
Dibromomethane	22.6	---	1.00	ug/L	1	20.0	---	113	80 - 120%	---	---	
1,2-Dichlorobenzene	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100336 - EPA 5030B						Water						
LCS (0100336-BS1)	Prepared: 10/09/20 14:00		Analyzed: 10/09/20 16:01									
1,3-Dichlorobenzene	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,4-Dichlorobenzene	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Dichlorodifluoromethane	18.0	---	1.00	ug/L	1	20.0	---	90	80 - 120%	---	---	
1,1-Dichloroethane	19.8	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	19.3	---	0.400	ug/L	1	20.0	---	96	80 - 120%	---	---	
1,1-Dichloroethene	20.1	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.3	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
trans-1,2-Dichloroethene	20.0	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,2-Dichloropropane	20.5	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,3-Dichloropropane	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
2,2-Dichloropropane	17.1	---	1.00	ug/L	1	20.0	---	85	80 - 120%	---	---	
1,1-Dichloropropene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
cis-1,3-Dichloropropene	19.1	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
trans-1,3-Dichloropropene	18.2	---	1.00	ug/L	1	20.0	---	91	80 - 120%	---	---	
Hexachlorobutadiene	19.1	---	5.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
Methylene chloride	21.2	---	10.0	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	23.0	---	0.400	ug/L	1	20.0	---	115	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Tetrachloroethene (PCE)	21.0	---	0.400	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,2,3-Trichlorobenzene	17.2	---	2.00	ug/L	1	20.0	---	86	80 - 120%	---	---	
1,2,4-Trichlorobenzene	16.7	---	2.00	ug/L	1	20.0	---	83	80 - 120%	---	---	
1,1,1-Trichloroethane	20.0	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,1,2-Trichloroethane	21.0	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
Trichloroethene (TCE)	23.8	---	0.400	ug/L	1	20.0	---	119	80 - 120%	---	---	
Trichlorofluoromethane	29.5	---	2.00	ug/L	1	20.0	---	147	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	20.6	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
Vinyl chloride	20.0	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>	<i>Recovery: 108 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>							
<i>Toluene-d8 (Surr)</i>	<i>96 %</i>		<i>80-120 %</i>		<i>"</i>							
<i>4-Bromofluorobenzene (Surr)</i>	<i>96 %</i>		<i>80-120 %</i>		<i>"</i>							

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100357 - EPA 5030B						Water						
Blank (0100357-BLK1)		Prepared: 10/10/20 12:30			Analyzed: 10/10/20 14:28							
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromoform	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100357 - EPA 5030B												
Water												
Blank (0100357-BLK1)	Prepared: 10/10/20 12:30 Analyzed: 10/10/20 14:28											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>94 %</i>		<i>80-120 %</i>		<i>"</i>						

LCS (0100357-BS1)												
Prepared: 10/10/20 12:30 Analyzed: 10/10/20 13:33												
EPA 8260D												
Bromobenzene	18.3	---	0.500	ug/L	1	20.0	---	91	80 - 120%	---	---	
Bromochloromethane	20.6	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
Bromodichloromethane	21.5	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
Bromoform	19.8	---	2.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
Bromomethane	12.2	---	5.00	ug/L	1	20.0	---	61	80 - 120%	---	---	Q-55
Carbon tetrachloride	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
Chlorobenzene	18.4	---	0.500	ug/L	1	20.0	---	92	80 - 120%	---	---	
Chloroethane	21.5	---	5.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Chloroform	20.1	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Chloromethane	24.9	---	5.00	ug/L	1	20.0	---	125	80 - 120%	---	---	Q-56
2-Chlorotoluene	18.7	---	1.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
4-Chlorotoluene	18.7	---	1.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
Dibromochloromethane	17.8	---	1.00	ug/L	1	20.0	---	89	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	20.5	---	5.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Dibromomethane	20.1	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,2-Dichlorobenzene	18.7	---	0.500	ug/L	1	20.0	---	94	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100357 - EPA 5030B						Water						
LCS (0100357-BS1)			Prepared: 10/10/20 12:30		Analyzed: 10/10/20 13:33							
1,3-Dichlorobenzene	18.8	---	0.500	ug/L	1	20.0	---	94	80 - 120%	---	---	
1,4-Dichlorobenzene	18.7	---	0.500	ug/L	1	20.0	---	94	80 - 120%	---	---	
Dichlorodifluoromethane	17.0	---	1.00	ug/L	1	20.0	---	85	80 - 120%	---	---	
1,1-Dichloroethane	20.4	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	20.0	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,1-Dichloroethene	18.2	---	0.400	ug/L	1	20.0	---	91	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.2	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
trans-1,2-Dichloroethene	19.5	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,2-Dichloropropane	20.6	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
1,3-Dichloropropane	20.3	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
2,2-Dichloropropane	19.1	---	1.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
1,1-Dichloropropene	18.5	---	1.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
cis-1,3-Dichloropropene	21.1	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
trans-1,3-Dichloropropene	18.5	---	1.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
Hexachlorobutadiene	18.5	---	5.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
Methylene chloride	23.4	---	10.0	ug/L	1	20.0	---	117	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	21.8	---	0.400	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	21.8	---	0.500	ug/L	1	20.0	---	109	80 - 120%	---	---	
Tetrachloroethene (PCE)	17.7	---	0.400	ug/L	1	20.0	---	89	80 - 120%	---	---	
1,2,3-Trichlorobenzene	19.7	---	2.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,2,4-Trichlorobenzene	19.1	---	2.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
1,1,1-Trichloroethane	19.0	---	0.400	ug/L	1	20.0	---	95	80 - 120%	---	---	
1,1,2-Trichloroethane	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Trichloroethene (TCE)	17.8	---	0.400	ug/L	1	20.0	---	89	80 - 120%	---	---	
Trichlorofluoromethane	20.2	---	2.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,2,3-Trichloropropane	19.7	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
Vinyl chloride	18.9	---	0.400	ug/L	1	20.0	---	94	80 - 120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>94 %</i>		<i>80-120 %</i>		<i>"</i>						



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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC % REC	% REC Limits	RPD RPD	RPD Limit	Notes
Batch 0100200 - Method Prep: Aq						Water						
Blank (0100200-BLK1)		Prepared: 10/07/20 08:43 Analyzed: 10/07/20 15:06										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	---
LCS (0100200-BS1)		Prepared: 10/07/20 08:43 Analyzed: 10/07/20 15:07										
SM 4500-NH3 G												
Ammonia as N	2.20	---	0.0200	mg/L	1	2.00	---	110	87 - 116%	---	---	---
Matrix Spike (0100200-MS1)		Prepared: 10/07/20 08:43 Analyzed: 10/07/20 15:10										
QC Source Sample: MW-8 (A0J0177-08)												
SM 4500-NH3 G												
Ammonia as N	2.61	---	0.0250	mg/L	1	2.50	ND	104	87 - 116%	---	---	---
Matrix Spike Dup (0100200-MSD1)		Prepared: 10/07/20 08:43 Analyzed: 10/07/20 15:12										
QC Source Sample: MW-8 (A0J0177-08)												
SM 4500-NH3 G												
Ammonia as N	2.56	---	0.0250	mg/L	1	2.50	ND	102	87 - 116%	2	13%	---



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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100266 - Method Prep: Aq						Water						
Blank (0100266-BLK1)		Prepared: 10/08/20 09:37 Analyzed: 10/09/20 13:34										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	
LCS (0100266-BS1)		Prepared: 10/08/20 09:37 Analyzed: 10/09/20 13:35										
SM 4500-NH3 G												
Ammonia as N	2.10	---	0.0200	mg/L	1	2.00	---	105	87 - 116%	---	---	
Matrix Spike (0100266-MS1)		Prepared: 10/08/20 09:37 Analyzed: 10/09/20 13:38										
QC Source Sample: MGMS3-40 (A0J0177-06RE1)												
SM 4500-NH3 G												
Ammonia as N	4.26	---	0.0250	mg/L	1	2.50	1.68	103	87 - 116%	---	---	
Matrix Spike Dup (0100266-MSD1)		Prepared: 10/08/20 09:37 Analyzed: 10/09/20 13:40										
QC Source Sample: MGMS3-40 (A0J0177-06RE1)												
SM 4500-NH3 G												
Ammonia as N	4.26	---	0.0250	mg/L	1	2.50	1.68	103	87 - 116%	0.2	13%	



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QUALITY CONTROL (QC) SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100213 - Method Prep: Aq						Water						
Blank (0100213-BLK1)			Prepared: 10/07/20 10:10			Analyzed: 10/07/20 14:49						
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	
LCS (0100213-BS1)			Prepared: 10/07/20 10:10			Analyzed: 10/07/20 15:10						
EPA 300.0												
Nitrate-Nitrogen	2.01	---	0.250	mg/L	1	2.00	---	100	90 - 110%	---	---	
Nitrite-Nitrogen	2.01	---	0.250	mg/L	1	2.00	---	101	90 - 110%	---	---	
Duplicate (0100213-DUP1)			Prepared: 10/07/20 10:10			Analyzed: 10/07/20 16:37						
QC Source Sample: MGMS1-60 (A0J0177-02)												
EPA 300.0												
Nitrate-Nitrogen	2.48	---	0.250	mg/L	1	---	2.49	---	---	0.6	5%	M-02
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	
Duplicate (0100213-DUP2)			Prepared: 10/07/20 10:10			Analyzed: 10/07/20 19:30						
QC Source Sample: MGMS3-40 (A0J0177-06)												
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	5%	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	
Matrix Spike (0100213-MS1)			Prepared: 10/07/20 10:10			Analyzed: 10/07/20 16:58						
QC Source Sample: MGMS1-60 (A0J0177-02)												
EPA 300.0												
Nitrate-Nitrogen	4.91	---	0.312	mg/L	1	2.50	2.49	97	86 - 118%	---	---	M-02
Nitrite-Nitrogen	2.52	---	0.312	mg/L	1	2.50	ND	101	82 - 117%	---	---	
Matrix Spike (0100213-MS2)			Prepared: 10/07/20 10:10			Analyzed: 10/07/20 19:51						
QC Source Sample: MGMS3-40 (A0J0177-06)												
EPA 300.0												
Nitrate-Nitrogen	2.50	---	0.312	mg/L	1	2.50	ND	100	86 - 118%	---	---	
Nitrite-Nitrogen	2.53	---	0.312	mg/L	1	2.50	ND	101	82 - 117%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100370 - Method Prep: Aq						Water						
Blank (0100370-BLK1)		Prepared: 10/12/20 09:17 Analyzed: 10/12/20 14:51										
SM 5310 C												
Total Organic Carbon	ND	---	1.00	mg/L	1	---	---	---	---	---	---	---
LCS (0100370-BS1)		Prepared: 10/12/20 09:17 Analyzed: 10/12/20 15:23										
SM 5310 C												
Total Organic Carbon	10.3	---	1.00	mg/L	1	10.0	---	103	90 - 114%	---	---	---
Duplicate (0100370-DUP1)		Prepared: 10/12/20 09:17 Analyzed: 10/12/20 20:26										
QC Source Sample: MGMS1-43 (A0J0177-01)												
SM 5310 C												
Total Organic Carbon	5.23	---	1.00	mg/L	1	---	5.30	---	---	1	10%	---
Matrix Spike (0100370-MS1)		Prepared: 10/12/20 09:17 Analyzed: 10/12/20 20:57										
QC Source Sample: MGMS1-43 (A0J0177-01)												
SM 5310 C												
Total Organic Carbon	15.2	---	1.01	mg/L	1	10.0	5.30	99	90 - 114%	---	---	---



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
--	--	---

SAMPLE PREPARATION INFORMATION

Halogenated Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100282</u>							
A0J0177-01	Water	EPA 8260D	10/06/20 08:01	10/08/20 12:36	5mL/5mL	5mL/5mL	1.00
A0J0177-02	Water	EPA 8260D	10/06/20 08:29	10/08/20 12:36	5mL/5mL	5mL/5mL	1.00
A0J0177-03	Water	EPA 8260D	10/06/20 09:17	10/08/20 12:36	5mL/5mL	5mL/5mL	1.00
A0J0177-04	Water	EPA 8260D	10/06/20 09:43	10/08/20 12:36	5mL/5mL	5mL/5mL	1.00
A0J0177-05	Water	EPA 8260D	10/06/20 10:22	10/08/20 12:36	5mL/5mL	5mL/5mL	1.00
A0J0177-07	Water	EPA 8260D	10/06/20 10:48	10/08/20 12:36	5mL/5mL	5mL/5mL	1.00
A0J0177-08	Water	EPA 8260D	10/06/20 11:55	10/08/20 12:36	5mL/5mL	5mL/5mL	1.00
A0J0177-09	Water	EPA 8260D	10/06/20 14:11	10/08/20 12:36	5mL/5mL	5mL/5mL	1.00
<u>Batch: 0100336</u>							
A0J0177-06RE1	Water	EPA 8260D	10/06/20 10:48	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
<u>Batch: 0100357</u>							
A0J0177-09RE1	Water	EPA 8260D	10/06/20 14:11	10/10/20 14:47	5mL/5mL	5mL/5mL	1.00

Ammonia by Gas Diffusion and Colorimetric Detection

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100200</u>							
A0J0177-01	Water	SM 4500-NH3 G	10/06/20 08:01	10/07/20 08:43	10mL/10mL	10mL/10mL	1.00
A0J0177-02	Water	SM 4500-NH3 G	10/06/20 08:29	10/07/20 08:43	10mL/10mL	10mL/10mL	1.00
A0J0177-03	Water	SM 4500-NH3 G	10/06/20 09:17	10/07/20 08:43	10mL/10mL	10mL/10mL	1.00
A0J0177-04	Water	SM 4500-NH3 G	10/06/20 09:43	10/07/20 08:43	10mL/10mL	10mL/10mL	1.00
A0J0177-05	Water	SM 4500-NH3 G	10/06/20 10:22	10/07/20 08:43	10mL/10mL	10mL/10mL	1.00
A0J0177-08	Water	SM 4500-NH3 G	10/06/20 11:55	10/07/20 08:43	10mL/10mL	10mL/10mL	1.00
<u>Batch: 0100266</u>							
A0J0177-06RE1	Water	SM 4500-NH3 G	10/06/20 10:48	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0177-07RE1	Water	SM 4500-NH3 G	10/06/20 10:48	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0177-09RE2	Water	SM 4500-NH3 G	10/06/20 14:11	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00

Anions by Ion Chromatography

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100213</u>							
A0J0177-01RE1	Water	EPA 300.0	10/06/20 08:01	10/07/20 10:10	5mL/5mL	5mL/5mL	1.00

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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SAMPLE PREPARATION INFORMATION

Anions by Ion Chromatography

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A0J0177-02	Water	EPA 300.0	10/06/20 08:29	10/07/20 10:10	5mL/5mL	5mL/5mL	1.00
A0J0177-03	Water	EPA 300.0	10/06/20 09:17	10/07/20 10:10	5mL/5mL	5mL/5mL	1.00
A0J0177-04	Water	EPA 300.0	10/06/20 09:43	10/07/20 10:10	5mL/5mL	5mL/5mL	1.00
A0J0177-05	Water	EPA 300.0	10/06/20 10:22	10/07/20 10:10	5mL/5mL	5mL/5mL	1.00
A0J0177-06	Water	EPA 300.0	10/06/20 10:48	10/07/20 10:10	5mL/5mL	5mL/5mL	1.00
A0J0177-07	Water	EPA 300.0	10/06/20 10:48	10/07/20 10:10	5mL/5mL	5mL/5mL	1.00
A0J0177-08RE1	Water	EPA 300.0	10/06/20 11:55	10/07/20 10:10	5mL/5mL	5mL/5mL	1.00
A0J0177-09	Water	EPA 300.0	10/06/20 14:11	10/07/20 10:10	5mL/5mL	5mL/5mL	1.00

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100370</u>							
A0J0177-01	Water	SM 5310 C	10/06/20 08:01	10/12/20 09:17	40mL/40mL	40mL/40mL	1.00
A0J0177-04	Water	SM 5310 C	10/06/20 09:43	10/12/20 09:17	40mL/40mL	40mL/40mL	1.00
A0J0177-06	Water	SM 5310 C	10/06/20 10:48	10/12/20 09:17	40mL/40mL	40mL/40mL	1.00
A0J0177-07	Water	SM 5310 C	10/06/20 10:48	10/12/20 09:17	40mL/40mL	40mL/40mL	1.00



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- EST** Result reported as an Estimated Value. Result estimated. Initial Calibration Verification Standard (ICV) failed low.
- ESTa** Result reported as an Estimated Value. Results Estimated. Initial Calibration Verification (ICV) failed low.
- H-01** This sample was analyzed outside the recommended holding time.
- M-02** Due to matrix interference, this analyte cannot be accurately quantified. The reported result is estimated.
- Q-54a** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +17%. The results are reported as Estimated Values.
- Q-54b** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +2%. The results are reported as Estimated Values.
- Q-54c** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +21%. The results are reported as Estimated Values.
- Q-55** Daily CCV/LCS recovery for this analyte was below the +/-20% criteria listed in EPA 8260, however there is adequate sensitivity to ensure detection at the reporting level.
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported.
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis. The Result Basis is listed following the units as "dry", "wet", or "" (blank) designation.
 - "dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
 - "wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
 - "" Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) are not included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation)

EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
<u>All reported analytes are included in Apex Laboratories' current ORELAP scope.</u>					

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0177 - 10 28 20 0952
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APEX LABS COOLER RECEIPT FORM

Client: Cascadia Assoc. Element WO#: A0J0177

Project/Project #: Nustar Vanc. GWM 3Q20

Delivery Info:

Date/time received: 10/6/20 @ 16:18 By: HAS

Delivered by: Apex Client ESS FedEx UPS Swift Senvoy SDS Other

Cooler Inspection Date/time inspected: 10/6/20 @ 17:07 By: HAS

Chain of Custody included? Yes No Custody seals? Yes No

Signed/dated by client? Yes No

Signed/dated by Apex? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>0.8</u>						
Received on ice? (Y/N)	<u>Yes</u> <i>HAS 10/6/20</i>	<u>Yes</u> <i>HAS 10/6/20</i>					
Temp. blanks? (Y/N)	<u>Yes</u> <i>AS</i>	<u>Yes</u> <i>AS</i>					
Ice type: (Gel/Real/Other)	<u>get real</u> <i>HAS 10/6/20</i>	<u>get real</u> <i>HAS 10/6/20</i>					
Condition:	<u>good</u>						

Cooler out of temp? (Y/N) Possible reason why: NA
If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA

Out of temperature samples form initiated? Yes/No/NA

Samples Inspection: Date/time inspected: 10/6/20 @ 17:33 By: AKK

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: TB #2417 provided, not on COC.

COC/container discrepancies form initiated? Yes No

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information: _____

Labeled by: AKK Witness: OB Cooler Inspected by: AKK See Project Contact Form: Y

Lisa Domenighini

October 27, 2020

Apex Laboratories
ATTN: Lisa Domenighini
6700 S.W. Sandburg St.
Tigard, OR 97223



LA Cert #04140
EPA Methods TO3, TO14A, TO15, 25C/3C,
RSK-175

TX Cert T104704450-14-6
EPA Methods TO14A, TO15

UT Cert CA0133332015-3
EPA Methods TO3, TO14A, TO15, RSK-175

LABORATORY TEST RESULTS

Project Reference: A0J0177
Lab Number: L100807-01/04

Enclosed are results for sample(s) received 10/08/20 by Air Technology Laboratories. Sample was received intact and chilled to 3° C. Analyses were performed according to specifications on the chain of custody provided with the sample(s).

Report Narrative:

- Unless otherwise noted in the report, sample analyses were performed within method performance criteria and meet all requirements of the TNI Standards.
- The enclosed results relate only to the sample(s).

ATL appreciates the opportunity to provide testing services to your company. If you have any questions regarding these results, please call me at (626) 964-4032.

Sincerely,

A handwritten signature in blue ink, appearing to read "Mark Johnson".

Mark Johnson
Operations Manager
MJohnson@AirTechLabs.com

Note: The cover letter is an integral part of this analytical report.

SUBCONTRACT ORDER

Apex Laboratories

A0J0177

L100887-01/04

OB 10/16/20

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Lisa Domenighini

RECEIVING LABORATORY:

Air Technology Laboratories, Inc
18501 E. Gale Ave Suite 130
City of Industry, CA 91748
Phone : (626) 964-4032
Fax: (626) 964-5832

Sample Name: MGMS1-43

Water Sampled: 10/06/20 08:01

A0J0177-01 (A0J0177-01)

Table with 4 columns: Analysis, Due, Expires, Comments. Row 1: RSK 175 Preserved (Meth, Eth, Eth) (Sub) with handwritten due date 10/22/20 and expires 10/20/20 08:01. Includes 'Containers Supplied' details.

Sample Name: MGMS2-40

Water Sampled: 10/06/20 09:43

(A0J0177-04)

Table with 4 columns: Analysis, Due, Expires, Comments. Row 1: RSK 175 Preserved (Meth, Eth, Eth) (Sub) with handwritten due date 10/22/20 and expires 10/20/20 09:43. Includes 'Containers Supplied' details.

Sample Name: MGMS3-40

Water Sampled: 10/06/20 10:48

(A0J0177-06)

Table with 4 columns: Analysis, Due, Expires, Comments. Row 1: RSK 175 Preserved (Meth, Eth, Eth) (Sub) with handwritten due date 10/22/20 and expires 10/20/20 10:48. Includes 'Containers Supplied' details.

Sample Name: MGMS3-40 Dup

Water Sampled: 10/06/20 10:48

(A0J0177-07)

Table with 4 columns: Analysis, Due, Expires, Comments. Row 1: RSK 175 Preserved (Meth, Eth, Eth) (Sub) with handwritten due date 10/22/20 and expires 10/20/20 10:48. Includes 'Containers Supplied' details.

Standard TAT

30

Handwritten signature and date 10/7/20 14:00

UPS (Shipper)

Released By Date Received By Date

UPS (Shipper)

Handwritten signature and date 10/8/20 1017

Released By Date Received By Date

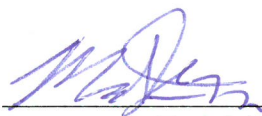
Client: Apex Laboratories
Attn: Lisa Domenighini
Project Name: NA
Project No.: A0J0177
Date Received: 10/08/20
Matrix: Water
Reporting Units: ug/L

RSK175

Lab No.:	L100807-01	L100807-02	L100807-03	L100807-04				
Client Sample I.D.:	MGMS1-43 (A0J0177-01)	MGMS2-40 (A0J0177-04)	MGMS3-40 (A0J0177-06)	MGMS3-40-Dup (A0J0177-07)				
Date/Time Sampled:	10/6/20 8:01	10/6/20 9:43	10/6/20 10:48	10/6/20 10:48				
Date/Time Analyzed:	10/16/20 15:59	10/16/20 16:11	10/16/20 16:23	10/16/20 16:35				
QC Batch No.:	201016GC8A2	201016GC8A2	201016GC8A2	201016GC8A2				
Analyst Initials:	CM	CM	CM	CM				
Dilution Factor:	1.0	1.0	1.0	1.0				
ANALYTE	Result ug/L	RL ug/L	Result ug/L	RL ug/L	Result ug/L	RL ug/L	Result ug/L	RL ug/L
Ethene	ND	1.0	3.8	1.0	4.0	1.0	4.1	1.0
Ethane	21	1.0	5.4	1.0	38	1.0	38	1.0
Methane	820	1.0	14	1.0	6,700	1.0	7,000	1.0

ND = Not Detected (below RL)

RL = Reporting Limit

Reviewed/Approved By: 
 Mark Johnson
 Operations Manager

Date 10-27-20

The cover letter is an integral part of this analytical report

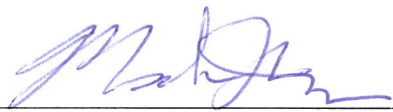


QC Batch No: 201016GC8A2
 Matrix: Water
 Reporting Units: ug/L

RSK 175
LABORATORY CONTROL SAMPLE SUMMARY

Lab No.:	METHOD BLANK		LCS		LCSD						
Date/Time Analyzed:	10/16/20 13:46		10/16/20 14:55		10/16/20 14:27						
Analyst Initials:	CM		CM		CM						
Dilution Factor:	1.1		1.0		1.0		Limits				
ANALYTE	Result ug/L	RL ug/L	SPIKE AMT. ug/L	Result ug/L	% Rec.	Result ug/L	% Rec.	RPD %	Low %Rec	High %Rec	Max. RPD
Ethene	ND	1.0	1,150	1,160	102	1,360	118	15.3	70	130	30
Ethane	ND	1.0	1,200	1,190	97	1,400	114	16.2	70	130	30
Methane	ND	1.0	650	618	94	724	111	15.8	70	130	30

ND = Not Detected (below RL)
 RL = Reporting Limit

Reviewed/Approved By: 
 Mark Johnson
 Operations Manager

Date 10-27-20

The cover letter is an integral part of this analytical report





Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Thursday, October 29, 2020

Stephanie Salisbury
Cascadia Associates
5820 SW Kelly Ave Unit B
Portland, OR 97239

RE: A0J0329 - Shore Terminal-Vancouver - Nustar Vanc GWM 3Q20

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A0J0329, which was received by the laboratory on 10/9/2020 at 4:50:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1 2.7 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-24D	A0J0329-01	Water	10/09/20 08:24	10/09/20 16:50
MW-24i	A0J0329-02	Water	10/09/20 09:11	10/09/20 16:50
MW-32s	A0J0329-03	Water	10/09/20 10:07	10/09/20 16:50
MW-14	A0J0329-04	Water	10/09/20 10:48	10/09/20 16:50

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <u>Shore Terminal-Vancouver</u> Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	<u>Report ID:</u> A0J0329 - 10 29 20 0921
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ANALYTICAL CASE NARRATIVE

Work Order: A0J0329

Subcontract

This report is not complete without the attached subcontract laboratory report for RSK 175 from Air Technology.

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-24D (A0J0329-01)				Matrix: Water		Batch: 0100407		
Bromobenzene	ND	---	0.500	ug/L	1	10/13/20 17:23	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/13/20 17:23	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/13/20 17:23	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/13/20 17:23	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/13/20 17:23	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/13/20 17:23	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/13/20 17:23	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 17:23	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 17:23	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 17:23	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/13/20 17:23	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/13/20 17:23	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/13/20 17:23	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/13/20 17:23	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/13/20 17:23	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/13/20 17:23	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/13/20 17:23	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/13/20 17:23	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/13/20 17:23	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/13/20 17:23	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	10/13/20 17:23	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/13/20 17:23	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/13/20 17:23	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/13/20 17:23	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-24D (A0J0329-01)			Matrix: Water		Batch: 0100407			
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/13/20 17:23	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/13/20 17:23	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/13/20 17:23	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/13/20 17:23	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/13/20 17:23	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 110 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/13/20 17:23</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/13/20 17:23</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/13/20 17:23</i>	<i>EPA 8260D</i>

MW-24i (A0J0329-02)			Matrix: Water		Batch: 0100407			
Bromobenzene	ND	---	0.500	ug/L	1	10/13/20 17:50	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/13/20 17:50	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/13/20 17:50	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/13/20 17:50	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/13/20 17:50	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/13/20 17:50	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/13/20 17:50	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 17:50	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 17:50	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 17:50	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/13/20 17:50	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/13/20 17:50	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/13/20 17:50	EPA 8260D	
cis-1,2-Dichloroethene	1.08	---	0.400	ug/L	1	10/13/20 17:50	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/13/20 17:50	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/13/20 17:50	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-24i (A0J0329-02)				Matrix: Water		Batch: 0100407		
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/13/20 17:50	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/13/20 17:50	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/13/20 17:50	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/13/20 17:50	EPA 8260D	
Tetrachloroethene (PCE)	1.35	---	0.400	ug/L	1	10/13/20 17:50	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/13/20 17:50	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/13/20 17:50	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/13/20 17:50	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/13/20 17:50	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/13/20 17:50	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/13/20 17:50	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/13/20 17:50	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/13/20 17:50	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 114 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/13/20 17:50</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/13/20 17:50</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/13/20 17:50</i>	<i>EPA 8260D</i>

MW-32s (A0J0329-03)				Matrix: Water		Batch: 0100407		
Bromobenzene	ND	---	0.500	ug/L	1	10/13/20 18:17	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/13/20 18:17	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/13/20 18:17	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/13/20 18:17	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/13/20 18:17	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/13/20 18:17	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/13/20 18:17	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 18:17	EPA 8260D	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-32s (A0J0329-03)				Matrix: Water		Batch: 0100407		
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 18:17	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/13/20 18:17	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/13/20 18:17	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/13/20 18:17	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/13/20 18:17	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/13/20 18:17	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/13/20 18:17	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/13/20 18:17	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/13/20 18:17	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/13/20 18:17	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/13/20 18:17	EPA 8260D	
1,1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/13/20 18:17	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	10/13/20 18:17	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/13/20 18:17	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/13/20 18:17	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/13/20 18:17	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/13/20 18:17	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/13/20 18:17	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/13/20 18:17	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/13/20 18:17	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/13/20 18:17	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery:</i>	<i>112 %</i>	<i>Limits:</i>	<i>80-120 %</i>	<i>1</i>	<i>10/13/20 18:17</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>			<i>101 %</i>		<i>80-120 %</i>	<i>1</i>	<i>10/13/20 18:17</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>			<i>107 %</i>		<i>80-120 %</i>	<i>1</i>	<i>10/13/20 18:17</i>	<i>EPA 8260D</i>

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Lisa Domenighini, Client Services Manager



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6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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ANALYTICAL SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-24D (A0J0329-01)				Matrix: Water		Batch: 0100498		
Ammonia as N	0.140	---	0.0200	mg/L	1	10/15/20 11:54	SM 4500-NH3 G	
MW-24i (A0J0329-02)				Matrix: Water		Batch: 0100498		
Ammonia as N	ND	---	0.0200	mg/L	1	10/15/20 11:56	SM 4500-NH3 G	
MW-32s (A0J0329-03)				Matrix: Water		Batch: 0100498		
Ammonia as N	ND	---	0.0200	mg/L	1	10/15/20 12:08	SM 4500-NH3 G	

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-24D (A0J0329-01)				Matrix: Water				
Batch: 0100313								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/10/20 00:30	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/10/20 00:30	EPA 300.0	
MW-24i (A0J0329-02)				Matrix: Water				
Batch: 0100313								
Nitrate-Nitrogen	1.70	---	0.250	mg/L	1	10/10/20 00:52	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/10/20 00:52	EPA 300.0	
MW-32s (A0J0329-03)				Matrix: Water				
Batch: 0100313								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/10/20 01:13	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/10/20 01:13	EPA 300.0	



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ANALYTICAL SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-24i (A0J0329-02)				Matrix: Water		Batch: 0100370		
Total Organic Carbon	1.09	---	1.00	mg/L	1	10/13/20 06:11	SM 5310 C	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100407 - EPA 5030B						Water						
Blank (0100407-BLK1)		Prepared: 10/13/20 08:35		Analyzed: 10/13/20 10:09								
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromoform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	EST
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100407 - EPA 5030B						Water						
Blank (0100407-BLK1)			Prepared: 10/13/20 08:35		Analyzed: 10/13/20 10:09							
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 112 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>"</i>						

LCS (0100407-BS1)			Prepared: 10/13/20 08:35		Analyzed: 10/13/20 09:14							
EPA 8260D												
Bromobenzene	20.5	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Bromochloromethane	23.9	---	1.00	ug/L	1	20.0	---	119	80 - 120%	---	---	
Bromodichloromethane	22.7	---	1.00	ug/L	1	20.0	---	113	80 - 120%	---	---	
Bromoform	24.1	---	1.00	ug/L	1	20.0	---	121	80 - 120%	---	---	Q-56
Bromomethane	25.9	---	5.00	ug/L	1	20.0	---	129	80 - 120%	---	---	Q-56
Carbon tetrachloride	24.0	---	1.00	ug/L	1	20.0	---	120	80 - 120%	---	---	
Chlorobenzene	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Chloroethane	18.5	---	5.00	ug/L	1	20.0	---	92	80 - 120%	---	---	EST
Chloroform	21.8	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Chloromethane	24.3	---	5.00	ug/L	1	20.0	---	122	80 - 120%	---	---	Q-56
2-Chlorotoluene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
4-Chlorotoluene	18.4	---	1.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
Dibromochloromethane	24.0	---	1.00	ug/L	1	20.0	---	120	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	18.7	---	5.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.2	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
Dibromomethane	22.2	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,2-Dichlorobenzene	19.9	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100407 - EPA 5030B												
						Water						
LCS (0100407-BS1)	Prepared: 10/13/20 08:35			Analyzed: 10/13/20 09:14								
1,3-Dichlorobenzene	20.7	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
1,4-Dichlorobenzene	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Dichlorodifluoromethane	18.6	---	1.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
1,1-Dichloroethane	20.1	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	19.8	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,1-Dichloroethene	21.0	---	0.400	ug/L	1	20.0	---	105	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.1	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
trans-1,2-Dichloroethene	20.4	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2-Dichloropropane	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,3-Dichloropropane	19.5	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
2,2-Dichloropropane	17.8	---	1.00	ug/L	1	20.0	---	89	80 - 120%	---	---	
1,1-Dichloropropene	20.4	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
cis-1,3-Dichloropropene	18.0	---	1.00	ug/L	1	20.0	---	90	80 - 120%	---	---	
trans-1,3-Dichloropropene	17.5	---	1.00	ug/L	1	20.0	---	88	80 - 120%	---	---	
Hexachlorobutadiene	19.0	---	5.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
Methylene chloride	21.2	---	10.0	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	22.2	---	0.400	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	20.9	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
Tetrachloroethene (PCE)	21.2	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,2,3-Trichlorobenzene	16.6	---	2.00	ug/L	1	20.0	---	83	80 - 120%	---	---	
1,2,4-Trichlorobenzene	16.1	---	2.00	ug/L	1	20.0	---	80	80 - 120%	---	---	
1,1,1-Trichloroethane	20.4	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,1,2-Trichloroethane	20.7	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
Trichloroethene (TCE)	23.2	---	0.400	ug/L	1	20.0	---	116	80 - 120%	---	---	
Trichlorofluoromethane	29.8	---	2.00	ug/L	1	20.0	---	149	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Vinyl chloride	20.5	---	0.400	ug/L	1	20.0	---	103	80 - 120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr) Recovery: 108 % Limits: 80-120 % Dilution: 1x</i>												
<i>Toluene-d8 (Surr) 94 % 80-120 % "</i>												
<i>4-Bromofluorobenzene (Surr) 95 % 80-120 % "</i>												

Matrix Spike (0100407-MS1) Prepared: 10/13/20 09:00 Analyzed: 10/13/20 18:44

QC Source Sample: MW-32s (A0J0329-03)

EPA 8260D

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100407 - EPA 5030B												
Water												
Matrix Spike (0100407-MS1)		Prepared: 10/13/20 09:00 Analyzed: 10/13/20 18:44										
QC Source Sample: MW-32s (A0J0329-03)												
Bromobenzene	20.8	---	0.500	ug/L	1	20.0	ND	104	80 - 120%	---	---	
Bromochloromethane	24.6	---	1.00	ug/L	1	20.0	ND	123	78 - 123%	---	---	
Bromodichloromethane	23.0	---	1.00	ug/L	1	20.0	ND	115	79 - 125%	---	---	
Bromoform	24.4	---	1.00	ug/L	1	20.0	ND	122	66 - 130%	---	---	Q-54
Bromomethane	19.9	---	5.00	ug/L	1	20.0	ND	99	53 - 141%	---	---	Q-54c
Carbon tetrachloride	25.0	---	1.00	ug/L	1	20.0	ND	125	72 - 136%	---	---	
Chlorobenzene	21.0	---	0.500	ug/L	1	20.0	ND	105	80 - 120%	---	---	
Chloroethane	21.9	---	5.00	ug/L	1	20.0	ND	110	60 - 138%	---	---	EST
Chloroform	22.4	---	1.00	ug/L	1	20.0	ND	112	79 - 124%	---	---	
Chloromethane	31.0	---	5.00	ug/L	1	20.0	ND	155	50 - 139%	---	---	Q-54a
2-Chlorotoluene	21.3	---	1.00	ug/L	1	20.0	ND	106	79 - 122%	---	---	
4-Chlorotoluene	18.9	---	1.00	ug/L	1	20.0	ND	94	78 - 122%	---	---	
Dibromochloromethane	24.2	---	1.00	ug/L	1	20.0	ND	121	74 - 126%	---	---	
1,2-Dibromo-3-chloropropane	18.8	---	5.00	ug/L	1	20.0	ND	94	62 - 128%	---	---	
1,2-Dibromoethane (EDB)	20.8	---	0.500	ug/L	1	20.0	ND	104	77 - 121%	---	---	
Dibromomethane	22.1	---	1.00	ug/L	1	20.0	ND	111	79 - 123%	---	---	
1,2-Dichlorobenzene	20.7	---	0.500	ug/L	1	20.0	ND	103	80 - 120%	---	---	
1,3-Dichlorobenzene	21.3	---	0.500	ug/L	1	20.0	ND	106	80 - 120%	---	---	
1,4-Dichlorobenzene	20.5	---	0.500	ug/L	1	20.0	ND	103	79 - 120%	---	---	
Dichlorodifluoromethane	19.4	---	1.00	ug/L	1	20.0	ND	97	32 - 152%	---	---	
1,1-Dichloroethane	20.6	---	0.400	ug/L	1	20.0	ND	103	77 - 125%	---	---	
1,2-Dichloroethane (EDC)	20.1	---	0.400	ug/L	1	20.0	ND	101	73 - 128%	---	---	
1,1-Dichloroethene	22.0	---	0.400	ug/L	1	20.0	ND	110	71 - 131%	---	---	
cis-1,2-Dichloroethene	21.0	---	0.400	ug/L	1	20.0	ND	105	78 - 123%	---	---	
trans-1,2-Dichloroethene	21.3	---	0.400	ug/L	1	20.0	ND	106	75 - 124%	---	---	
1,2-Dichloropropane	20.6	---	0.500	ug/L	1	20.0	ND	103	78 - 122%	---	---	
1,3-Dichloropropane	19.6	---	1.00	ug/L	1	20.0	ND	98	80 - 120%	---	---	
2,2-Dichloropropane	15.1	---	1.00	ug/L	1	20.0	ND	76	60 - 139%	---	---	
1,1-Dichloropropene	21.6	---	1.00	ug/L	1	20.0	ND	108	79 - 125%	---	---	
cis-1,3-Dichloropropene	16.4	---	1.00	ug/L	1	20.0	ND	82	75 - 124%	---	---	
trans-1,3-Dichloropropene	17.0	---	1.00	ug/L	1	20.0	ND	85	73 - 127%	---	---	
Hexachlorobutadiene	20.1	---	5.00	ug/L	1	20.0	ND	100	66 - 134%	---	---	
Methylene chloride	21.4	---	10.0	ug/L	1	20.0	ND	107	74 - 124%	---	---	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100407 - EPA 5030B						Water						
Matrix Spike (0100407-MS1)		Prepared: 10/13/20 09:00		Analyzed: 10/13/20 18:44								
QC Source Sample: MW-32s (A0J0329-03)												
1,1,1,2-Tetrachloroethane	22.6	---	0.400	ug/L	1	20.0	ND	113	78 - 124%	---	---	
1,1,2,2-Tetrachloroethane	21.8	---	0.500	ug/L	1	20.0	ND	109	71 - 121%	---	---	
Tetrachloroethene (PCE)	22.3	---	0.400	ug/L	1	20.0	ND	112	74 - 129%	---	---	
1,2,3-Trichlorobenzene	17.6	---	2.00	ug/L	1	20.0	ND	88	69 - 129%	---	---	
1,2,4-Trichlorobenzene	17.0	---	2.00	ug/L	1	20.0	ND	85	69 - 130%	---	---	
1,1,1-Trichloroethane	21.4	---	0.400	ug/L	1	20.0	ND	107	74 - 131%	---	---	
1,1,2-Trichloroethane	21.2	---	0.500	ug/L	1	20.0	ND	106	80 - 120%	---	---	
Trichloroethene (TCE)	23.2	---	0.400	ug/L	1	20.0	ND	116	79 - 123%	---	---	
Trichlorofluoromethane	30.6	---	2.00	ug/L	1	20.0	ND	153	65 - 141%	---	---	Q-54b
1,2,3-Trichloropropane	20.6	---	1.00	ug/L	1	20.0	ND	103	73 - 122%	---	---	
Vinyl chloride	21.3	---	0.400	ug/L	1	20.0	ND	106	58 - 137%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 110 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>93 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>94 %</i>		<i>80-120 %</i>		<i>"</i>						



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100498 - Method Prep: Aq						Water						
Blank (0100498-BLK1)		Prepared: 10/15/20 09:51 Analyzed: 10/15/20 11:42										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	
LCS (0100498-BS1)		Prepared: 10/15/20 09:51 Analyzed: 10/15/20 11:44										
SM 4500-NH3 G												
Ammonia as N	1.95	---	0.0200	mg/L	1	2.00	---	97	87 - 116%	---	---	
Matrix Spike (0100498-MS1)		Prepared: 10/15/20 09:51 Analyzed: 10/15/20 11:57										
QC Source Sample: MW-24i (A0J0329-02)												
SM 4500-NH3 G												
Ammonia as N	2.30	---	0.0250	mg/L	1	2.50	ND	92	87 - 116%	---	---	
Matrix Spike Dup (0100498-MSD1)		Prepared: 10/15/20 09:51 Analyzed: 10/15/20 12:06										
QC Source Sample: MW-24i (A0J0329-02)												
SM 4500-NH3 G												
Ammonia as N	2.44	---	0.0250	mg/L	1	2.50	ND	98	87 - 116%	6	13%	



Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

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QUALITY CONTROL (QC) SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100313 - Method Prep: Aq						Water						
Blank (0100313-BLK1)		Prepared: 10/09/20 09:38		Analyzed: 10/09/20 11:55								
<u>EPA 300.0</u>												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
LCS (0100313-BS1)		Prepared: 10/09/20 09:38		Analyzed: 10/09/20 12:17								
<u>EPA 300.0</u>												
Nitrate-Nitrogen	2.03	---	0.250	mg/L	1	2.00	---	101	90 - 110%	---	---	---
Nitrite-Nitrogen	2.05	---	0.250	mg/L	1	2.00	---	102	90 - 110%	---	---	---

Apex Laboratories

Lisa Domenighini, Client Services Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100370 - Method Prep: Aq						Water						
Blank (0100370-BLK1)		Prepared: 10/12/20 09:17 Analyzed: 10/12/20 14:51										
SM 5310 C												
Total Organic Carbon	ND	---	1.00	mg/L	1	---	---	---	---	---	---	---
LCS (0100370-BS1)		Prepared: 10/12/20 09:17 Analyzed: 10/12/20 15:23										
SM 5310 C												
Total Organic Carbon	10.3	---	1.00	mg/L	1	10.0	---	103	90 - 114%	---	---	---



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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SAMPLE PREPARATION INFORMATION

Halogenated Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100407</u>							
A0J0329-01	Water	EPA 8260D	10/09/20 08:24	10/13/20 09:00	5mL/5mL	5mL/5mL	1.00
A0J0329-02	Water	EPA 8260D	10/09/20 09:11	10/13/20 09:00	5mL/5mL	5mL/5mL	1.00
A0J0329-03	Water	EPA 8260D	10/09/20 10:07	10/13/20 09:00	5mL/5mL	5mL/5mL	1.00

Ammonia by Gas Diffusion and Colorimetric Detection

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100498</u>							
A0J0329-01	Water	SM 4500-NH3 G	10/09/20 08:24	10/15/20 09:51	10mL/10mL	10mL/10mL	1.00
A0J0329-02	Water	SM 4500-NH3 G	10/09/20 09:11	10/15/20 09:51	10mL/10mL	10mL/10mL	1.00
A0J0329-03	Water	SM 4500-NH3 G	10/09/20 10:07	10/15/20 09:51	10mL/10mL	10mL/10mL	1.00

Anions by Ion Chromatography

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100313</u>							
A0J0329-01	Water	EPA 300.0	10/09/20 08:24	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0329-02	Water	EPA 300.0	10/09/20 09:11	10/09/20 09:38	5mL/5mL	5mL/5mL	1.00
A0J0329-03	Water	EPA 300.0	10/09/20 10:07	10/09/20 17:20	5mL/5mL	5mL/5mL	1.00

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100370</u>							
A0J0329-02	Water	SM 5310 C	10/09/20 09:11	10/12/20 09:17	40mL/40mL	40mL/40mL	1.00

Apex Laboratories

Lisa Domenighini, Client Services Manager

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- EST** Result reported as an Estimated Value. Result estimated. Initial Calibration Verification Standard (ICV) failed low.
- Q-54** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +1%. The results are reported as Estimated Values.
- Q-54a** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +2%. The results are reported as Estimated Values.
- Q-54b** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +29%. The results are reported as Estimated Values.
- Q-54c** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +9%. The results are reported as Estimated Values.
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported.
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis. The Result Basis is listed following the units as "dry", "wet", or "" (blank) designation.
 - "dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
 - "wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
 - "" Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) are not included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation)
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
<u>All reported analytes are included in Apex Laboratories' current ORELAP scope.</u>					

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Lisa Domenighini, Client Services Manager

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Cascadia Associates Project: Shore Terminal-Vancouver
5820 SW Kelly Ave Unit B Project Number: Nustar Vanc GWM 3Q20
Portland, OR 97239 Project Manager: Stephanie Salisbury Report ID:
A0J0329 - 10 29 20 0921

CHAIN OF CUSTODY

Lab # AO80329 coc 1 of 1

APEX LABS
6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

Company: Cascadia Assoc. Project Mgr: Stephanie Salisbury Project Name: Nustar Vanc GWM 3Q20 Project #:
Address: 5820 S Kelly Ave Ste B, Portland Phone: 503 466 5774 Email: shsalisbury@cascadiassociates.com

Sampled by: J. Weatherford

LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-DX	NWTPH-GX	8260 RBDM VOCs	8260 HALO VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	AL, Sb, As, Ba, Be, Cd, Cr, Cu, Co, Fe, Pb, Hg, Mn, Ni, Mo, Ni, K, Se, Ag, Na, Tl, Zn	TOTAL DISS. TCLP	TCLP Metals (8)	NOR/NO3	NH3	RSK-175	TOC	Archive
MW-24D	10/9	824	GW	5						✓										✓				
MW-24i		911		7						↓										↓		✓		
MW-32s		1007		5																↓		✓		
MW-14		1048		2																		✓		
Trip Blank				1							H													

SPECIAL INSTRUCTIONS:
VOC same list as Nustar Vanc GWM 2020
Ethanol/Ethane/methane by RSk-175

Normal Turn Around Time (TAT) = 10 Business Days
1 Day 2 Day 3 Day
4 DAY 5 DAY Other: _____

RELINQUISHED BY:
Signature: [Signature] Date: 10-9-20
Printed Name: Jon Weatherford Time: 1650
Company: Cascadia Assoc

RECEIVED BY:
Signature: [Signature] Date: _____
Printed Name: _____ Time: _____
Company: _____

Lisa Domenighini



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc GWM 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0329 - 10 29 20 0921
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APEX LABS COOLER RECEIPT FORM

Client: Cascadia Assoc. Element WO#: A0 80329

Project/Project #: Nustar Vanc GWM 3620

Delivery Info:
Date/time received: 10-9-20 @ 16:50 By: TAM
Delivered by: Apex Client ESS FedEx UPS Swift Senvoy SDS Other

Cooler Inspection Date/time inspected: 10-9-20 @ 16:50 By: TAM

Chain of Custody included? Yes No Custody seals? Yes No

Signed/dated by client? Yes No

Signed/dated by Apex? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>2.7</u>						
Received on ice? (Y/N)	<u>Y</u>						
Temp. blanks? (Y/N)	<u>N</u>						
Ice type: (Gel/Real/Other)	<u>Real</u>						
Condition:	<u>good</u>						

Cooler out of temp? (Y/N) Possible reason why: _____
If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA (NA)
Out of temperature samples form initiated? Yes/No/NA (NA)

Samples Inspection: Date/time inspected: 10/9/20 @ 1715 By: AKK

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: MW-24: T on '15 VOAs reads 9/11. TB # 2417.

COC/container discrepancies form initiated? Yes No

Containers/volumes received appropriate for analysis? Yes No Comments: MW-14 requesting TOC but only provided 2 HCl VOAs.

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information:

Labeled by: AKK Witness: AKK Cooler Inspected by: AKK See Project Contact Form:

October 28, 2020

Apex Laboratories
ATTN: Lisa Domenighini
6700 S.W. Sandburg St.
Tigard, OR 97223



LA Cert #04140
EPA Methods TO3, TO14A, TO15, 25C/3C,
RSK-175

TX Cert T104704450-14-6
EPA Methods TO14A, TO15

UT Cert CA0133332015-3
EPA Methods TO3, TO14A, TO15, RSK-175

LABORATORY TEST RESULTS

Project Reference: A0J0329
Lab Number: L101302-01/02

Enclosed are results for sample(s) received 10/13/20 by Air Technology Laboratories. Sample was received intact and chilled to 3° C. Analyses were performed according to specifications on the chain of custody provided with the sample(s).

Report Narrative:

- Unless otherwise noted in the report, sample analyses were performed within method performance criteria and meet all requirements of the TNI Standards.
- The enclosed results relate only to the sample(s).

ATL appreciates the opportunity to provide testing services to your company. If you have any questions regarding these results, please call me at (626) 964-4032.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Mark Johnson'.

Mark Johnson
Operations Manager
MJohnson@AirTechLabs.com

Note: The cover letter is an integral part of this analytical report.

SUBCONTRACT ORDER

Apex Laboratories

A0J0329

L101302-01/02

02/10/19/20

[Handwritten signature]

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Lisa Domenighini

RECEIVING LABORATORY:

Air Technology Laboratories, Inc
18501 E. Gale Ave Suite 130
City of Industry, CA 91748
Phone : (626) 964-4032
Fax: (626) 964-5832

Sample Name: MW-24i Water Sampled: 10/09/20 09:11 (A0J0329-02)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	10/22/20 10/22/20 17:00 10/19/20 10/27/20	10/23/20 09:11	
Containers Supplied:			
(D)40 mL VOA - HCL			
(E)40 mL VOA - HCL			

4

No Cont. provided for TOC.

Sample Name: MW-14 Water Sampled: 10/09/20 10:48 (A0J0329-04)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	10/22/20 10/22/20 17:00 10/19/20 10/27/20	10/23/20 10:48	
Containers Supplied:			
(A)40 mL VOA - HCL			
(B)40 mL VOA - HCL			

02

Standard TAT

30

[Signature] 10/12/20

Released By UPS (Shipper) Date

UPS (Shipper)

Received By *[Signature]* 10/17/20 Date

Released By Date

Received By Date

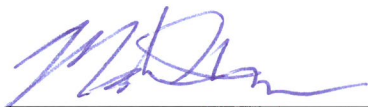
1003

Client: Apex Laboratories
Attn: Lisa Domenighini
Project Name: NA
Project No.: A0J0329
Date Received: 10/13/20
Matrix: Water
Reporting Units: ug/L

RSK175

Lab No.:	L101302-01	L101302-02		
Client Sample I.D.:	MW-24i (A0J0329-02)	MW-14 (A0J0329-04)		
Date/Time Sampled:	10/9/20 9:11	10/9/20 10:48		
Date/Time Analyzed:	10/17/20 11:41	10/17/20 12:09		
QC Batch No.:	201016GC8A2	201016GC8A2		
Analyst Initials:	CM	CM		
Dilution Factor:	1.0	1.0		
ANALYTE	Result ug/L	RL ug/L	Result ug/L	RL ug/L
Ethene	ND	1.0	ND	1.0
Ethane	ND	1.0	ND	1.0
Methane	1.9	1.0	8.5	1.0

ND = Not Detected (below RL)
 RL = Reporting Limit

Reviewed/Approved By: 
Mark Johnson
Operations Manager

Date 10-28-20

The cover letter is an integral part of this analytical report



QC Batch No: 201016GC8A2

Matrix: Water


Reporting Units: ug/L

RSK 175
LABORATORY CONTROL SAMPLE SUMMARY

Lab No.:	METHOD BLANK			LCS		LCSD					
Date/Time Analyzed:	10/16/20 13:46			10/16/20 14:55		10/16/20 14:27					
Analyst Initials:	CM			CM		CM					
Dilution Factor:	1.1			1.0		1.0		Limits			
ANALYTE	Result ug/L	RL ug/L	SPIKE AMT. ug/L	Result ug/L	% Rec.	Result ug/L	% Rec.	RPD %	Low %Rec	High %Rec	Max. RPD
Ethene	ND	1.0	1,150	1,160	102	1,360	118	15.3	70	130	30
Ethane	ND	1.0	1,200	1,190	97	1,400	114	16.2	70	130	30
Methane	ND	1.0	650	618	94	724	111	15.8	70	130	30

ND = Not Detected (below RL)

RL = Reporting Limit

Reviewed/Approved By: 
 Mark Johnson
 Operations Manager

Date 10-28-20

The cover letter is an integral part of this analytical report





Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Thursday, October 29, 2020

Stephanie Salisbury
Cascadia Associates
5820 SW Kelly Ave Unit B
Portland, OR 97239

RE: A0J0228 - Shore Terminal-Vancouver - Nustar Vanc 3Q20

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A0J0228, which was received by the laboratory on 10/7/2020 at 4:05:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	3.9 degC	Cooler #2	0.6 degC
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This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
EW-1	A0J0228-01	Water	10/07/20 14:20	10/07/20 16:05
MW-16	A0J0228-02	Water	10/07/20 13:40	10/07/20 16:05
MW-20i	A0J0228-03	Water	10/07/20 13:10	10/07/20 16:05
MW-21i-40	A0J0228-04	Water	10/07/20 12:30	10/07/20 16:05
MW-25i	A0J0228-05	Water	10/07/20 11:40	10/07/20 16:05
MW-19i	A0J0228-06	Water	10/07/20 10:50	10/07/20 16:05
MW-18i	A0J0228-07	Water	10/07/20 10:10	10/07/20 16:05
MW-23i	A0J0228-08	Water	10/07/20 09:30	10/07/20 16:05
MW-26	A0J0228-09	Water	10/07/20 08:40	10/07/20 16:05
MW-17	A0J0228-10	Water	10/07/20 08:15	10/07/20 16:05
MW-1	A0J0228-11	Water	10/07/20 08:59	10/07/20 16:05
MW-3	A0J0228-12	Water	10/07/20 09:45	10/07/20 16:05
MW-12	A0J0228-13	Water	10/07/20 10:27	10/07/20 16:05
MW-12 Dup	A0J0228-14	Water	10/07/20 10:27	10/07/20 16:05
MW-19	A0J0228-15	Water	10/07/20 11:21	10/07/20 16:05
MW-19 Dup	A0J0228-16	Water	10/07/20 11:21	10/07/20 16:05
MW-13	A0J0228-17	Water	10/07/20 12:21	10/07/20 16:05
S-1	A0J0228-18	Water	10/07/20 13:20	10/07/20 16:05
S-2	A0J0228-19	Water	10/07/20 13:59	10/07/20 16:05

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates

5820 SW Kelly Ave Unit B
Portland, OR 97239

Project: Shore Terminal-Vancouver

Project Number: Nustar Vanc 3Q20

Project Manager: Stephanie Salisbury

Report ID:

A0J0228 - 10 29 20 0900

ANALYTICAL CASE NARRATIVE

Work Order: A0J0228

Subcontract

This report is not complete without the attached subcontract laboratory report for RSK 175 from Air Technology.

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
EW-1 (A0J0228-01)				Matrix: Water		Batch: 0100336		
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 17:22	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 17:22	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 17:22	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/09/20 17:22	EPA 8260D	EST
Chloroform	1.36	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 17:22	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 17:22	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 17:22	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 17:22	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 17:22	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 17:22	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/09/20 17:22	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 17:22	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 17:22	EPA 8260D	
cis-1,2-Dichloroethene	3.30	---	0.400	ug/L	1	10/09/20 17:22	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 17:22	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 17:22	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 17:22	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 17:22	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 17:22	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 17:22	EPA 8260D	
Tetrachloroethene (PCE)	44.7	---	0.400	ug/L	1	10/09/20 17:22	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 17:22	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 17:22	EPA 8260D	
1,1,1-Trichloroethane	0.449	---	0.400	ug/L	1	10/09/20 17:22	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
EW-1 (A0J0228-01)			Matrix: Water		Batch: 0100336			
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 17:22	EPA 8260D	
Trichloroethene (TCE)	10.6	---	0.400	ug/L	1	10/09/20 17:22	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 17:22	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 17:22	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/09/20 17:22	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 111 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/09/20 17:22</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 17:22</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>108 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 17:22</i>	<i>EPA 8260D</i>

MW-16 (A0J0228-02)			Matrix: Water		Batch: 0100336			
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 18:44	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 18:44	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 18:44	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/09/20 18:44	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 18:44	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 18:44	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 18:44	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 18:44	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 18:44	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 18:44	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/09/20 18:44	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 18:44	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 18:44	EPA 8260D	
cis-1,2-Dichloroethene	26.7	---	0.400	ug/L	1	10/09/20 18:44	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 18:44	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 18:44	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-16 (A0J0228-02)				Matrix: Water		Batch: 0100336		
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 18:44	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 18:44	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 18:44	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 18:44	EPA 8260D	
Tetrachloroethene (PCE)	172	---	0.400	ug/L	1	10/09/20 18:44	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 18:44	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 18:44	EPA 8260D	
1,1,1-Trichloroethane	0.642	---	0.400	ug/L	1	10/09/20 18:44	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 18:44	EPA 8260D	
Trichloroethene (TCE)	35.9	---	0.400	ug/L	1	10/09/20 18:44	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 18:44	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 18:44	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/09/20 18:44	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 113 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/09/20 18:44</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 18:44</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 18:44</i>	<i>EPA 8260D</i>

MW-20i (A0J0228-03RE1)				Matrix: Water		Batch: 0100363		
Bromobenzene	ND	---	0.500	ug/L	1	10/12/20 19:22	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	10/12/20 19:22	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/12/20 19:22	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/12/20 19:22	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/12/20 19:22	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/12/20 19:22	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/12/20 19:22	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/12/20 19:22	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/12/20 19:22	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-20i (A0J0228-03RE1)				Matrix: Water		Batch: 0100363		
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/12/20 19:22	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/12/20 19:22	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/12/20 19:22	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/12/20 19:22	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/12/20 19:22	EPA 8260D	
cis-1,2-Dichloroethene	7.66	---	0.400	ug/L	1	10/12/20 19:22	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/12/20 19:22	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/12/20 19:22	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/12/20 19:22	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/12/20 19:22	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/12/20 19:22	EPA 8260D	
1,1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/12/20 19:22	EPA 8260D	
Tetrachloroethene (PCE)	1.11	---	0.400	ug/L	1	10/12/20 19:22	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/12/20 19:22	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/12/20 19:22	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/12/20 19:22	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/12/20 19:22	EPA 8260D	
Trichloroethene (TCE)	0.850	---	0.400	ug/L	1	10/12/20 19:22	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/12/20 19:22	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/12/20 19:22	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/12/20 19:22	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 108 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/12/20 19:22</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/12/20 19:22</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>94 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/12/20 19:22</i>	<i>EPA 8260D</i>

MW-21i-40 (A0J0228-04)				Matrix: Water		Batch: 0100336		
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 19:38	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 19:38	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-21i-40 (A0J0228-04)				Matrix: Water		Batch: 0100336		
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 19:38	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/09/20 19:38	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 19:38	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 19:38	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 19:38	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 19:38	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 19:38	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 19:38	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
1,1-Dichloroethane	2.16	---	0.400	ug/L	1	10/09/20 19:38	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 19:38	EPA 8260D	
1,1-Dichloroethene	0.527	---	0.400	ug/L	1	10/09/20 19:38	EPA 8260D	
cis-1,2-Dichloroethene	50.7	---	0.400	ug/L	1	10/09/20 19:38	EPA 8260D	
trans-1,2-Dichloroethene	0.433	---	0.400	ug/L	1	10/09/20 19:38	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 19:38	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 19:38	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 19:38	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 19:38	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 19:38	EPA 8260D	
Tetrachloroethene (PCE)	32.7	---	0.400	ug/L	1	10/09/20 19:38	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 19:38	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 19:38	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/09/20 19:38	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 19:38	EPA 8260D	
Trichloroethene (TCE)	18.7	---	0.400	ug/L	1	10/09/20 19:38	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 19:38	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 19:38	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/09/20 19:38	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-21i-40 (A0J0228-04)			Matrix: Water		Batch: 0100336			
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 111 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>		<i>10/09/20 19:38</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>	<i>80-120 %</i>	<i>1</i>		<i>10/09/20 19:38</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>110 %</i>	<i>80-120 %</i>	<i>1</i>		<i>10/09/20 19:38</i>	<i>EPA 8260D</i>	

MW-25i (A0J0228-05)			Matrix: Water		Batch: 0100336			
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 20:05	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 20:05	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 20:05	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/09/20 20:05	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 20:05	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 20:05	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 20:05	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 20:05	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 20:05	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 20:05	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/09/20 20:05	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 20:05	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 20:05	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 20:05	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 20:05	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 20:05	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 20:05	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 20:05	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 20:05	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-25i (A0J0228-05)				Matrix: Water		Batch: 0100336		
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 20:05	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	10/09/20 20:05	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 20:05	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 20:05	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/09/20 20:05	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 20:05	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/09/20 20:05	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 20:05	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 20:05	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/09/20 20:05	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 112 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/09/20 20:05</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 20:05</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 20:05</i>	<i>EPA 8260D</i>

MW-19i (A0J0228-06)				Matrix: Water		Batch: 0100336		
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 20:32	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 20:32	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 20:32	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/09/20 20:32	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 20:32	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 20:32	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 20:32	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 20:32	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 20:32	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 20:32	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/09/20 20:32	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 20:32	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 20:32	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-19i (A0J0228-06)				Matrix: Water		Batch: 0100336		
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 20:32	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 20:32	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 20:32	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 20:32	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 20:32	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 20:32	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 20:32	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	10/09/20 20:32	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 20:32	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 20:32	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/09/20 20:32	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 20:32	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/09/20 20:32	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 20:32	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 20:32	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/09/20 20:32	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 111 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/09/20 20:32</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 20:32</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 20:32</i>	<i>EPA 8260D</i>

MW-18i (A0J0228-07)				Matrix: Water		Batch: 0100336		
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 20:59	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 20:59	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 20:59	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/09/20 20:59	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 20:59	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-18i (A0J0228-07)				Matrix: Water		Batch: 0100336		
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 20:59	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 20:59	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 20:59	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 20:59	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 20:59	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/09/20 20:59	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 20:59	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 20:59	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 20:59	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 20:59	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 20:59	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 20:59	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 20:59	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 20:59	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 20:59	EPA 8260D	
Tetrachloroethene (PCE)	0.891	---	0.400	ug/L	1	10/09/20 20:59	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 20:59	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 20:59	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/09/20 20:59	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 20:59	EPA 8260D	
Trichloroethene (TCE)	0.419	---	0.400	ug/L	1	10/09/20 20:59	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 20:59	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 20:59	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/09/20 20:59	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 109 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/09/20 20:59</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 20:59</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 20:59</i>	<i>EPA 8260D</i>

MW-23i (A0J0228-08)				Matrix: Water		Batch: 0100336		
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 21:26	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-23i (A0J0228-08)				Matrix: Water		Batch: 0100336		
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 21:26	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 21:26	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/09/20 21:26	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 21:26	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 21:26	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 21:26	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 21:26	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 21:26	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 21:26	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/09/20 21:26	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 21:26	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 21:26	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 21:26	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 21:26	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 21:26	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 21:26	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 21:26	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 21:26	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 21:26	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	10/09/20 21:26	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 21:26	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 21:26	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/09/20 21:26	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 21:26	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-23i (A0J0228-08)				Matrix: Water		Batch: 0100336		
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	10/09/20 21:26	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 21:26	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 21:26	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/09/20 21:26	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 111 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/09/20 21:26</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 21:26</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 21:26</i>	<i>EPA 8260D</i>

MW-26 (A0J0228-09)				Matrix: Water		Batch: 0100336		
Bromobenzene	ND	---	2.50	ug/L	5	10/10/20 01:03	EPA 8260D	
Bromochloromethane	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
Bromodichloromethane	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
Bromoform	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
Bromomethane	ND	---	25.0	ug/L	5	10/10/20 01:03	EPA 8260D	
Carbon tetrachloride	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
Chlorobenzene	ND	---	2.50	ug/L	5	10/10/20 01:03	EPA 8260D	
Chloroethane	ND	---	25.0	ug/L	5	10/10/20 01:03	EPA 8260D	EST
Chloroform	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
Chloromethane	ND	---	25.0	ug/L	5	10/10/20 01:03	EPA 8260D	
2-Chlorotoluene	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
4-Chlorotoluene	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
Dibromochloromethane	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	25.0	ug/L	5	10/10/20 01:03	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	2.50	ug/L	5	10/10/20 01:03	EPA 8260D	
Dibromomethane	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
1,2-Dichlorobenzene	ND	---	2.50	ug/L	5	10/10/20 01:03	EPA 8260D	
1,3-Dichlorobenzene	ND	---	2.50	ug/L	5	10/10/20 01:03	EPA 8260D	
1,4-Dichlorobenzene	ND	---	2.50	ug/L	5	10/10/20 01:03	EPA 8260D	
Dichlorodifluoromethane	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
1,1-Dichloroethane	2.64	---	2.00	ug/L	5	10/10/20 01:03	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	2.00	ug/L	5	10/10/20 01:03	EPA 8260D	
1,1-Dichloroethene	ND	---	2.00	ug/L	5	10/10/20 01:03	EPA 8260D	
cis-1,2-Dichloroethene	62.8	---	2.00	ug/L	5	10/10/20 01:03	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	2.00	ug/L	5	10/10/20 01:03	EPA 8260D	
1,2-Dichloropropane	ND	---	2.50	ug/L	5	10/10/20 01:03	EPA 8260D	
1,3-Dichloropropane	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
2,2-Dichloropropane	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
1,1-Dichloropropene	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-26 (A0J0228-09)				Matrix: Water		Batch: 0100336		
cis-1,3-Dichloropropene	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
Hexachlorobutadiene	ND	---	25.0	ug/L	5	10/10/20 01:03	EPA 8260D	
Methylene chloride	ND	---	50.0	ug/L	5	10/10/20 01:03	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	2.00	ug/L	5	10/10/20 01:03	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	2.50	ug/L	5	10/10/20 01:03	EPA 8260D	
Tetrachloroethene (PCE)	118	---	2.00	ug/L	5	10/10/20 01:03	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	10.0	ug/L	5	10/10/20 01:03	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	10.0	ug/L	5	10/10/20 01:03	EPA 8260D	
1,1,1-Trichloroethane	ND	---	2.00	ug/L	5	10/10/20 01:03	EPA 8260D	
1,1,2-Trichloroethane	ND	---	2.50	ug/L	5	10/10/20 01:03	EPA 8260D	
Trichloroethene (TCE)	208	---	2.00	ug/L	5	10/10/20 01:03	EPA 8260D	
Trichlorofluoromethane	ND	---	10.0	ug/L	5	10/10/20 01:03	EPA 8260D	
1,2,3-Trichloropropane	ND	---	5.00	ug/L	5	10/10/20 01:03	EPA 8260D	
Vinyl chloride	ND	---	2.00	ug/L	5	10/10/20 01:03	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 114 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>10/10/20 01:03</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>	<i>1</i>	<i>10/10/20 01:03</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>	<i>1</i>	<i>10/10/20 01:03</i>	<i>EPA 8260D</i>	

MW-17 (A0J0228-10)				Matrix: Water		Batch: 0100336		
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 21:53	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 21:53	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 21:53	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/09/20 21:53	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 21:53	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 21:53	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 21:53	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 21:53	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 21:53	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-17 (A0J0228-10)				Matrix: Water		Batch: 0100336		
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 21:53	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/09/20 21:53	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 21:53	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 21:53	EPA 8260D	
cis-1,2-Dichloroethene	2.28	---	0.400	ug/L	1	10/09/20 21:53	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 21:53	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 21:53	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 21:53	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 21:53	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 21:53	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 21:53	EPA 8260D	
Tetrachloroethene (PCE)	1.75	---	0.400	ug/L	1	10/09/20 21:53	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 21:53	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 21:53	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/09/20 21:53	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 21:53	EPA 8260D	
Trichloroethene (TCE)	3.61	---	0.400	ug/L	1	10/09/20 21:53	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 21:53	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 21:53	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/09/20 21:53	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 110 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/09/20 21:53</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 21:53</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 21:53</i>	<i>EPA 8260D</i>

MW-1 (A0J0228-11)				Matrix: Water		Batch: 0100336		
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 22:20	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 22:20	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 22:20	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-1 (A0J0228-11)				Matrix: Water		Batch: 0100336		
Chloroethane	ND	---	5.00	ug/L	1	10/09/20 22:20	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 22:20	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 22:20	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 22:20	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 22:20	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 22:20	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 22:20	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
1,1-Dichloroethane	6.45	---	0.400	ug/L	1	10/09/20 22:20	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 22:20	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 22:20	EPA 8260D	
cis-1,2-Dichloroethene	104	---	0.400	ug/L	1	10/09/20 22:20	EPA 8260D	
trans-1,2-Dichloroethene	1.41	---	0.400	ug/L	1	10/09/20 22:20	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 22:20	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 22:20	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 22:20	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 22:20	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 22:20	EPA 8260D	
Tetrachloroethene (PCE)	26.4	---	0.400	ug/L	1	10/09/20 22:20	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 22:20	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 22:20	EPA 8260D	
1,1,1-Trichloroethane	0.425	---	0.400	ug/L	1	10/09/20 22:20	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 22:20	EPA 8260D	
Trichloroethene (TCE)	22.2	---	0.400	ug/L	1	10/09/20 22:20	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 22:20	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 22:20	EPA 8260D	
Vinyl chloride	1.80	---	0.400	ug/L	1	10/09/20 22:20	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 112 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/09/20 22:20</i>	<i>EPA 8260D</i>

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-1 (A0J0228-11)			Matrix: Water		Batch: 0100336			
<i>Surrogate: Toluene-d8 (Surr)</i>		<i>Recovery: 100 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>		<i>10/09/20 22:20</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>108 %</i>	<i>80-120 %</i>	<i>1</i>		<i>10/09/20 22:20</i>	<i>EPA 8260D</i>	
MW-3 (A0J0228-12RE1)			Matrix: Water		Batch: 0100446			
Bromobenzene	ND	---	0.500	ug/L	1	10/14/20 12:38	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/14/20 12:38	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/14/20 12:38	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/14/20 12:38	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/14/20 12:38	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/14/20 12:38	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/14/20 12:38	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/14/20 12:38	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/14/20 12:38	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/14/20 12:38	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
1,1-Dichloroethane	5.30	---	0.400	ug/L	1	10/14/20 12:38	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/14/20 12:38	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/14/20 12:38	EPA 8260D	
cis-1,2-Dichloroethene	62.9	---	0.400	ug/L	1	10/14/20 12:38	EPA 8260D	
trans-1,2-Dichloroethene	1.02	---	0.400	ug/L	1	10/14/20 12:38	EPA 8260D	
1,2-Dichloropropane	1.10	---	0.500	ug/L	1	10/14/20 12:38	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/14/20 12:38	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/14/20 12:38	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/14/20 12:38	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-3 (A0J0228-12RE1)				Matrix: Water		Batch: 0100446		
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/14/20 12:38	EPA 8260D	
Tetrachloroethene (PCE)	169	---	0.400	ug/L	1	10/14/20 12:38	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/14/20 12:38	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/14/20 12:38	EPA 8260D	
1,1,1-Trichloroethane	1.57	---	0.400	ug/L	1	10/14/20 12:38	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/14/20 12:38	EPA 8260D	
Trichloroethene (TCE)	32.6	---	0.400	ug/L	1	10/14/20 12:38	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/14/20 12:38	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/14/20 12:38	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/14/20 12:38	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 99 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/14/20 12:38</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/14/20 12:38</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/14/20 12:38</i>	<i>EPA 8260D</i>

MW-12 (A0J0228-13)				Matrix: Water		Batch: 0100336		
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 22:47	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 22:47	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 22:47	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 22:47	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 22:47	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 22:47	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 22:47	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 22:47	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 22:47	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
1,1-Dichloroethane	36.6	---	0.400	ug/L	1	10/09/20 22:47	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 22:47	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 22:47	EPA 8260D	
cis-1,2-Dichloroethene	80.9	---	0.400	ug/L	1	10/09/20 22:47	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-12 (A0J0228-13)				Matrix: Water		Batch: 0100336		
trans-1,2-Dichloroethene	0.582	---	0.400	ug/L	1	10/09/20 22:47	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 22:47	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 22:47	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 22:47	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 22:47	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 22:47	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	10/09/20 22:47	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 22:47	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 22:47	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/09/20 22:47	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 22:47	EPA 8260D	
Trichloroethene (TCE)	0.745	---	0.400	ug/L	1	10/09/20 22:47	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 22:47	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 22:47	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 109 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/09/20 22:47</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 22:47</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>109 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 22:47</i>	<i>EPA 8260D</i>

MW-12 (A0J0228-13RE1)				Matrix: Water		Batch: 0100408		
Chloroethane	ND	---	10.0	ug/L	2	10/13/20 13:50	EPA 8260D	
Vinyl chloride	184	---	0.800	ug/L	2	10/13/20 13:50	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 112 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/13/20 13:50</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/13/20 13:50</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>93 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/13/20 13:50</i>	<i>EPA 8260D</i>

MW-12 Dup (A0J0228-14)				Matrix: Water		Batch: 0100336		
Bromobenzene	ND	---	0.500	ug/L	1	10/09/20 23:14	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/09/20 23:14	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/09/20 23:14	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-12 Dup (A0J0228-14)				Matrix: Water		Batch: 0100336		
Chloroform	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/09/20 23:14	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/09/20 23:14	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/09/20 23:14	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 23:14	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 23:14	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/09/20 23:14	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
1,1-Dichloroethane	37.8	---	0.400	ug/L	1	10/09/20 23:14	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/09/20 23:14	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/09/20 23:14	EPA 8260D	
cis-1,2-Dichloroethene	81.7	---	0.400	ug/L	1	10/09/20 23:14	EPA 8260D	
trans-1,2-Dichloroethene	0.632	---	0.400	ug/L	1	10/09/20 23:14	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/09/20 23:14	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/09/20 23:14	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/09/20 23:14	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/09/20 23:14	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/09/20 23:14	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	10/09/20 23:14	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 23:14	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/09/20 23:14	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/09/20 23:14	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/09/20 23:14	EPA 8260D	
Trichloroethene (TCE)	0.750	---	0.400	ug/L	1	10/09/20 23:14	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/09/20 23:14	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/09/20 23:14	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 111 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/09/20 23:14</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 23:14</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/09/20 23:14</i>	<i>EPA 8260D</i>

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-12 Dup (A0J0228-14RE1)			Matrix: Water		Batch: 0100408			
Chloroethane	ND	---	10.0	ug/L	2	10/13/20 14:17	EPA 8260D	
Vinyl chloride	196	---	0.800	ug/L	2	10/13/20 14:17	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 111 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/13/20 14:17</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/13/20 14:17</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>92 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/13/20 14:17</i>	<i>EPA 8260D</i>

MW-19 (A0J0228-15)			Matrix: Water		Batch: 0100336			
Bromobenzene	ND	---	25.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Bromochloromethane	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Bromodichloromethane	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Bromoform	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Bromomethane	ND	---	250	ug/L	50	10/10/20 01:57	EPA 8260D	
Carbon tetrachloride	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Chlorobenzene	ND	---	25.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Chloroethane	ND	---	250	ug/L	50	10/10/20 01:57	EPA 8260D	EST
Chloroform	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Chloromethane	ND	---	250	ug/L	50	10/10/20 01:57	EPA 8260D	
2-Chlorotoluene	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
4-Chlorotoluene	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Dibromochloromethane	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	250	ug/L	50	10/10/20 01:57	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	25.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Dibromomethane	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,2-Dichlorobenzene	ND	---	25.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,3-Dichlorobenzene	ND	---	25.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,4-Dichlorobenzene	ND	---	25.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Dichlorodifluoromethane	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,1-Dichloroethane	44.5	---	20.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	20.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,1-Dichloroethene	53.2	---	20.0	ug/L	50	10/10/20 01:57	EPA 8260D	
cis-1,2-Dichloroethene	1470	---	20.0	ug/L	50	10/10/20 01:57	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	20.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,2-Dichloropropane	ND	---	25.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,3-Dichloropropane	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
2,2-Dichloropropane	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,1-Dichloropropene	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-19 (A0J0228-15)				Matrix: Water		Batch: 0100336		
Hexachlorobutadiene	ND	---	250	ug/L	50	10/10/20 01:57	EPA 8260D	
Methylene chloride	ND	---	500	ug/L	50	10/10/20 01:57	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	20.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	25.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Tetrachloroethene (PCE)	7450	---	20.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	100	ug/L	50	10/10/20 01:57	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	100	ug/L	50	10/10/20 01:57	EPA 8260D	
1,1,1-Trichloroethane	39.0	---	20.0	ug/L	50	10/10/20 01:57	EPA 8260D	
1,1,2-Trichloroethane	ND	---	25.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Trichloroethene (TCE)	2760	---	20.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Trichlorofluoromethane	ND	---	100	ug/L	50	10/10/20 01:57	EPA 8260D	
1,2,3-Trichloropropane	ND	---	50.0	ug/L	50	10/10/20 01:57	EPA 8260D	
Vinyl chloride	52.4	---	20.0	ug/L	50	10/10/20 01:57	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 115 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>10/10/20 01:57</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>	<i>1</i>	<i>10/10/20 01:57</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>108 %</i>		<i>80-120 %</i>	<i>1</i>	<i>10/10/20 01:57</i>	<i>EPA 8260D</i>	

MW-19 Dup (A0J0228-16)				Matrix: Water		Batch: 0100336		
Bromobenzene	ND	---	25.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Bromochloromethane	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Bromodichloromethane	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Bromoform	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Bromomethane	ND	---	250	ug/L	50	10/10/20 02:24	EPA 8260D	
Carbon tetrachloride	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Chlorobenzene	ND	---	25.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Chloroethane	ND	---	250	ug/L	50	10/10/20 02:24	EPA 8260D	EST
Chloroform	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Chloromethane	ND	---	250	ug/L	50	10/10/20 02:24	EPA 8260D	
2-Chlorotoluene	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
4-Chlorotoluene	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Dibromochloromethane	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	250	ug/L	50	10/10/20 02:24	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	25.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Dibromomethane	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
1,2-Dichlorobenzene	ND	---	25.0	ug/L	50	10/10/20 02:24	EPA 8260D	
1,3-Dichlorobenzene	ND	---	25.0	ug/L	50	10/10/20 02:24	EPA 8260D	
1,4-Dichlorobenzene	ND	---	25.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Dichlorodifluoromethane	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-19 Dup (A0J0228-16)			Matrix: Water		Batch: 0100336			
1,1-Dichloroethane	46.9	---	20.0	ug/L	50	10/10/20 02:24	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	20.0	ug/L	50	10/10/20 02:24	EPA 8260D	
1,1-Dichloroethene	58.8	---	20.0	ug/L	50	10/10/20 02:24	EPA 8260D	
cis-1,2-Dichloroethene	1510	---	20.0	ug/L	50	10/10/20 02:24	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	20.0	ug/L	50	10/10/20 02:24	EPA 8260D	
1,2-Dichloropropane	ND	---	25.0	ug/L	50	10/10/20 02:24	EPA 8260D	
1,3-Dichloropropane	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
2,2-Dichloropropane	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
1,1-Dichloropropene	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Hexachlorobutadiene	ND	---	250	ug/L	50	10/10/20 02:24	EPA 8260D	
Methylene chloride	ND	---	500	ug/L	50	10/10/20 02:24	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	20.0	ug/L	50	10/10/20 02:24	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	25.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Tetrachloroethene (PCE)	8110	---	20.0	ug/L	50	10/10/20 02:24	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	100	ug/L	50	10/10/20 02:24	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	100	ug/L	50	10/10/20 02:24	EPA 8260D	
1,1,1-Trichloroethane	39.0	---	20.0	ug/L	50	10/10/20 02:24	EPA 8260D	
1,1,2-Trichloroethane	ND	---	25.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Trichloroethene (TCE)	2920	---	20.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Trichlorofluoromethane	ND	---	100	ug/L	50	10/10/20 02:24	EPA 8260D	
1,2,3-Trichloropropane	ND	---	50.0	ug/L	50	10/10/20 02:24	EPA 8260D	
Vinyl chloride	53.8	---	20.0	ug/L	50	10/10/20 02:24	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 113 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/10/20 02:24</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 02:24</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>108 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 02:24</i>	<i>EPA 8260D</i>

MW-13 (A0J0228-17RE1)			Matrix: Water		Batch: 0100363			
Bromobenzene	ND	---	0.500	ug/L	1	10/12/20 20:17	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	10/12/20 20:17	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/12/20 20:17	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/12/20 20:17	EPA 8260D	
Chloroethane	7.13	---	5.00	ug/L	1	10/12/20 20:17	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-13 (A0J0228-17RE1)				Matrix: Water		Batch: 0100363		
Chloromethane	ND	---	5.00	ug/L	1	10/12/20 20:17	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/12/20 20:17	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/12/20 20:17	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/12/20 20:17	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/12/20 20:17	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/12/20 20:17	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
1,1-Dichloroethane	18.1	---	0.400	ug/L	1	10/12/20 20:17	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/12/20 20:17	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/12/20 20:17	EPA 8260D	
cis-1,2-Dichloroethene	3.47	---	0.400	ug/L	1	10/12/20 20:17	EPA 8260D	
trans-1,2-Dichloroethene	0.920	---	0.400	ug/L	1	10/12/20 20:17	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/12/20 20:17	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/12/20 20:17	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/12/20 20:17	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/12/20 20:17	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/12/20 20:17	EPA 8260D	
Tetrachloroethene (PCE)	0.470	---	0.400	ug/L	1	10/12/20 20:17	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/12/20 20:17	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/12/20 20:17	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/12/20 20:17	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/12/20 20:17	EPA 8260D	
Trichloroethene (TCE)	0.870	---	0.400	ug/L	1	10/12/20 20:17	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/12/20 20:17	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/12/20 20:17	EPA 8260D	
Vinyl chloride	98.8	---	0.400	ug/L	1	10/12/20 20:17	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 110 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>10/12/20 20:17</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>	<i>1</i>	<i>10/12/20 20:17</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>92 %</i>		<i>80-120 %</i>	<i>1</i>	<i>10/12/20 20:17</i>	<i>EPA 8260D</i>	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
S-1 (A0J0228-18RE1)				Matrix: Water		Batch: 0100363		
Bromobenzene	ND	---	0.500	ug/L	1	10/12/20 19:50	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	10/12/20 19:50	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/12/20 19:50	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/12/20 19:50	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/12/20 19:50	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/12/20 19:50	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/12/20 19:50	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/12/20 19:50	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/12/20 19:50	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/12/20 19:50	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/12/20 19:50	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	10/12/20 19:50	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/12/20 19:50	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/12/20 19:50	EPA 8260D	
cis-1,2-Dichloroethene	2.95	---	0.400	ug/L	1	10/12/20 19:50	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	10/12/20 19:50	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/12/20 19:50	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/12/20 19:50	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/12/20 19:50	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/12/20 19:50	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/12/20 19:50	EPA 8260D	
Tetrachloroethene (PCE)	1.20	---	0.400	ug/L	1	10/12/20 19:50	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/12/20 19:50	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/12/20 19:50	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	10/12/20 19:50	EPA 8260D	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
S-1 (A0J0228-18RE1)			Matrix: Water		Batch: 0100363			
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/12/20 19:50	EPA 8260D	
Trichloroethene (TCE)	2.06	---	0.400	ug/L	1	10/12/20 19:50	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/12/20 19:50	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/12/20 19:50	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	10/12/20 19:50	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 110 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/12/20 19:50</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/12/20 19:50</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>93 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/12/20 19:50</i>	<i>EPA 8260D</i>

S-2 (A0J0228-19)			Matrix: Water		Batch: 0100336			
Bromobenzene	ND	---	0.500	ug/L	1	10/10/20 00:36	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	10/10/20 00:36	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	10/10/20 00:36	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	10/10/20 00:36	EPA 8260D	EST
Chloroform	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	10/10/20 00:36	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	10/10/20 00:36	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	10/10/20 00:36	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 00:36	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 00:36	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	10/10/20 00:36	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
1,1-Dichloroethane	10.2	---	0.400	ug/L	1	10/10/20 00:36	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	10/10/20 00:36	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	10/10/20 00:36	EPA 8260D	
cis-1,2-Dichloroethene	54.4	---	0.400	ug/L	1	10/10/20 00:36	EPA 8260D	
trans-1,2-Dichloroethene	0.539	---	0.400	ug/L	1	10/10/20 00:36	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	10/10/20 00:36	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	

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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
S-2 (A0J0228-19)				Matrix: Water		Batch: 0100336		
1,1-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	10/10/20 00:36	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	10/10/20 00:36	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	10/10/20 00:36	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	10/10/20 00:36	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	10/10/20 00:36	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 00:36	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	10/10/20 00:36	EPA 8260D	
1,1,1-Trichloroethane	1.01	---	0.400	ug/L	1	10/10/20 00:36	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	10/10/20 00:36	EPA 8260D	
Trichloroethene (TCE)	3.08	---	0.400	ug/L	1	10/10/20 00:36	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	10/10/20 00:36	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	10/10/20 00:36	EPA 8260D	
Vinyl chloride	0.448	---	0.400	ug/L	1	10/10/20 00:36	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 110 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>10/10/20 00:36</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 00:36</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>		<i>1</i>	<i>10/10/20 00:36</i>	<i>EPA 8260D</i>



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ANALYTICAL SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
EW-1 (A0J0228-01)				Matrix: Water		Batch: 0100266		
Ammonia as N	ND	---	0.0200	mg/L	1	10/09/20 13:58	SM 4500-NH3 G	
MW-16 (A0J0228-02)				Matrix: Water		Batch: 0100266		
Ammonia as N	ND	---	0.0200	mg/L	1	10/09/20 13:59	SM 4500-NH3 G	
MW-20i (A0J0228-03)				Matrix: Water		Batch: 0100266		
Ammonia as N	ND	---	0.0200	mg/L	1	10/09/20 14:01	SM 4500-NH3 G	
MW-21i-40 (A0J0228-04)				Matrix: Water		Batch: 0100266		
Ammonia as N	ND	---	0.0200	mg/L	1	10/09/20 14:02	SM 4500-NH3 G	
MW-25i (A0J0228-05)				Matrix: Water		Batch: 0100266		
Ammonia as N	ND	---	0.0200	mg/L	1	10/09/20 14:04	SM 4500-NH3 G	
MW-19i (A0J0228-06)				Matrix: Water		Batch: 0100266		
Ammonia as N	0.178	---	0.0200	mg/L	1	10/09/20 14:05	SM 4500-NH3 G	
MW-18i (A0J0228-07)				Matrix: Water		Batch: 0100266		
Ammonia as N	ND	---	0.0200	mg/L	1	10/09/20 14:07	SM 4500-NH3 G	
MW-23i (A0J0228-08)				Matrix: Water		Batch: 0100266		
Ammonia as N	ND	---	0.0200	mg/L	1	10/09/20 14:08	SM 4500-NH3 G	
MW-26 (A0J0228-09RE1)				Matrix: Water		Batch: 0100266		
Ammonia as N	30.1	---	0.400	mg/L	20	10/09/20 16:08	SM 4500-NH3 G	
MW-17 (A0J0228-10)				Matrix: Water		Batch: 0100266		
Ammonia as N	3.44	---	0.0200	mg/L	1	10/09/20 14:19	SM 4500-NH3 G	
MW-1 (A0J0228-11RE2)				Matrix: Water		Batch: 0100266		
Ammonia as N	401	---	2.00	mg/L	100	10/09/20 17:26	SM 4500-NH3 G	
MW-3 (A0J0228-12RE1)				Matrix: Water		Batch: 0100266		
Ammonia as N	0.998	---	0.0200	mg/L	1	10/09/20 16:05	SM 4500-NH3 G	
MW-12 (A0J0228-13RE2)				Matrix: Water		Batch: 0100266		

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ANALYTICAL SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-12 (A0J0228-13RE2)				Matrix: Water		Batch: 0100266		
Ammonia as N	125	---	0.800	mg/L	40	10/09/20 17:27	SM 4500-NH3 G	
MW-12 Dup (A0J0228-14RE1)				Matrix: Water		Batch: 0100338		
Ammonia as N	122	---	1.00	mg/L	50	10/09/20 16:32	SM 4500-NH3 G	
MW-19 (A0J0228-15)				Matrix: Water		Batch: 0100338		
Ammonia as N	187	---	1.00	mg/L	50	10/09/20 16:34	SM 4500-NH3 G	
MW-19 Dup (A0J0228-16RE1)				Matrix: Water		Batch: 0100338		
Ammonia as N	155	---	1.00	mg/L	50	10/09/20 17:29	SM 4500-NH3 G	
MW-13 (A0J0228-17RE1)				Matrix: Water		Batch: 0100338		
Ammonia as N	56.6	---	1.00	mg/L	50	10/09/20 17:30	SM 4500-NH3 G	
S-1 (A0J0228-18RE1)				Matrix: Water		Batch: 0100338		
Ammonia as N	ND	---	0.0200	mg/L	1	10/09/20 17:39	SM 4500-NH3 G	
S-2 (A0J0228-19RE1)				Matrix: Water		Batch: 0100338		
Ammonia as N	5.97	---	0.0400	mg/L	2	10/09/20 17:41	SM 4500-NH3 G	

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
EW-1 (A0J0228-01)				Matrix: Water				
Batch: 0100249								
Nitrate-Nitrogen	1.46	---	0.250	mg/L	1	10/08/20 03:45	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 03:45	EPA 300.0	
MW-16 (A0J0228-02RE1)				Matrix: Water				
Batch: 0100249								
Nitrate-Nitrogen	7.10	---	0.250	mg/L	1	10/08/20 04:29	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 04:29	EPA 300.0	
MW-20i (A0J0228-03)				Matrix: Water				
Batch: 0100249								
Nitrate-Nitrogen	0.360	---	0.250	mg/L	1	10/08/20 04:51	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 04:51	EPA 300.0	
MW-21i-40 (A0J0228-04)				Matrix: Water				
Batch: 0100249								
Nitrate-Nitrogen	5.67	---	0.250	mg/L	1	10/08/20 05:56	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 05:56	EPA 300.0	
MW-25i (A0J0228-05)				Matrix: Water				
Batch: 0100249								
Nitrate-Nitrogen	0.644	---	0.250	mg/L	1	10/08/20 06:17	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 06:17	EPA 300.0	
MW-19i (A0J0228-06)				Matrix: Water				
Batch: 0100249								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 07:22	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 07:22	EPA 300.0	
MW-18i (A0J0228-07)				Matrix: Water				
Batch: 0100249								
Nitrate-Nitrogen	0.415	---	0.250	mg/L	1	10/08/20 08:27	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 08:27	EPA 300.0	
MW-23i (A0J0228-08)				Matrix: Water				
Batch: 0100249								

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-23i (A0J0228-08)				Matrix: Water				
Nitrate-Nitrogen	0.796	---	0.250	mg/L	1	10/08/20 08:49	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 08:49	EPA 300.0	
MW-26 (A0J0228-09)				Matrix: Water				
Batch: 0100249								
Nitrate-Nitrogen	358	---	25.0	mg/L	100	10/08/20 09:12	EPA 300.0	
MW-26 (A0J0228-09RE1)				Matrix: Water				
Batch: 0100249								
Nitrite-Nitrogen	ND	---	2.50	mg/L	10	10/08/20 09:34	EPA 300.0	R-04
MW-17 (A0J0228-10RE1)				Matrix: Water				
Batch: 0100249								
Nitrate-Nitrogen	0.636	---	0.250	mg/L	1	10/08/20 10:17	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 10:17	EPA 300.0	
MW-1 (A0J0228-11)				Matrix: Water				
Batch: 0100249								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 10:39	EPA 300.0	
MW-1 (A0J0228-11RE1)				Matrix: Water				
Batch: 0100249								
Nitrate-Nitrogen	96.9	---	5.00	mg/L	20	10/08/20 21:36	EPA 300.0	M-02
MW-3 (A0J0228-12RE1)				Matrix: Water				
Batch: 0100281								
Nitrate-Nitrogen	5.57	---	0.250	mg/L	1	10/08/20 14:03	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 14:03	EPA 300.0	
MW-12 (A0J0228-13RE1)				Matrix: Water				
Batch: 0100281								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 14:46	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 14:46	EPA 300.0	
MW-12 Dup (A0J0228-14RE1)				Matrix: Water				
Batch: 0100281								

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-12 Dup (A0J0228-14RE1)				Matrix: Water				
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 15:29	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 15:29	EPA 300.0	
MW-19 (A0J0228-15RE1)				Matrix: Water				
Batch: 0100281								
Nitrate-Nitrogen	224	---	12.5	mg/L	50	10/08/20 21:57	EPA 300.0	M-02
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 16:12	EPA 300.0	
MW-19 Dup (A0J0228-16RE1)				Matrix: Water				
Batch: 0100281								
Nitrate-Nitrogen	228	---	12.5	mg/L	50	10/08/20 22:19	EPA 300.0	M-02
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 17:39	EPA 300.0	
MW-13 (A0J0228-17)				Matrix: Water				
Batch: 0100281								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 18:00	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 18:00	EPA 300.0	
S-1 (A0J0228-18)				Matrix: Water				
Batch: 0100281								
Nitrate-Nitrogen	1.86	---	0.250	mg/L	1	10/08/20 18:22	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 18:22	EPA 300.0	
S-2 (A0J0228-19)				Matrix: Water				
Batch: 0100281								
Nitrate-Nitrogen	5.45	---	0.250	mg/L	1	10/08/20 19:26	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	10/08/20 19:26	EPA 300.0	



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ANALYTICAL SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-26 (A0J0228-09)				Matrix: Water		Batch: 0100370		
Total Organic Carbon	4.06	---	1.00	mg/L	1	10/12/20 23:06	SM 5310 C	
MW-12 (A0J0228-13RE1)				Matrix: Water		Batch: 0100605		
Total Organic Carbon	39.5	---	2.00	mg/L	2	10/19/20 17:10	SM 5310 C	
MW-12 Dup (A0J0228-14RE1)				Matrix: Water		Batch: 0100605		
Total Organic Carbon	39.5	---	2.00	mg/L	2	10/19/20 18:51	SM 5310 C	
MW-19 (A0J0228-15)				Matrix: Water		Batch: 0100370		
Total Organic Carbon	19.7	---	2.00	mg/L	2	10/13/20 00:41	SM 5310 C	
MW-19 Dup (A0J0228-16RE1)				Matrix: Water		Batch: 0100605		
Total Organic Carbon	8.71	---	1.00	mg/L	1	10/19/20 15:00	SM 5310 C	
MW-13 (A0J0228-17RE1)				Matrix: Water		Batch: 0100605		
Total Organic Carbon	9.99	---	1.00	mg/L	1	10/19/20 16:39	SM 5310 C	

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Lisa Domenighini, Client Services Manager

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100336 - EPA 5030B						Water						
Blank (0100336-BLK1)		Prepared: 10/09/20 14:00			Analyzed: 10/09/20 16:55							
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromoform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	EST
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100336 - EPA 5030B												
Water												
Blank (0100336-BLK1)	Prepared: 10/09/20 14:00 Analyzed: 10/09/20 16:55											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)	Recovery: 108 %		Limits: 80-120 %		Dilution: 1x							
Toluene-d8 (Surr)	102 %		80-120 %		"							
4-Bromofluorobenzene (Surr)	107 %		80-120 %		"							

LCS (0100336-BS1)												
Prepared: 10/09/20 14:00 Analyzed: 10/09/20 16:01												
EPA 8260D												
Bromobenzene	20.5	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Bromochloromethane	23.7	---	1.00	ug/L	1	20.0	---	119	80 - 120%	---	---	
Bromodichloromethane	22.4	---	1.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
Bromoform	25.9	---	1.00	ug/L	1	20.0	---	130	80 - 120%	---	---	Q-56
Bromomethane	28.9	---	5.00	ug/L	1	20.0	---	145	80 - 120%	---	---	Q-56
Carbon tetrachloride	23.3	---	1.00	ug/L	1	20.0	---	116	80 - 120%	---	---	
Chlorobenzene	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Chloroethane	21.1	---	5.00	ug/L	1	20.0	---	105	80 - 120%	---	---	EST
Chloroform	21.4	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
Chloromethane	18.5	---	5.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
2-Chlorotoluene	20.3	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
4-Chlorotoluene	18.4	---	1.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
Dibromochloromethane	25.2	---	1.00	ug/L	1	20.0	---	126	80 - 120%	---	---	Q-56
1,2-Dibromo-3-chloropropane	20.4	---	5.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	21.1	---	0.500	ug/L	1	20.0	---	106	80 - 120%	---	---	
Dibromomethane	22.6	---	1.00	ug/L	1	20.0	---	113	80 - 120%	---	---	
1,2-Dichlorobenzene	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100336 - EPA 5030B												
						Water						
LCS (0100336-BS1)			Prepared: 10/09/20 14:00			Analyzed: 10/09/20 16:01						
1,3-Dichlorobenzene	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,4-Dichlorobenzene	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Dichlorodifluoromethane	18.0	---	1.00	ug/L	1	20.0	---	90	80 - 120%	---	---	
1,1-Dichloroethane	19.8	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	19.3	---	0.400	ug/L	1	20.0	---	96	80 - 120%	---	---	
1,1-Dichloroethene	20.1	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.3	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
trans-1,2-Dichloroethene	20.0	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,2-Dichloropropane	20.5	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,3-Dichloropropane	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
2,2-Dichloropropane	17.1	---	1.00	ug/L	1	20.0	---	85	80 - 120%	---	---	
1,1-Dichloropropene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
cis-1,3-Dichloropropene	19.1	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
trans-1,3-Dichloropropene	18.2	---	1.00	ug/L	1	20.0	---	91	80 - 120%	---	---	
Hexachlorobutadiene	19.1	---	5.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
Methylene chloride	21.2	---	10.0	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	23.0	---	0.400	ug/L	1	20.0	---	115	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Tetrachloroethene (PCE)	21.0	---	0.400	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,2,3-Trichlorobenzene	17.2	---	2.00	ug/L	1	20.0	---	86	80 - 120%	---	---	
1,2,4-Trichlorobenzene	16.7	---	2.00	ug/L	1	20.0	---	83	80 - 120%	---	---	
1,1,1-Trichloroethane	20.0	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,1,2-Trichloroethane	21.0	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
Trichloroethene (TCE)	23.8	---	0.400	ug/L	1	20.0	---	119	80 - 120%	---	---	
Trichlorofluoromethane	29.5	---	2.00	ug/L	1	20.0	---	147	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	20.6	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
Vinyl chloride	20.0	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr) Recovery: 108 % Limits: 80-120 % Dilution: 1x												
Toluene-d8 (Surr) 96 % 80-120 % "												
4-Bromofluorobenzene (Surr) 96 % 80-120 % "												

Duplicate (0100336-DUP1) Prepared: 10/09/20 16:51 Analyzed: 10/09/20 17:49

QC Source Sample: EW-1 (A0J0228-01)

EPA 8260D

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100336 - EPA 5030B												
Water												
Duplicate (0100336-DUP1)			Prepared: 10/09/20 16:51 Analyzed: 10/09/20 17:49									
QC Source Sample: EW-1 (A0J0228-01)												
Bromobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	EST
Chloroform	1.34	---	1.00	ug/L	1	---	1.36	---	---	2	30%	
Chloromethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Dibromomethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	Q-05
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	3.32	---	0.400	ug/L	1	---	3.30	---	---	0.7	30%	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Methylene chloride	ND	---	10.0	ug/L	1	---	ND	---	---	---	30%	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100336 - EPA 5030B												
Water												
Duplicate (0100336-DUP1)			Prepared: 10/09/20 16:51 Analyzed: 10/09/20 17:49									
QC Source Sample: EW-1 (A0J0228-01)												
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	45.3	---	0.400	ug/L	1	---	44.7	---	---	1	30%	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	0.430	---	0.400	ug/L	1	---	0.449	---	---	4	30%	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	10.5	---	0.400	ug/L	1	---	10.6	---	---	0.7	30%	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 113 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>					
<i>Toluene-d8 (Surr)</i>			<i>102 %</i>		<i>80-120 %</i>		<i>"</i>					
<i>4-Bromofluorobenzene (Surr)</i>			<i>108 %</i>		<i>80-120 %</i>		<i>"</i>					

Matrix Spike (0100336-MS1)												
Prepared: 10/09/20 16:51 Analyzed: 10/10/20 02:51												
QC Source Sample: MW-19 Dup (A0J0228-16)												
EPA 8260D												
Bromobenzene	1020	---	25.0	ug/L	50	1000	ND	102	80 - 120%	---	---	
Bromochloromethane	1220	---	50.0	ug/L	50	1000	ND	122	78 - 123%	---	---	
Bromodichloromethane	1160	---	50.0	ug/L	50	1000	ND	116	79 - 125%	---	---	
Bromoform	1210	---	50.0	ug/L	50	1000	ND	121	66 - 130%	---	---	Q-54
Bromomethane	1510	---	250	ug/L	50	1000	ND	151	53 - 141%	---	---	Q-54c
Carbon tetrachloride	1270	---	50.0	ug/L	50	1000	ND	127	72 - 136%	---	---	
Chlorobenzene	1030	---	25.0	ug/L	50	1000	ND	103	80 - 120%	---	---	
Chloroethane	1200	---	250	ug/L	50	1000	ND	120	60 - 138%	---	---	EST
Chloroform	1130	---	50.0	ug/L	50	1000	ND	113	79 - 124%	---	---	
Chloromethane	941	---	250	ug/L	50	1000	ND	94	50 - 139%	---	---	
2-Chlorotoluene	1030	---	50.0	ug/L	50	1000	ND	103	79 - 122%	---	---	
4-Chlorotoluene	942	---	50.0	ug/L	50	1000	ND	94	78 - 122%	---	---	
Dibromochloromethane	1210	---	50.0	ug/L	50	1000	ND	121	74 - 126%	---	---	Q-54f
1,2-Dibromo-3-chloropropane	936	---	250	ug/L	50	1000	ND	94	62 - 128%	---	---	
1,2-Dibromoethane (EDB)	1010	---	25.0	ug/L	50	1000	ND	101	77 - 121%	---	---	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100336 - EPA 5030B						Water						
Matrix Spike (0100336-MS1)			Prepared: 10/09/20 16:51 Analyzed: 10/10/20 02:51									
QC Source Sample: MW-19 Dup (A0J0228-16)												
Dibromomethane	1160	---	50.0	ug/L	50	1000	ND	116	79 - 123%	---	---	
1,2-Dichlorobenzene	998	---	25.0	ug/L	50	1000	ND	100	80 - 120%	---	---	
1,3-Dichlorobenzene	1040	---	25.0	ug/L	50	1000	ND	104	80 - 120%	---	---	
1,4-Dichlorobenzene	997	---	25.0	ug/L	50	1000	ND	100	79 - 120%	---	---	
Dichlorodifluoromethane	1030	---	50.0	ug/L	50	1000	ND	103	32 - 152%	---	---	
1,1-Dichloroethane	1100	---	20.0	ug/L	50	1000	46.9	105	77 - 125%	---	---	
1,2-Dichloroethane (EDC)	1010	---	20.0	ug/L	50	1000	ND	101	73 - 128%	---	---	
1,1-Dichloroethene	1170	---	20.0	ug/L	50	1000	58.8	111	71 - 131%	---	---	
cis-1,2-Dichloroethene	2590	---	20.0	ug/L	50	1000	1510	108	78 - 123%	---	---	
trans-1,2-Dichloroethene	1080	---	20.0	ug/L	50	1000	14.1	107	75 - 124%	---	---	
1,2-Dichloropropane	1040	---	25.0	ug/L	50	1000	ND	104	78 - 122%	---	---	
1,3-Dichloropropane	983	---	50.0	ug/L	50	1000	ND	98	80 - 120%	---	---	
2,2-Dichloropropane	763	---	50.0	ug/L	50	1000	ND	76	60 - 139%	---	---	
1,1-Dichloropropene	1080	---	50.0	ug/L	50	1000	ND	108	79 - 125%	---	---	
cis-1,3-Dichloropropene	812	---	50.0	ug/L	50	1000	ND	81	75 - 124%	---	---	
trans-1,3-Dichloropropene	853	---	50.0	ug/L	50	1000	ND	85	73 - 127%	---	---	
Hexachlorobutadiene	974	---	250	ug/L	50	1000	ND	97	66 - 134%	---	---	
Methylene chloride	1160	---	500	ug/L	50	1000	ND	116	74 - 124%	---	---	
1,1,1,2-Tetrachloroethane	1130	---	20.0	ug/L	50	1000	ND	113	78 - 124%	---	---	
1,1,2,2-Tetrachloroethane	999	---	25.0	ug/L	50	1000	ND	100	71 - 121%	---	---	
Tetrachloroethene (PCE)	8670	---	20.0	ug/L	50	1000	8110	56	74 - 129%	---	---	Q-03
1,2,3-Trichlorobenzene	810	---	100	ug/L	50	1000	ND	81	69 - 129%	---	---	
1,2,4-Trichlorobenzene	808	---	100	ug/L	50	1000	ND	81	69 - 130%	---	---	
1,1,1-Trichloroethane	1110	---	20.0	ug/L	50	1000	39.0	107	74 - 131%	---	---	
1,1,2-Trichloroethane	1060	---	25.0	ug/L	50	1000	ND	106	80 - 120%	---	---	
Trichloroethene (TCE)	4160	---	20.0	ug/L	50	1000	2920	124	79 - 123%	---	---	Q-03
Trichlorofluoromethane	1630	---	100	ug/L	50	1000	ND	163	65 - 141%	---	---	Q-54d
1,2,3-Trichloropropane	1030	---	50.0	ug/L	50	1000	ND	103	73 - 122%	---	---	
Vinyl chloride	1160	---	20.0	ug/L	50	1000	53.8	111	58 - 137%	---	---	
Surr: 1,4-Difluorobenzene (Surr)		Recovery: 111 %		Limits: 80-120 %		Dilution: 1x						
Toluene-d8 (Surr)		95 %		80-120 %		"						
4-Bromofluorobenzene (Surr)		95 %		80-120 %		"						

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100363 - EPA 5030B						Water						
Blank (0100363-BLK1)		Prepared: 10/12/20 07:30		Analyzed: 10/12/20 10:40								
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromoform	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100363 - EPA 5030B												
Water												
Blank (0100363-BLK1)	Prepared: 10/12/20 07:30 Analyzed: 10/12/20 10:40											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 108 %</i>			<i>Limits: 80-120 %</i>			<i>Dilution: 1x</i>			
<i>Toluene-d8 (Surr)</i>			<i>104 %</i>			<i>80-120 %</i>			<i>"</i>			
<i>4-Bromofluorobenzene (Surr)</i>			<i>94 %</i>			<i>80-120 %</i>			<i>"</i>			

LCS (0100363-BS2)												
Prepared: 10/12/20 07:30 Analyzed: 10/12/20 09:17												
EPA 8260D												
Bromobenzene	19.6	---	0.500	ug/L	1	20.0	---	98	80 - 120%	---	---	
Bromochloromethane	22.0	---	1.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
Bromodichloromethane	22.7	---	1.00	ug/L	1	20.0	---	114	80 - 120%	---	---	
Bromoform	21.6	---	2.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Bromomethane	13.0	---	5.00	ug/L	1	20.0	---	65	80 - 120%	---	---	Q-55
Carbon tetrachloride	22.3	---	1.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
Chlorobenzene	19.6	---	0.500	ug/L	1	20.0	---	98	80 - 120%	---	---	
Chloroethane	23.0	---	5.00	ug/L	1	20.0	---	115	80 - 120%	---	---	
Chloroform	21.3	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
Chloromethane	26.8	---	5.00	ug/L	1	20.0	---	134	80 - 120%	---	---	Q-56
2-Chlorotoluene	20.7	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
4-Chlorotoluene	20.6	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
Dibromochloromethane	19.1	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	21.7	---	5.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.9	---	0.500	ug/L	1	20.0	---	104	80 - 120%	---	---	
Dibromomethane	20.9	---	1.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,2-Dichlorobenzene	20.3	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100363 - EPA 5030B												
Water												
LCS (0100363-BS2)	Prepared: 10/12/20 07:30 Analyzed: 10/12/20 09:17											
1,3-Dichlorobenzene	20.1	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,4-Dichlorobenzene	20.3	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Dichlorodifluoromethane	17.8	---	1.00	ug/L	1	20.0	---	89	80 - 120%	---	---	
1,1-Dichloroethane	21.8	---	0.400	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	20.2	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,1-Dichloroethene	20.4	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
cis-1,2-Dichloroethene	21.1	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
trans-1,2-Dichloroethene	21.3	---	0.400	ug/L	1	20.0	---	107	80 - 120%	---	---	
1,2-Dichloropropane	21.8	---	0.500	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,3-Dichloropropane	21.4	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
2,2-Dichloropropane	22.9	---	1.00	ug/L	1	20.0	---	114	80 - 120%	---	---	
1,1-Dichloropropene	20.5	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
cis-1,3-Dichloropropene	23.4	---	1.00	ug/L	1	20.0	---	117	80 - 120%	---	---	
trans-1,3-Dichloropropene	20.1	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Hexachlorobutadiene	21.5	---	5.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
Methylene chloride	22.4	---	10.0	ug/L	1	20.0	---	112	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	23.9	---	0.400	ug/L	1	20.0	---	119	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	22.7	---	0.500	ug/L	1	20.0	---	114	80 - 120%	---	---	
Tetrachloroethene (PCE)	19.7	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,2,3-Trichlorobenzene	20.5	---	2.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2,4-Trichlorobenzene	20.4	---	2.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,1,1-Trichloroethane	21.0	---	0.400	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,1,2-Trichloroethane	21.0	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
Trichloroethene (TCE)	19.6	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---	
Trichlorofluoromethane	21.4	---	2.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
1,2,3-Trichloropropane	20.6	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
Vinyl chloride	20.4	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 105 %</i>			<i>Limits: 80-120 %</i>			<i>Dilution: 1x</i>			
<i>Toluene-d8 (Surr)</i>			<i>102 %</i>			<i>80-120 %</i>			<i>"</i>			
<i>4-Bromofluorobenzene (Surr)</i>			<i>95 %</i>			<i>80-120 %</i>			<i>"</i>			



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100408 - EPA 5030B						Water						
Blank (0100408-BLK1)		Prepared: 10/13/20 08:35		Analyzed: 10/13/20 10:10								
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromoform	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100408 - EPA 5030B												
Water												
Blank (0100408-BLK1)	Prepared: 10/13/20 08:35 Analyzed: 10/13/20 10:10											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 110 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>93 %</i>		<i>80-120 %</i>		<i>"</i>						

LCS (0100408-BS1)	Prepared: 10/13/20 08:35 Analyzed: 10/13/20 09:15											A-01
EPA 8260D												
Bromobenzene	19.0	---	0.500	ug/L	1	20.0	---	95	80 - 120%	---	---	
Bromochloromethane	22.7	---	1.00	ug/L	1	20.0	---	114	80 - 120%	---	---	
Bromodichloromethane	23.4	---	1.00	ug/L	1	20.0	---	117	80 - 120%	---	---	
Bromoform	22.3	---	2.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
Bromomethane	11.6	---	5.00	ug/L	1	20.0	---	58	80 - 120%	---	---	Q-55
Carbon tetrachloride	21.4	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
Chlorobenzene	19.4	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
Chloroethane	23.4	---	5.00	ug/L	1	20.0	---	117	80 - 120%	---	---	
Chloroform	21.8	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Chloromethane	28.8	---	5.00	ug/L	1	20.0	---	144	80 - 120%	---	---	Q-56
2-Chlorotoluene	19.3	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
4-Chlorotoluene	19.4	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
Dibromochloromethane	19.3	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	22.2	---	5.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Dibromomethane	21.7	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,2-Dichlorobenzene	19.5	---	0.500	ug/L	1	20.0	---	98	80 - 120%	---	---	

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The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100408 - EPA 5030B						Water						
LCS (0100408-BS1)	Prepared: 10/13/20 08:35 Analyzed: 10/13/20 09:15					A-01						
1,3-Dichlorobenzene	19.3	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,4-Dichlorobenzene	19.4	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
Dichlorodifluoromethane	18.3	---	1.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
1,1-Dichloroethane	22.2	---	0.400	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	21.0	---	0.400	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,1-Dichloroethene	20.1	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
cis-1,2-Dichloroethene	21.1	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
trans-1,2-Dichloroethene	20.9	---	0.400	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,2-Dichloropropane	22.2	---	0.500	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,3-Dichloropropane	21.3	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
2,2-Dichloropropane	21.2	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,1-Dichloropropene	19.5	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
cis-1,3-Dichloropropene	22.0	---	1.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
trans-1,3-Dichloropropene	19.5	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
Hexachlorobutadiene	19.3	---	5.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
Methylene chloride	23.7	---	10.0	ug/L	1	20.0	---	119	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	23.7	---	0.400	ug/L	1	20.0	---	118	80 - 120%	---	---	
1,1,1,2,2-Tetrachloroethane	23.2	---	0.500	ug/L	1	20.0	---	116	80 - 120%	---	---	
Tetrachloroethene (PCE)	18.6	---	0.400	ug/L	1	20.0	---	93	80 - 120%	---	---	
1,2,3-Trichlorobenzene	19.9	---	2.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,2,4-Trichlorobenzene	19.2	---	2.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
1,1,1-Trichloroethane	20.4	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,1,2-Trichloroethane	21.3	---	0.500	ug/L	1	20.0	---	107	80 - 120%	---	---	
Trichloroethene (TCE)	19.0	---	0.400	ug/L	1	20.0	---	95	80 - 120%	---	---	
Trichlorofluoromethane	21.2	---	2.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,2,3-Trichloropropane	20.5	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
Vinyl chloride	20.1	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>93 %</i>		<i>80-120 %</i>		<i>"</i>						



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100446 - EPA 5030B						Water						
Blank (0100446-BLK1)		Prepared: 10/14/20 08:00		Analyzed: 10/14/20 11:09								
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromoform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100446 - EPA 5030B												
Water												
Blank (0100446-BLK1)	Prepared: 10/14/20 08:00 Analyzed: 10/14/20 11:09											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)	Recovery: 99 %		Limits: 80-120 %		Dilution: 1x							
Toluene-d8 (Surr)	100 %		80-120 %		"							
4-Bromofluorobenzene (Surr)	102 %		80-120 %		"							

LCS (0100446-BS2)	Prepared: 10/14/20 08:00 Analyzed: 10/14/20 10:09											
EPA 8260D												
Bromobenzene	20.1	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
Bromochloromethane	20.6	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
Bromodichloromethane	18.9	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
Bromoform	15.1	---	1.00	ug/L	1	20.0	---	76	80 - 120%	---	---	Q-55
Bromomethane	19.2	---	5.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
Carbon tetrachloride	20.4	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
Chlorobenzene	20.1	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Chloroethane	19.3	---	5.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
Chloroform	20.1	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Chloromethane	20.1	---	5.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
2-Chlorotoluene	20.4	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
4-Chlorotoluene	20.0	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
Dibromochloromethane	17.8	---	1.00	ug/L	1	20.0	---	89	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	17.4	---	5.00	ug/L	1	20.0	---	87	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.9	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
Dibromomethane	19.6	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,2-Dichlorobenzene	21.0	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100446 - EPA 5030B						Water						
LCS (0100446-BS2)			Prepared: 10/14/20 08:00		Analyzed: 10/14/20 10:09							
1,3-Dichlorobenzene	20.2	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,4-Dichlorobenzene	19.9	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Dichlorodifluoromethane	23.6	---	1.00	ug/L	1	20.0	---	118	80 - 120%	---	---	
1,1-Dichloroethane	20.3	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	22.0	---	0.400	ug/L	1	20.0	---	110	80 - 120%	---	---	
1,1-Dichloroethene	22.1	---	0.400	ug/L	1	20.0	---	110	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.9	---	0.400	ug/L	1	20.0	---	105	80 - 120%	---	---	
trans-1,2-Dichloroethene	21.2	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,2-Dichloropropane	20.1	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,3-Dichloropropane	21.1	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
2,2-Dichloropropane	26.0	---	1.00	ug/L	1	20.0	---	130	80 - 120%	---	---	Q-56
1,1-Dichloropropene	22.1	---	1.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
cis-1,3-Dichloropropene	20.9	---	1.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
trans-1,3-Dichloropropene	21.2	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
Hexachlorobutadiene	23.9	---	5.00	ug/L	1	20.0	---	119	80 - 120%	---	---	
Methylene chloride	19.5	---	10.0	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	20.0	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,1,1,2,2-Tetrachloroethane	22.4	---	0.500	ug/L	1	20.0	---	112	80 - 120%	---	---	
Tetrachloroethene (PCE)	20.9	---	0.400	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,2,3-Trichlorobenzene	23.7	---	2.00	ug/L	1	20.0	---	119	80 - 120%	---	---	
1,2,4-Trichlorobenzene	22.9	---	2.00	ug/L	1	20.0	---	115	80 - 120%	---	---	
1,1,1-Trichloroethane	19.9	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,1,2-Trichloroethane	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Trichloroethene (TCE)	19.2	---	0.400	ug/L	1	20.0	---	96	80 - 120%	---	---	
Trichlorofluoromethane	24.7	---	2.00	ug/L	1	20.0	---	124	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	20.5	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
Vinyl chloride	22.1	---	0.400	ug/L	1	20.0	---	111	80 - 120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 99 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100266 - Method Prep: Aq						Water						
Blank (0100266-BLK1)		Prepared: 10/08/20 09:37 Analyzed: 10/09/20 13:34										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	
LCS (0100266-BS1)		Prepared: 10/08/20 09:37 Analyzed: 10/09/20 13:35										
SM 4500-NH3 G												
Ammonia as N	2.10	---	0.0200	mg/L	1	2.00	---	105	87 - 116%	---	---	



Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100338 - Method Prep: Aq						Water						
Blank (0100338-BLK1)		Prepared: 10/09/20 16:00 Analyzed: 10/09/20 16:28										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	
LCS (0100338-BS1)		Prepared: 10/09/20 16:00 Analyzed: 10/09/20 16:29										
SM 4500-NH3 G												
Ammonia as N	2.05	---	0.0200	mg/L	1	2.00	---	103	87 - 116%	---	---	

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Lisa Domenighini, Client Services Manager

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QUALITY CONTROL (QC) SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100249 - Method Prep: Aq						Water						
Blank (0100249-BLK1)			Prepared: 10/07/20 18:52			Analyzed: 10/08/20 03:02						
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
LCS (0100249-BS1)			Prepared: 10/07/20 18:52			Analyzed: 10/08/20 03:24						
EPA 300.0												
Nitrate-Nitrogen	1.99	---	0.250	mg/L	1	2.00	---	99	90 - 110%	---	---	---
Nitrite-Nitrogen	2.02	---	0.250	mg/L	1	2.00	---	101	90 - 110%	---	---	---
Duplicate (0100249-DUP1)			Prepared: 10/07/20 18:52			Analyzed: 10/08/20 05:12						
QC Source Sample: MW-20i (A0J0228-03)												
EPA 300.0												
Nitrate-Nitrogen	0.361	---	0.250	mg/L	1	---	0.360	---	---	0.2	5%	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	---
Duplicate (0100249-DUP2)			Prepared: 10/07/20 18:52			Analyzed: 10/08/20 07:44						
QC Source Sample: MW-19i (A0J0228-06)												
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	5%	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	---
Matrix Spike (0100249-MS1)			Prepared: 10/07/20 18:52			Analyzed: 10/08/20 05:34						
QC Source Sample: MW-20i (A0J0228-03)												
EPA 300.0												
Nitrate-Nitrogen	2.81	---	0.312	mg/L	1	2.50	0.360	98	86 - 118%	---	---	---
Nitrite-Nitrogen	2.52	---	0.312	mg/L	1	2.50	ND	101	82 - 117%	---	---	---
Matrix Spike (0100249-MS2)			Prepared: 10/07/20 18:52			Analyzed: 10/08/20 08:05						
QC Source Sample: MW-19i (A0J0228-06)												
EPA 300.0												
Nitrate-Nitrogen	2.47	---	0.312	mg/L	1	2.50	ND	99	86 - 118%	---	---	---
Nitrite-Nitrogen	2.57	---	0.312	mg/L	1	2.50	ND	103	82 - 117%	---	---	---

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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QUALITY CONTROL (QC) SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100281 - Method Prep: Aq						Water						
Blank (0100281-BLK1)		Prepared: 10/08/20 12:07 Analyzed: 10/08/20 12:58										
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
LCS (0100281-BS1)		Prepared: 10/08/20 12:07 Analyzed: 10/08/20 13:20										
EPA 300.0												
Nitrate-Nitrogen	2.00	---	0.250	mg/L	1	2.00	---	100	90 - 110%	---	---	---
Nitrite-Nitrogen	2.02	---	0.250	mg/L	1	2.00	---	101	90 - 110%	---	---	---
Duplicate (0100281-DUP1)		Prepared: 10/08/20 12:07 Analyzed: 10/08/20 18:43										
QC Source Sample: S-1 (A0J0228-18)												
EPA 300.0												
Nitrate-Nitrogen	1.85	---	0.250	mg/L	1	---	1.86	---	---	0.8	5%	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	---
Matrix Spike (0100281-MS1)		Prepared: 10/08/20 12:07 Analyzed: 10/08/20 19:05										
QC Source Sample: S-1 (A0J0228-18)												
EPA 300.0												
Nitrate-Nitrogen	4.27	---	0.312	mg/L	1	2.50	1.86	96	86 - 118%	---	---	---
Nitrite-Nitrogen	2.53	---	0.312	mg/L	1	2.50	ND	101	82 - 117%	---	---	---



Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100370 - Method Prep: Aq						Water						
Blank (0100370-BLK1)		Prepared: 10/12/20 09:17 Analyzed: 10/12/20 14:51										
<u>SM 5310 C</u>												
Total Organic Carbon	ND	---	1.00	mg/L	1	---	---	---	---	---	---	
LCS (0100370-BS1)		Prepared: 10/12/20 09:17 Analyzed: 10/12/20 15:23										
<u>SM 5310 C</u>												
Total Organic Carbon	10.3	---	1.00	mg/L	1	10.0	---	103	90 - 114%	---	---	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0100605 - Method Prep: Aq						Water						
Blank (0100605-BLK1)		Prepared: 10/19/20 09:15 Analyzed: 10/19/20 12:55										
SM 5310 C												
Total Organic Carbon	ND	---	1.00	mg/L	1	---	---	---	---	---	---	---
LCS (0100605-BS1)		Prepared: 10/19/20 09:15 Analyzed: 10/19/20 13:26										
SM 5310 C												
Total Organic Carbon	10.4	---	1.00	mg/L	1	10.0	---	104	90 - 114%	---	---	---
Duplicate (0100605-DUP1)		Prepared: 10/19/20 09:15 Analyzed: 10/19/20 15:34										
QC Source Sample: MW-19 Dup (A0J0228-16RE1)												
SM 5310 C												
Total Organic Carbon	9.30	---	1.00	mg/L	1	---	8.71	---	---	7	10%	---
Matrix Spike (0100605-MS1)		Prepared: 10/19/20 09:15 Analyzed: 10/19/20 16:07										
QC Source Sample: MW-19 Dup (A0J0228-16RE1)												
SM 5310 C												
Total Organic Carbon	19.4	---	1.01	mg/L	1	10.0	8.71	107	90 - 114%	---	---	---



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SAMPLE PREPARATION INFORMATION

Halogenated Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100336</u>							
A0J0228-01	Water	EPA 8260D	10/07/20 14:20	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-02	Water	EPA 8260D	10/07/20 13:40	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-04	Water	EPA 8260D	10/07/20 12:30	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-05	Water	EPA 8260D	10/07/20 11:40	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-06	Water	EPA 8260D	10/07/20 10:50	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-07	Water	EPA 8260D	10/07/20 10:10	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-08	Water	EPA 8260D	10/07/20 09:30	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-09	Water	EPA 8260D	10/07/20 08:40	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-10	Water	EPA 8260D	10/07/20 08:15	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-11	Water	EPA 8260D	10/07/20 08:59	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-13	Water	EPA 8260D	10/07/20 10:27	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-14	Water	EPA 8260D	10/07/20 10:27	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-15	Water	EPA 8260D	10/07/20 11:21	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-16	Water	EPA 8260D	10/07/20 11:21	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
A0J0228-19	Water	EPA 8260D	10/07/20 13:59	10/09/20 16:51	5mL/5mL	5mL/5mL	1.00
<u>Batch: 0100363</u>							
A0J0228-03RE1	Water	EPA 8260D	10/07/20 13:10	10/12/20 08:27	5mL/5mL	5mL/5mL	1.00
A0J0228-17RE1	Water	EPA 8260D	10/07/20 12:21	10/12/20 08:27	5mL/5mL	5mL/5mL	1.00
A0J0228-18RE1	Water	EPA 8260D	10/07/20 13:20	10/12/20 08:27	5mL/5mL	5mL/5mL	1.00
<u>Batch: 0100408</u>							
A0J0228-13RE1	Water	EPA 8260D	10/07/20 10:27	10/13/20 08:35	5mL/5mL	5mL/5mL	1.00
A0J0228-14RE1	Water	EPA 8260D	10/07/20 10:27	10/13/20 08:35	5mL/5mL	5mL/5mL	1.00
<u>Batch: 0100446</u>							
A0J0228-12RE1	Water	EPA 8260D	10/07/20 09:45	10/14/20 09:00	5mL/5mL	5mL/5mL	1.00

Ammonia by Gas Diffusion and Colorimetric Detection

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100266</u>							
A0J0228-01	Water	SM 4500-NH3 G	10/07/20 14:20	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0228-02	Water	SM 4500-NH3 G	10/07/20 13:40	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0228-03	Water	SM 4500-NH3 G	10/07/20 13:10	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0228-04	Water	SM 4500-NH3 G	10/07/20 12:30	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0228-05	Water	SM 4500-NH3 G	10/07/20 11:40	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00

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SAMPLE PREPARATION INFORMATION

Ammonia by Gas Diffusion and Colorimetric Detection

Prep: Method Prep: Aq					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
A0J0228-06	Water	SM 4500-NH3 G	10/07/20 10:50	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0228-07	Water	SM 4500-NH3 G	10/07/20 10:10	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0228-08	Water	SM 4500-NH3 G	10/07/20 09:30	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0228-09RE1	Water	SM 4500-NH3 G	10/07/20 08:40	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0228-10	Water	SM 4500-NH3 G	10/07/20 08:15	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0228-11RE2	Water	SM 4500-NH3 G	10/07/20 08:59	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0228-12RE1	Water	SM 4500-NH3 G	10/07/20 09:45	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
A0J0228-13RE2	Water	SM 4500-NH3 G	10/07/20 10:27	10/08/20 09:37	10mL/10mL	10mL/10mL	1.00
Batch: 0100338							
A0J0228-14RE1	Water	SM 4500-NH3 G	10/07/20 10:27	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0228-15	Water	SM 4500-NH3 G	10/07/20 11:21	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0228-16RE1	Water	SM 4500-NH3 G	10/07/20 11:21	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0228-17RE1	Water	SM 4500-NH3 G	10/07/20 12:21	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0228-18RE1	Water	SM 4500-NH3 G	10/07/20 13:20	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00
A0J0228-19RE1	Water	SM 4500-NH3 G	10/07/20 13:59	10/09/20 16:00	10mL/10mL	10mL/10mL	1.00

Anions by Ion Chromatography

Prep: Method Prep: Aq					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 0100249							
A0J0228-01	Water	EPA 300.0	10/07/20 14:20	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
A0J0228-02RE1	Water	EPA 300.0	10/07/20 13:40	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
A0J0228-03	Water	EPA 300.0	10/07/20 13:10	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
A0J0228-04	Water	EPA 300.0	10/07/20 12:30	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
A0J0228-05	Water	EPA 300.0	10/07/20 11:40	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
A0J0228-06	Water	EPA 300.0	10/07/20 10:50	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
A0J0228-07	Water	EPA 300.0	10/07/20 10:10	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
A0J0228-08	Water	EPA 300.0	10/07/20 09:30	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
A0J0228-09	Water	EPA 300.0	10/07/20 08:40	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
A0J0228-09RE1	Water	EPA 300.0	10/07/20 08:40	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
A0J0228-10RE1	Water	EPA 300.0	10/07/20 08:15	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
A0J0228-11	Water	EPA 300.0	10/07/20 08:59	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
A0J0228-11RE1	Water	EPA 300.0	10/07/20 08:59	10/07/20 18:52	5mL/5mL	5mL/5mL	1.00
Batch: 0100281							
A0J0228-12RE1	Water	EPA 300.0	10/07/20 09:45	10/08/20 12:07	5mL/5mL	5mL/5mL	1.00

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SAMPLE PREPARATION INFORMATION

Anions by Ion Chromatography

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A0J0228-13RE1	Water	EPA 300.0	10/07/20 10:27	10/08/20 12:07	5mL/5mL	5mL/5mL	1.00
A0J0228-14RE1	Water	EPA 300.0	10/07/20 10:27	10/08/20 12:07	5mL/5mL	5mL/5mL	1.00
A0J0228-15RE1	Water	EPA 300.0	10/07/20 11:21	10/08/20 12:07	5mL/5mL	5mL/5mL	1.00
A0J0228-16RE1	Water	EPA 300.0	10/07/20 11:21	10/08/20 12:07	5mL/5mL	5mL/5mL	1.00
A0J0228-17	Water	EPA 300.0	10/07/20 12:21	10/08/20 12:07	5mL/5mL	5mL/5mL	1.00
A0J0228-18	Water	EPA 300.0	10/07/20 13:20	10/08/20 12:07	5mL/5mL	5mL/5mL	1.00
A0J0228-19	Water	EPA 300.0	10/07/20 13:59	10/08/20 12:07	5mL/5mL	5mL/5mL	1.00

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0100370</u>							
A0J0228-09	Water	SM 5310 C	10/07/20 08:40	10/12/20 09:17	40mL/40mL	40mL/40mL	1.00
A0J0228-15	Water	SM 5310 C	10/07/20 11:21	10/12/20 09:17	40mL/40mL	40mL/40mL	1.00
<u>Batch: 0100605</u>							
A0J0228-13RE1	Water	SM 5310 C	10/07/20 10:27	10/19/20 09:15	40mL/40mL	40mL/40mL	1.00
A0J0228-14RE1	Water	SM 5310 C	10/07/20 10:27	10/19/20 09:15	40mL/40mL	40mL/40mL	1.00
A0J0228-16RE1	Water	SM 5310 C	10/07/20 11:21	10/19/20 09:15	40mL/40mL	40mL/40mL	1.00
A0J0228-17RE1	Water	SM 5310 C	10/07/20 12:21	10/19/20 09:15	40mL/40mL	40mL/40mL	1.00



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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- A-01** Duplicate was not analyzed for this batch. Batch is accepted based on results of the Blank Spike and Matrix Spike recovery only.
- EST** Result reported as an Estimated Value. Results Estimated. Initial Calibration Verification (ICV) failed low.
- M-02** Due to matrix interference, this analyte cannot be accurately quantified. The reported result is estimated.
- Q-03** Spike recovery and/or RPD is outside control limits due to the high concentration of analyte present in the sample.
- Q-05** Analyses are not controlled on RPD values from sample and duplicate concentrations that are below 5 times the reporting level.
- Q-54** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +10%. The results are reported as Estimated Values.
- Q-54c** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +25%. The results are reported as Estimated Values.
- Q-54d** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +27%. The results are reported as Estimated Values.
- Q-54f** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +6%. The results are reported as Estimated Values.
- Q-55** Daily CCV/LCS recovery for this analyte was below the +/-20% criteria listed in EPA 8260, however there is adequate sensitivity to ensure detection at the reporting level.
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260
- R-04** Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.



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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported.
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis. The Result Basis is listed following the units as "dry", "wet", or "" (blank) designation.
 - "dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
 - "wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
 - "" Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) are not included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
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LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation)

EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
--------	----------	--------	---------	--------	---------------

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Lisa Domenighini, Client Services Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Cascadia Associates Project: **Shore Terminal-Vancouver**
 5820 SW Kelly Ave Unit B Project Number: **Nustar Vanc 3Q20**
 Portland, OR 97239 Project Manager: **Stephanie Salisbury** Report ID: **A0J0228 - 10 29 20 0900**

CHAIN OF CUSTODY

Lab # **A0J0228** COC **1 of 2**

APEX LABS 6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

Company: **Cascadia Assoc** Project Mgr: **Stephanie Salisbury** Project Name: **Nustar Vanc 3Q20** Project #:
 Address: **5820 S Kelly Ave B, Portland** Phone: **503 966 6577** Email: **shawly@cascoadiassociates**

Sampled by: **J. Weatherford / L. Wallis**

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NVTPH-HCID	NVTPH-DX	NVTPH-GX	8260 BTEX	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (9)	Priority Metals (13)	AL, Sb, As, Ba, Be, Bi, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mn, Ni, Min, Mo, N, K, Se, Ag, Na, TL, Zn	TOTAL DISS. TCLP	TCLP Metals (9)	NH3	RSK 175	TOC	Archive	
EW-1		10/7	1400	W	5																					
MW-16			1340		5																					
MW-20			1230		5																					
MW-21			1140		5																					
MW-25			1050		5																					
MW-18			1010		5																					
MW-23			930		5																					
MIN-26			840		7																					
MW-17			815		5																					

SPECIAL INSTRUCTIONS:
 VOC Same list as Nustar Vancouver 2Q20
 Ethane/Ethane/ Methane by RSK 175

TAT Requested (circle):
 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: _____

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY: Signature: *[Signature]* Date: 10/7/20
 RECEIVED BY: Signature: *[Signature]* Date: 10/7/20
 Printed Name: Son Weatherford Time: 1605
 Printed Name: *[Signature]* Time: 1605
 Company: Cascadia Assoc. Company: Apex

Lisa Domenighini

Cascadia Associates

5820 SW Kelly Ave Unit B
Portland, OR 97239

Project: **Shore Terminal-Vancouver**

Project Number: **Nustar Vanc 3Q20**

Project Manager: **Stephanie Salisbury**

Report ID:

A0J0228 - 10 29 20 0900

CHAIN OF CUSTODY

APEX LABS
6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

Lab # **A0J0228** COC 2 of 2

Company: **Cascadia Assoc** Project Mgr: **Stephanie Salisbury** Project Name: **Nu Star Vanc 3Q20** Act #:
Address: **5820 S Kelly, Ste B, Portland** Phone: **503 906 6571** Email: **sb.salisbury@cascadiaassociates.com**

Sampled by: **J. Weatherford / L. Nelli's**

Site Location: **OR WA CA**
AK ID _____

LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-CID	NWTPH-DX	NWTPH-CX	8260 BTEX	8260 RBDM VOCs	8260 Halo VOCs	8260 Vocs Full List	8270 SIM PAHs	8270 Semi-Vocs Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	Al, Sb, As, Ba, Be, Cd, Cr, Cu, Co, Ni, K, Se, Ag, Hg, Mn, Mo, Pb, Fe, Ni, Ti, Zn, V, H, Br, I, Na, Li, TOTAL DISS. TCLP	TCLP Metals (8)	NH3	RSL 175	TOC	Archive		
MW-1	10/7	857	GW	5																					
MW-3		945		5																					
MW-12		1027		7																					
MW-12 Dup		1027		7																					
MW-19		1121		7																					
MW-19 Dup		1121		7																					
MW-13		1221		7																					
S-1		1320		5																					
S-2		1359		5																					

SPECIAL INSTRUCTIONS:
NDC same list as Nustar Vanc 2020
Ethane / Ethane / Methane by RSL 175

TAT Requested (circle):
1 Day 2 Day 3 Day 4 DAY 5 DAY Other: _____

RELINQUISHED BY:
Signature: *[Signature]* Date: **10/7/20**
Printed Name: **James Hoffer** Time: **1605**
Company: **Apex**

RECEIVED BY:
Signature: _____ Date: _____
Printed Name: _____ Time: _____
Company: _____

RELINQUISHED BY:
Signature: *[Signature]* Date: **10/7/20**
Printed Name: **James Hoffer** Time: **1605**
Company: **Apex**

RECEIVED BY:
Signature: _____ Date: _____
Printed Name: _____ Time: _____
Company: _____

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Lisa Domenighini

Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Shore Terminal-Vancouver Project Number: Nustar Vanc 3Q20 Project Manager: Stephanie Salisbury	Report ID: A0J0228 - 10 29 20 0900
--	--	--

APEX LABS COOLER RECEIPT FORM

Client: Cascadia Associates Element WO#: A0 80228

Project/Project #: Nustar Vanc 3Q20

Delivery Info:

Date/time received: 10/7/20 @ 1605 By: CFH

Delivered by: Apex Client ESS FedEx UPS Swift Senvoy SDS Other

Cooler Inspection Date/time inspected: 10/7/20 @ 1658 By: CFH

Chain of Custody included? Yes No Custody seals? Yes No

Signed/dated by client? Yes No

Signed/dated by Apex? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>3.9</u>	<u>0.6</u>					
Received on ice? (Y/N)	<u>Y</u>	<u>Y</u>					
Temp. blanks? (Y/N)	<u>Y</u>	<u>N</u>					
Ice type: (Gel/Real/Other)	<u>Real</u>	<u>Real</u>					
Condition:	<u>Good</u>	<u>Good</u>					

Cooler out of temp? (Y/N) Possible reason why: _____
If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA NA
Out of temperature samples form initiated? Yes/No/NA NA

Samples Inspection: Date/time inspected: 10/7/20 @ 1742 By: AKK

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: TB # 2417 provided, not on COC.

COC/container discrepancies form initiated? Yes No

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments MW-12 + MW-12 Dup 4/5 HS. MW-13 1/5 HS.

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information: _____

Labeled by: AKK Witness: [Signature] Cooler Inspected by: AKK See Project Contact Form: Y

Lisa Domenighini

October 28, 2020

Apex Laboratories
ATTN: Lisa Domenighini
6700 S.W. Sandburg St.
Tigard, OR 97223



LA Cert #04140
EPA Methods TO3, TO14A, TO15, 25C/3C,
RSK-175

TX Cert T104704450-14-6
EPA Methods TO14A, TO15

UT Cert CA0133332015-3
EPA Methods TO3, TO14A, TO15, RSK-175

LABORATORY TEST RESULTS

Project Reference: A0J0228
Lab Number: L101301-01/06

Enclosed are results for sample(s) received 10/13/20 by Air Technology Laboratories. Sample was received intact and chilled to 3° C. Analyses were performed according to specifications on the chain of custody provided with the sample(s).

Report Narrative:

- Unless otherwise noted in the report, sample analyses were performed within method performance criteria and meet all requirements of the TNI Standards.
- The enclosed results relate only to the sample(s).

ATL appreciates the opportunity to provide testing services to your company. If you have any questions regarding these results, please call me at (626) 964-4032.

Sincerely,

A handwritten signature in blue ink, appearing to read "Mark Johnson".

Mark Johnson
Operations Manager
MJohnson@AirTechLabs.com

Note: The cover letter is an integral part of this analytical report.

SUBCONTRACT ORDER

Apex Laboratories

A0J0228

L101301-01/06

CB 10/7/20

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Lisa Domenighini

RECEIVING LABORATORY:

Air Technology Laboratories, Inc
18501 E. Gale Ave Suite 130
City of Industry, CA 91748
Phone : (626) 964-4032
Fax: (626) 964-5832

Sample Name: MW-26 Water Sampled: 10/07/20 08:40 (A0J0228-09)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	10/20/20 17:00 CB 10/7/20 10/27/20	10/21/20 08:40	
Containers Supplied:			
(D)40 mL VOA - HCL			
(E)40 mL VOA - HCL			

61

Sample Name: MW-12 Water Sampled: 10/07/20 10:27 (A0J0228-13)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	10/20/20 17:00 CB 10/7/20 10/27/20	10/21/20 10:27	
Containers Supplied:			
(D)40 mL VOA - HCL			
(E)40 mL VOA - HCL			

62

Sample Name: MW-12 Dup Water Sampled: 10/07/20 10:27 (A0J0228-14)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	10/20/20 17:00 CB 10/7/20 10/27/20	10/21/20 10:27	
Containers Supplied:			
(D)40 mL VOA - HCL			
(E)40 mL VOA - HCL			

63


Sample Name: MW-19 Water Sampled: 10/07/20 11:21 (A0J0228-15)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	10/20/20 17:00 CB 10/7/20 10/27/20	10/21/20 11:21	
Containers Supplied:			
(D)40 mL VOA - HCL			
(E)40 mL VOA - HCL			

64

Standard TAT

3°C

Released By	Date	Received By	Date
	10/12/20	UPS (Shipper)	
Released By	Date	Received By	Date
UPS (Shipper)		UPS DJJ	10/13/20 1803

SUBCONTRACT ORDER

Apex Laboratories

A0J0228

L101301-8/06

CB 10/17/20

Sample Name: MW-19 Dup Water Sampled: 10/07/20 11:21 (A0J0228-16)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	CB 10/17/20 10/20/20 17:00	10/21/20 11:21	
Containers Supplied:			
(D)40 mL VOA - HCL	10/27/20		
(E)40 mL VOA - HCL			

59

Sample Name: MW-13 Water Sampled: 10/07/20 12:21 (A0J0228-17)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	CB 10/17/20 10/20/20 17:00	10/21/20 12:21	
Containers Supplied:			
(D)40 mL VOA - HCL	10/27/20		
(E)40 mL VOA - HCL			

06

Standard TAT

30

Released By	Date	Received By	Date
<i>[Signature]</i>	10/12/20	UPS (Shipper)	
Released By	Date	Received By	Date
UPS (Shipper)		<i>[Signature]</i>	10/13/20
Released By	Date	Received By	Date
			10/13

Client: Apex Laboratories
 Attn: Lisa Domenighini
 Project Name: NA
 Project No.: A0J0228
 Date Received: 10/13/20
 Matrix: Water
 Reporting Units: ug/L

RSK175

Lab No.:	L101301-01	L101301-02	L101301-03	L101301-04				
Client Sample I.D.:	MW-26 (A0J0228-09)	MW-12 (A0J0228-13)	MW-12 Dup (A0J0228-14)	MW-19 (A0J0228-15)				
Date/Time Sampled:	10/7/20 8:40	10/7/20 10:27	10/7/20 10:27	10/7/20 11:21				
Date/Time Analyzed:	10/17/20 10:17	10/17/20 10:29	10/17/20 10:50	10/17/20 11:04				
QC Batch No.:	201016GC8A2	201016GC8A2	201016GC8A2	201016GC8A2				
Analyst Initials:	CM	CM	CM	CM				
Dilution Factor:	1.0	1.0	1.0	1.0				
ANALYTE	Result ug/L	RL ug/L	Result ug/L	RL ug/L	Result ug/L	RL ug/L	Result ug/L	RL ug/L
Ethene	ND	1.0	55	1.0	56	1.0	ND	1.0
Ethane	ND	1.0	69	1.0	71	1.0	43	1.0
Methane	560	1.0	9,800	1.0	10,000	1.0	9,700	1.0

ND = Not Detected (below RL)

RL = Reporting Limit

Reviewed/Approved By:



Mark Johnson
 Operations Manager

Date

10-28-20

The cover letter is an integral part of this analytical report



Client: Apex Laboratories
Attn: Lisa Domenighini
Project Name: NA
Project No.: A0J0228
Date Received: 10/13/20
Matrix: Water
Reporting Units: ug/L

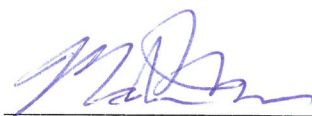
RSK175

Lab No.:	L101301-05	L101301-06						
Client Sample I.D.:	MW-19 Dup (A0J0228-16)	MW-13 (A0J0228-17)						
Date/Time Sampled:	10/7/20 11:21	10/7/20 12:21						
Date/Time Analyzed:	10/17/20 11:16	10/17/20 11:27						
QC Batch No.:	201016GC8A2	201016GC8A2						
Analyst Initials:	CM	CM						
Dilution Factor:	1.0	1.0						
ANALYTE	Result ug/L	RL ug/L	Result ug/L	RL ug/L				
Ethene	ND	1.0	120	1.0				
Ethane	43	1.0	180	1.0				
Methane	10,000	1.0	12,000	1.0				

ND = Not Detected (below RL)

RL = Reporting Limit

Reviewed/Approved By: _____



Mark Johnson
Operations Manager

Date

10-28-20

The cover letter is an integral part of this analytical report



QC Batch No: 201016GC8A2

Matrix: Water

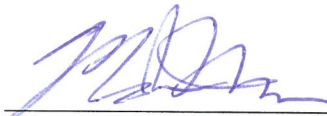
Reporting Units: ug/L

RSK 175
LABORATORY CONTROL SAMPLE SUMMARY

Lab No.:	METHOD BLANK			LCS		LCSD					
Date/Time Analyzed:	10/16/20 13:46			10/16/20 14:55		10/16/20 14:27					
Analyst Initials:	CM			CM		CM					
Dilution Factor:	1.1			1.0		1.0		Limits			
ANALYTE	Result ug/L	RL ug/L	SPIKE AMT. ug/L	Result ug/L	% Rec.	Result ug/L	% Rec.	RPD %	Low %Rec	High %Rec	Max. RPD
Ethene	ND	1.0	1,150	1,160	102	1,360	118	15.3	70	130	30
Ethane	ND	1.0	1,200	1,190	97	1,400	114	16.2	70	130	30
Methane	ND	1.0	650	618	94	724	111	15.8	70	130	30

ND = Not Detected (below RL)

RL = Reporting Limit

Reviewed/Approved By: 
 Mark Johnson
 Operations Manager

Date 10-28-20

The cover letter is an integral part of this analytical report





Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Tuesday, December 29, 2020

Stephanie Salisbury
Cascadia Associates
5820 SW Kelly Ave Unit B
Portland, OR 97239

RE: A0L0273 - Nustar-Vancouver - Nustar Van 4Q20 GWM

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A0L0273, which was received by the laboratory on 12/8/2020 at 4:00:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1 4.5 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
--	---	--

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MGMS2-40	A0L0273-01	Water	12/08/20 08:25	12/08/20 16:00
MGMS2-60	A0L0273-02	Water	12/08/20 08:50	12/08/20 16:00
MGMS2-110	A0L0273-03	Water	12/08/20 09:20	12/08/20 16:00
MGMS2-132	A0L0273-04	Water	12/08/20 09:50	12/08/20 16:00
MGMS1-110	A0L0273-05	Water	12/08/20 10:40	12/08/20 16:00
MW-3	A0L0273-06	Water	12/08/20 08:10	12/08/20 16:00
MW-1	A0L0273-07	Water	12/08/20 09:04	12/08/20 16:00
MW-12	A0L0273-08	Water	12/08/20 09:42	12/08/20 16:00
MW-12 Dup	A0L0273-09	Water	12/08/20 09:42	12/08/20 16:00
MW-19	A0L0273-10	Water	12/08/20 10:33	12/08/20 16:00
MW-19 Dup	A0L0273-11	Water	12/08/20 10:33	12/08/20 16:00
MW-13	A0L0273-12	Water	12/08/20 11:30	12/08/20 16:00
MW-17	A0L0273-13	Water	12/08/20 12:15	12/08/20 16:00
S-1	A0L0273-14	Water	12/08/20 13:12	12/08/20 16:00
S-2	A0L0273-15	Water	12/08/20 13:50	12/08/20 16:00

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates

5820 SW Kelly Ave Unit B
Portland, OR 97239

Project: Nustar-Vancouver

Project Number: Nustar Van 4Q20 GWM

Project Manager: Stephanie Salisbury

Report ID:

A0L0273 - 12 29 20 0727

ANALYTICAL CASE NARRATIVE

Work Order: A0L0273

Subcontract

This report is not complete without the attached subcontract laboratory report for RSK 175 from Air Technology.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
--	---	---

ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS2-40 (A0L0273-01)				Matrix: Water		Batch: 0120449		
Bromobenzene	ND	---	1.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Bromochloromethane	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Bromodichloromethane	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Bromoform	ND	---	4.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Bromomethane	ND	---	10.0	ug/L	2	12/12/20 06:49	EPA 8260D	
Carbon tetrachloride	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Chlorobenzene	ND	---	1.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Chloroethane	ND	---	10.0	ug/L	2	12/12/20 06:49	EPA 8260D	
Chloroform	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Chloromethane	ND	---	10.0	ug/L	2	12/12/20 06:49	EPA 8260D	
2-Chlorotoluene	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
4-Chlorotoluene	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Dibromochloromethane	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	10.0	ug/L	2	12/12/20 06:49	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Dibromomethane	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
1,2-Dichlorobenzene	ND	---	1.00	ug/L	2	12/12/20 06:49	EPA 8260D	
1,3-Dichlorobenzene	ND	---	1.00	ug/L	2	12/12/20 06:49	EPA 8260D	
1,4-Dichlorobenzene	ND	---	1.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Dichlorodifluoromethane	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
1,1-Dichloroethane	17.8	---	0.800	ug/L	2	12/12/20 06:49	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.800	ug/L	2	12/12/20 06:49	EPA 8260D	
1,1-Dichloroethene	1.85	---	0.800	ug/L	2	12/12/20 06:49	EPA 8260D	
cis-1,2-Dichloroethene	82.6	---	0.800	ug/L	2	12/12/20 06:49	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.800	ug/L	2	12/12/20 06:49	EPA 8260D	
1,2-Dichloropropane	ND	---	1.00	ug/L	2	12/12/20 06:49	EPA 8260D	
1,3-Dichloropropane	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
2,2-Dichloropropane	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
1,1-Dichloropropene	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Hexachlorobutadiene	ND	---	10.0	ug/L	2	12/12/20 06:49	EPA 8260D	
Methylene chloride	ND	---	20.0	ug/L	2	12/12/20 06:49	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.800	ug/L	2	12/12/20 06:49	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	1.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Tetrachloroethene (PCE)	41.0	---	0.800	ug/L	2	12/12/20 06:49	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	4.00	ug/L	2	12/12/20 06:49	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	4.00	ug/L	2	12/12/20 06:49	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.800	ug/L	2	12/12/20 06:49	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
			Matrix: Water			Batch: 0120449		
MGMS2-40 (A0L0273-01)								
1,1,2-Trichloroethane	ND	---	1.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Trichloroethene (TCE)	19.4	---	0.800	ug/L	2	12/12/20 06:49	EPA 8260D	
Trichlorofluoromethane	ND	---	4.00	ug/L	2	12/12/20 06:49	EPA 8260D	
1,2,3-Trichloropropane	ND	---	2.00	ug/L	2	12/12/20 06:49	EPA 8260D	
Vinyl chloride	80.2	---	0.800	ug/L	2	12/12/20 06:49	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/12/20 06:49</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 06:49</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 06:49</i>	<i>EPA 8260D</i>

			Matrix: Water			Batch: 0120449		
MGMS2-60 (A0L0273-02)								
Bromobenzene	ND	---	0.500	ug/L	1	12/12/20 00:54	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/12/20 00:54	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/12/20 00:54	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/12/20 00:54	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/12/20 00:54	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/12/20 00:54	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/12/20 00:54	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 00:54	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 00:54	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 00:54	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
1,1-Dichloroethane	0.860	---	0.400	ug/L	1	12/12/20 00:54	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/12/20 00:54	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 00:54	EPA 8260D	
cis-1,2-Dichloroethene	20.2	---	0.400	ug/L	1	12/12/20 00:54	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 00:54	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/12/20 00:54	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS2-60 (A0L0273-02)				Matrix: Water		Batch: 0120449		
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/12/20 00:54	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/12/20 00:54	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/12/20 00:54	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/12/20 00:54	EPA 8260D	
Tetrachloroethene (PCE)	21.8	---	0.400	ug/L	1	12/12/20 00:54	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 00:54	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 00:54	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/12/20 00:54	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/12/20 00:54	EPA 8260D	
Trichloroethene (TCE)	10.5	---	0.400	ug/L	1	12/12/20 00:54	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/12/20 00:54	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/12/20 00:54	EPA 8260D	
Vinyl chloride	0.757	---	0.400	ug/L	1	12/12/20 00:54	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/12/20 00:54</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 00:54</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 00:54</i>	<i>EPA 8260D</i>

MGMS2-110 (A0L0273-03)				Matrix: Water		Batch: 0120449		
Bromobenzene	ND	---	0.500	ug/L	1	12/12/20 02:16	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/12/20 02:16	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/12/20 02:16	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/12/20 02:16	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/12/20 02:16	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/12/20 02:16	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/12/20 02:16	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 02:16	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS2-110 (A0L0273-03)				Matrix: Water		Batch: 0120449		
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 02:16	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 02:16	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/12/20 02:16	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/12/20 02:16	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 02:16	EPA 8260D	
cis-1,2-Dichloroethene	4.63	---	0.400	ug/L	1	12/12/20 02:16	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 02:16	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/12/20 02:16	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/12/20 02:16	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/12/20 02:16	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/12/20 02:16	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/12/20 02:16	EPA 8260D	
Tetrachloroethene (PCE)	3.21	---	0.400	ug/L	1	12/12/20 02:16	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 02:16	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 02:16	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/12/20 02:16	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/12/20 02:16	EPA 8260D	
Trichloroethene (TCE)	2.52	---	0.400	ug/L	1	12/12/20 02:16	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/12/20 02:16	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/12/20 02:16	EPA 8260D	
Vinyl chloride	1.56	---	0.400	ug/L	1	12/12/20 02:16	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>12/12/20 02:16</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>	<i>1</i>	<i>12/12/20 02:16</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>	<i>1</i>	<i>12/12/20 02:16</i>	<i>EPA 8260D</i>	

MGMS2-132 (A0L0273-04)				Matrix: Water		Batch: 0120449		
Bromobenzene	ND	---	0.500	ug/L	1	12/12/20 02:43	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/12/20 02:43	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/12/20 02:43	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS2-132 (A0L0273-04)				Matrix: Water		Batch: 0120449		
Chlorobenzene	ND	---	0.500	ug/L	1	12/12/20 02:43	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/12/20 02:43	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/12/20 02:43	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/12/20 02:43	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 02:43	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 02:43	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 02:43	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/12/20 02:43	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/12/20 02:43	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 02:43	EPA 8260D	
cis-1,2-Dichloroethene	7.82	---	0.400	ug/L	1	12/12/20 02:43	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 02:43	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/12/20 02:43	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/12/20 02:43	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/12/20 02:43	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/12/20 02:43	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/12/20 02:43	EPA 8260D	
Tetrachloroethene (PCE)	3.34	---	0.400	ug/L	1	12/12/20 02:43	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 02:43	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 02:43	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/12/20 02:43	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/12/20 02:43	EPA 8260D	
Trichloroethene (TCE)	3.14	---	0.400	ug/L	1	12/12/20 02:43	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/12/20 02:43	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/12/20 02:43	EPA 8260D	
Vinyl chloride	2.84	---	0.400	ug/L	1	12/12/20 02:43	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS2-132 (A0L0273-04)				Matrix: Water		Batch: 0120449		
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>1</i>	<i>12/12/20 02:43</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>	<i>80-120 %</i>	<i>1</i>	<i>1</i>	<i>12/12/20 02:43</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>101 %</i>	<i>80-120 %</i>	<i>1</i>	<i>1</i>	<i>12/12/20 02:43</i>	<i>EPA 8260D</i>	

MGMS1-110 (A0L0273-05)				Matrix: Water		Batch: 0120449		
Bromobenzene	ND	---	0.500	ug/L	1	12/12/20 03:10	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/12/20 03:10	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/12/20 03:10	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/12/20 03:10	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/12/20 03:10	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/12/20 03:10	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/12/20 03:10	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 03:10	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 03:10	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 03:10	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
1,1-Dichloroethane	5.56	---	0.400	ug/L	1	12/12/20 03:10	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/12/20 03:10	EPA 8260D	
1,1-Dichloroethene	0.523	---	0.400	ug/L	1	12/12/20 03:10	EPA 8260D	
cis-1,2-Dichloroethene	163	---	0.400	ug/L	1	12/12/20 03:10	EPA 8260D	
trans-1,2-Dichloroethene	0.488	---	0.400	ug/L	1	12/12/20 03:10	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/12/20 03:10	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/12/20 03:10	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/12/20 03:10	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS1-110 (A0L0273-05)				Matrix: Water		Batch: 0120449		
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/12/20 03:10	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/12/20 03:10	EPA 8260D	
Tetrachloroethene (PCE)	16.1	---	0.400	ug/L	1	12/12/20 03:10	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 03:10	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 03:10	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/12/20 03:10	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/12/20 03:10	EPA 8260D	
Trichloroethene (TCE)	32.7	---	0.400	ug/L	1	12/12/20 03:10	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/12/20 03:10	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/12/20 03:10	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/12/20 03:10	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>12/12/20 03:10</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>	<i>1</i>	<i>12/12/20 03:10</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>	<i>1</i>	<i>12/12/20 03:10</i>	<i>EPA 8260D</i>	

MW-3 (A0L0273-06)				Matrix: Water		Batch: 0120449		
Bromobenzene	ND	---	2.50	ug/L	5	12/12/20 08:37	EPA 8260D	
Bromochloromethane	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
Bromodichloromethane	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
Bromoform	ND	---	10.0	ug/L	5	12/12/20 08:37	EPA 8260D	
Bromomethane	ND	---	25.0	ug/L	5	12/12/20 08:37	EPA 8260D	
Carbon tetrachloride	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
Chlorobenzene	ND	---	2.50	ug/L	5	12/12/20 08:37	EPA 8260D	
Chloroethane	ND	---	25.0	ug/L	5	12/12/20 08:37	EPA 8260D	
Chloroform	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
Chloromethane	ND	---	25.0	ug/L	5	12/12/20 08:37	EPA 8260D	
2-Chlorotoluene	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
4-Chlorotoluene	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
Dibromochloromethane	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	25.0	ug/L	5	12/12/20 08:37	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
Dibromomethane	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
1,2-Dichlorobenzene	ND	---	2.50	ug/L	5	12/12/20 08:37	EPA 8260D	
1,3-Dichlorobenzene	ND	---	2.50	ug/L	5	12/12/20 08:37	EPA 8260D	
1,4-Dichlorobenzene	ND	---	2.50	ug/L	5	12/12/20 08:37	EPA 8260D	
Dichlorodifluoromethane	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
1,1-Dichloroethane	ND	---	2.00	ug/L	5	12/12/20 08:37	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	2.00	ug/L	5	12/12/20 08:37	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
				Matrix: Water		Batch: 0120449		
MW-3 (A0L0273-06)								
1,1-Dichloroethene	ND	---	2.00	ug/L	5	12/12/20 08:37	EPA 8260D	
cis-1,2-Dichloroethene	29.7	---	2.00	ug/L	5	12/12/20 08:37	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	2.00	ug/L	5	12/12/20 08:37	EPA 8260D	
1,2-Dichloropropane	ND	---	2.50	ug/L	5	12/12/20 08:37	EPA 8260D	
1,3-Dichloropropane	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
2,2-Dichloropropane	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
1,1-Dichloropropene	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
Hexachlorobutadiene	ND	---	25.0	ug/L	5	12/12/20 08:37	EPA 8260D	
Methylene chloride	ND	---	50.0	ug/L	5	12/12/20 08:37	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	2.00	ug/L	5	12/12/20 08:37	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	2.50	ug/L	5	12/12/20 08:37	EPA 8260D	
Tetrachloroethene (PCE)	145	---	2.00	ug/L	5	12/12/20 08:37	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	10.0	ug/L	5	12/12/20 08:37	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	10.0	ug/L	5	12/12/20 08:37	EPA 8260D	
1,1,1-Trichloroethane	ND	---	2.00	ug/L	5	12/12/20 08:37	EPA 8260D	
1,1,2-Trichloroethane	ND	---	2.50	ug/L	5	12/12/20 08:37	EPA 8260D	
Trichloroethene (TCE)	36.1	---	2.00	ug/L	5	12/12/20 08:37	EPA 8260D	
Trichlorofluoromethane	ND	---	10.0	ug/L	5	12/12/20 08:37	EPA 8260D	
1,2,3-Trichloropropane	ND	---	5.00	ug/L	5	12/12/20 08:37	EPA 8260D	
Vinyl chloride	ND	---	2.00	ug/L	5	12/12/20 08:37	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/12/20 08:37</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 08:37</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 08:37</i>	<i>EPA 8260D</i>

				Matrix: Water		Batch: 0120449		
MW-1 (A0L0273-07)								
Bromobenzene	ND	---	0.500	ug/L	1	12/12/20 03:38	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/12/20 03:38	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/12/20 03:38	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/12/20 03:38	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/12/20 03:38	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/12/20 03:38	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-1 (A0L0273-07)				Matrix: Water		Batch: 0120449		
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/12/20 03:38	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 03:38	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 03:38	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 03:38	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
1,1-Dichloroethane	5.47	---	0.400	ug/L	1	12/12/20 03:38	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/12/20 03:38	EPA 8260D	
1,1-Dichloroethene	0.512	---	0.400	ug/L	1	12/12/20 03:38	EPA 8260D	
cis-1,2-Dichloroethene	62.6	---	0.400	ug/L	1	12/12/20 03:38	EPA 8260D	
trans-1,2-Dichloroethene	0.968	---	0.400	ug/L	1	12/12/20 03:38	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/12/20 03:38	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/12/20 03:38	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/12/20 03:38	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/12/20 03:38	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/12/20 03:38	EPA 8260D	
Tetrachloroethene (PCE)	19.0	---	0.400	ug/L	1	12/12/20 03:38	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 03:38	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 03:38	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/12/20 03:38	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/12/20 03:38	EPA 8260D	
Trichloroethene (TCE)	12.3	---	0.400	ug/L	1	12/12/20 03:38	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/12/20 03:38	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/12/20 03:38	EPA 8260D	
Vinyl chloride	1.42	---	0.400	ug/L	1	12/12/20 03:38	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>12/12/20 03:38</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>	<i>1</i>	<i>12/12/20 03:38</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>	<i>1</i>	<i>12/12/20 03:38</i>	<i>EPA 8260D</i>	

MW-12 (A0L0273-08)

Matrix: Water

Batch: 0120449

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-12 (A0L0273-08)				Matrix: Water		Batch: 0120449		
Bromobenzene	ND	---	0.500	ug/L	1	12/12/20 04:05	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/12/20 04:05	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/12/20 04:05	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/12/20 04:05	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/12/20 04:05	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/12/20 04:05	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/12/20 04:05	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 04:05	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 04:05	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 04:05	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
1,1-Dichloroethane	1.55	---	0.400	ug/L	1	12/12/20 04:05	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/12/20 04:05	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 04:05	EPA 8260D	
cis-1,2-Dichloroethene	9.92	---	0.400	ug/L	1	12/12/20 04:05	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 04:05	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/12/20 04:05	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/12/20 04:05	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/12/20 04:05	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/12/20 04:05	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/12/20 04:05	EPA 8260D	
Tetrachloroethene (PCE)	13.5	---	0.400	ug/L	1	12/12/20 04:05	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 04:05	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 04:05	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/12/20 04:05	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
			Matrix: Water			Batch: 0120449		
MW-12 (A0L0273-08)								
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/12/20 04:05	EPA 8260D	
Trichloroethene (TCE)	6.47	---	0.400	ug/L	1	12/12/20 04:05	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/12/20 04:05	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/12/20 04:05	EPA 8260D	
Vinyl chloride	7.36	---	0.400	ug/L	1	12/12/20 04:05	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/12/20 04:05</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 04:05</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 04:05</i>	<i>EPA 8260D</i>

			Matrix: Water			Batch: 0120449		
MW-12 Dup (A0L0273-09)								
Bromobenzene	ND	---	0.500	ug/L	1	12/12/20 04:32	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/12/20 04:32	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/12/20 04:32	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/12/20 04:32	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/12/20 04:32	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/12/20 04:32	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/12/20 04:32	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 04:32	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 04:32	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 04:32	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
1,1-Dichloroethane	1.52	---	0.400	ug/L	1	12/12/20 04:32	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/12/20 04:32	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 04:32	EPA 8260D	
cis-1,2-Dichloroethene	9.61	---	0.400	ug/L	1	12/12/20 04:32	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 04:32	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/12/20 04:32	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-12 Dup (A0L0273-09)			Matrix: Water		Batch: 0120449			
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/12/20 04:32	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/12/20 04:32	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/12/20 04:32	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/12/20 04:32	EPA 8260D	
Tetrachloroethene (PCE)	12.9	---	0.400	ug/L	1	12/12/20 04:32	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 04:32	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 04:32	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/12/20 04:32	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/12/20 04:32	EPA 8260D	
Trichloroethene (TCE)	6.24	---	0.400	ug/L	1	12/12/20 04:32	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/12/20 04:32	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/12/20 04:32	EPA 8260D	
Vinyl chloride	7.12	---	0.400	ug/L	1	12/12/20 04:32	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/12/20 04:32</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 04:32</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 04:32</i>	<i>EPA 8260D</i>

MW-19 (A0L0273-10)			Matrix: Water		Batch: 0120449			
Bromobenzene	ND	---	50.0	ug/L	100	12/12/20 07:16	EPA 8260D	
Bromochloromethane	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
Bromodichloromethane	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
Bromoform	ND	---	200	ug/L	100	12/12/20 07:16	EPA 8260D	
Bromomethane	ND	---	500	ug/L	100	12/12/20 07:16	EPA 8260D	
Carbon tetrachloride	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
Chlorobenzene	ND	---	50.0	ug/L	100	12/12/20 07:16	EPA 8260D	
Chloroethane	ND	---	500	ug/L	100	12/12/20 07:16	EPA 8260D	
Chloroform	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
Chloromethane	ND	---	500	ug/L	100	12/12/20 07:16	EPA 8260D	
2-Chlorotoluene	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
4-Chlorotoluene	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
Dibromochloromethane	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	500	ug/L	100	12/12/20 07:16	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
Dibromomethane	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
1,2-Dichlorobenzene	ND	---	50.0	ug/L	100	12/12/20 07:16	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-19 (A0L0273-10)				Matrix: Water		Batch: 0120449		
1,3-Dichlorobenzene	ND	---	50.0	ug/L	100	12/12/20 07:16	EPA 8260D	
1,4-Dichlorobenzene	ND	---	50.0	ug/L	100	12/12/20 07:16	EPA 8260D	
Dichlorodifluoromethane	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
1,1-Dichloroethane	54.5	---	40.0	ug/L	100	12/12/20 07:16	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	40.0	ug/L	100	12/12/20 07:16	EPA 8260D	
1,1-Dichloroethene	ND	---	40.0	ug/L	100	12/12/20 07:16	EPA 8260D	
cis-1,2-Dichloroethene	1150	---	40.0	ug/L	100	12/12/20 07:16	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	40.0	ug/L	100	12/12/20 07:16	EPA 8260D	
1,2-Dichloropropane	ND	---	50.0	ug/L	100	12/12/20 07:16	EPA 8260D	
1,3-Dichloropropane	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
2,2-Dichloropropane	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
1,1-Dichloropropene	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
Hexachlorobutadiene	ND	---	500	ug/L	100	12/12/20 07:16	EPA 8260D	
Methylene chloride	ND	---	1000	ug/L	100	12/12/20 07:16	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	40.0	ug/L	100	12/12/20 07:16	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	50.0	ug/L	100	12/12/20 07:16	EPA 8260D	
Tetrachloroethene (PCE)	3880	---	40.0	ug/L	100	12/12/20 07:16	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	200	ug/L	100	12/12/20 07:16	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	200	ug/L	100	12/12/20 07:16	EPA 8260D	
1,1,1-Trichloroethane	ND	---	40.0	ug/L	100	12/12/20 07:16	EPA 8260D	
1,1,2-Trichloroethane	ND	---	50.0	ug/L	100	12/12/20 07:16	EPA 8260D	
Trichloroethene (TCE)	1110	---	40.0	ug/L	100	12/12/20 07:16	EPA 8260D	
Trichlorofluoromethane	ND	---	200	ug/L	100	12/12/20 07:16	EPA 8260D	
1,2,3-Trichloropropane	ND	---	100	ug/L	100	12/12/20 07:16	EPA 8260D	
Vinyl chloride	117	---	40.0	ug/L	100	12/12/20 07:16	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/12/20 07:16</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 07:16</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 07:16</i>	<i>EPA 8260D</i>

MW-19 Dup (A0L0273-11)				Matrix: Water		Batch: 0120449		
Bromobenzene	ND	---	50.0	ug/L	100	12/12/20 07:43	EPA 8260D	
Bromochloromethane	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
Bromodichloromethane	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
Bromoform	ND	---	200	ug/L	100	12/12/20 07:43	EPA 8260D	
Bromomethane	ND	---	500	ug/L	100	12/12/20 07:43	EPA 8260D	
Carbon tetrachloride	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-19 Dup (A0L0273-11)				Matrix: Water		Batch: 0120449		
Chlorobenzene	ND	---	50.0	ug/L	100	12/12/20 07:43	EPA 8260D	
Chloroethane	ND	---	500	ug/L	100	12/12/20 07:43	EPA 8260D	
Chloroform	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
Chloromethane	ND	---	500	ug/L	100	12/12/20 07:43	EPA 8260D	
2-Chlorotoluene	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
4-Chlorotoluene	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
Dibromochloromethane	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	500	ug/L	100	12/12/20 07:43	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
Dibromomethane	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
1,2-Dichlorobenzene	ND	---	50.0	ug/L	100	12/12/20 07:43	EPA 8260D	
1,3-Dichlorobenzene	ND	---	50.0	ug/L	100	12/12/20 07:43	EPA 8260D	
1,4-Dichlorobenzene	ND	---	50.0	ug/L	100	12/12/20 07:43	EPA 8260D	
Dichlorodifluoromethane	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
1,1-Dichloroethane	70.8	---	40.0	ug/L	100	12/12/20 07:43	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	40.0	ug/L	100	12/12/20 07:43	EPA 8260D	
1,1-Dichloroethene	ND	---	40.0	ug/L	100	12/12/20 07:43	EPA 8260D	
cis-1,2-Dichloroethene	1330	---	40.0	ug/L	100	12/12/20 07:43	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	40.0	ug/L	100	12/12/20 07:43	EPA 8260D	
1,2-Dichloropropane	ND	---	50.0	ug/L	100	12/12/20 07:43	EPA 8260D	
1,3-Dichloropropane	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
2,2-Dichloropropane	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
1,1-Dichloropropene	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
Hexachlorobutadiene	ND	---	500	ug/L	100	12/12/20 07:43	EPA 8260D	
Methylene chloride	ND	---	1000	ug/L	100	12/12/20 07:43	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	40.0	ug/L	100	12/12/20 07:43	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	50.0	ug/L	100	12/12/20 07:43	EPA 8260D	
Tetrachloroethene (PCE)	3300	---	40.0	ug/L	100	12/12/20 07:43	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	200	ug/L	100	12/12/20 07:43	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	200	ug/L	100	12/12/20 07:43	EPA 8260D	
1,1,1-Trichloroethane	ND	---	40.0	ug/L	100	12/12/20 07:43	EPA 8260D	
1,1,2-Trichloroethane	ND	---	50.0	ug/L	100	12/12/20 07:43	EPA 8260D	
Trichloroethene (TCE)	1210	---	40.0	ug/L	100	12/12/20 07:43	EPA 8260D	
Trichlorofluoromethane	ND	---	200	ug/L	100	12/12/20 07:43	EPA 8260D	
1,2,3-Trichloropropane	ND	---	100	ug/L	100	12/12/20 07:43	EPA 8260D	
Vinyl chloride	87.9	---	40.0	ug/L	100	12/12/20 07:43	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-19 Dup (A0L0273-11)			Matrix: Water		Batch: 0120449			
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>		<i>12/12/20 07:43</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>	<i>80-120 %</i>	<i>1</i>		<i>12/12/20 07:43</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>100 %</i>	<i>80-120 %</i>	<i>1</i>		<i>12/12/20 07:43</i>	<i>EPA 8260D</i>	

MW-13 (A0L0273-12RE1)			Matrix: Water		Batch: 0120473			
Bromobenzene	ND	---	0.500	ug/L	1	12/14/20 18:04	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/14/20 18:04	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/14/20 18:04	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/14/20 18:04	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/14/20 18:04	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/14/20 18:04	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/14/20 18:04	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/14/20 18:04	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/14/20 18:04	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/14/20 18:04	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
1,1-Dichloroethane	2.67	---	0.400	ug/L	1	12/14/20 18:04	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/14/20 18:04	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/14/20 18:04	EPA 8260D	
cis-1,2-Dichloroethene	0.606	---	0.400	ug/L	1	12/14/20 18:04	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/14/20 18:04	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/14/20 18:04	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/14/20 18:04	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/14/20 18:04	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-13 (A0L0273-12RE1)				Matrix: Water		Batch: 0120473		
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/14/20 18:04	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/14/20 18:04	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	12/14/20 18:04	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/14/20 18:04	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/14/20 18:04	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/14/20 18:04	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/14/20 18:04	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	12/14/20 18:04	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/14/20 18:04	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/14/20 18:04	EPA 8260D	
Vinyl chloride	2.30	---	0.400	ug/L	1	12/14/20 18:04	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/14/20 18:04</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/14/20 18:04</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/14/20 18:04</i>	<i>EPA 8260D</i>

MW-17 (A0L0273-13)				Matrix: Water		Batch: 0120449		
Bromobenzene	ND	---	0.500	ug/L	1	12/12/20 04:59	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/12/20 04:59	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/12/20 04:59	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/12/20 04:59	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/12/20 04:59	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/12/20 04:59	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/12/20 04:59	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 04:59	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 04:59	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 04:59	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/12/20 04:59	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/12/20 04:59	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-17 (A0L0273-13)				Matrix: Water		Batch: 0120449		
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 04:59	EPA 8260D	
cis-1,2-Dichloroethene	17.9	---	0.400	ug/L	1	12/12/20 04:59	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 04:59	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/12/20 04:59	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/12/20 04:59	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/12/20 04:59	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/12/20 04:59	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/12/20 04:59	EPA 8260D	
Tetrachloroethene (PCE)	4.76	---	0.400	ug/L	1	12/12/20 04:59	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 04:59	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 04:59	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/12/20 04:59	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/12/20 04:59	EPA 8260D	
Trichloroethene (TCE)	8.70	---	0.400	ug/L	1	12/12/20 04:59	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/12/20 04:59	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/12/20 04:59	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/12/20 04:59	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/12/20 04:59</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 04:59</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 04:59</i>	<i>EPA 8260D</i>

S-1 (A0L0273-14)				Matrix: Water		Batch: 0120449		
Bromobenzene	ND	---	0.500	ug/L	1	12/12/20 05:27	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/12/20 05:27	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/12/20 05:27	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/12/20 05:27	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/12/20 05:27	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/12/20 05:27	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
S-1 (A0L0273-14)				Matrix: Water		Batch: 0120449		
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/12/20 05:27	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 05:27	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 05:27	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 05:27	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/12/20 05:27	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/12/20 05:27	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 05:27	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 05:27	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 05:27	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/12/20 05:27	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/12/20 05:27	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/12/20 05:27	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/12/20 05:27	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/12/20 05:27	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	12/12/20 05:27	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 05:27	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 05:27	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/12/20 05:27	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/12/20 05:27	EPA 8260D	
Trichloroethene (TCE)	1.30	---	0.400	ug/L	1	12/12/20 05:27	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/12/20 05:27	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/12/20 05:27	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/12/20 05:27	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/12/20 05:27</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 05:27</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 05:27</i>	<i>EPA 8260D</i>

S-2 (A0L0273-15)	Matrix: Water	Batch: 0120449
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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
S-2 (A0L0273-15)				Matrix: Water		Batch: 0120449		
Bromobenzene	ND	---	0.500	ug/L	1	12/12/20 05:54	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/12/20 05:54	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/12/20 05:54	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/12/20 05:54	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/12/20 05:54	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/12/20 05:54	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/12/20 05:54	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 05:54	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 05:54	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/12/20 05:54	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
1,1-Dichloroethane	7.72	---	0.400	ug/L	1	12/12/20 05:54	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/12/20 05:54	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 05:54	EPA 8260D	
cis-1,2-Dichloroethene	31.4	---	0.400	ug/L	1	12/12/20 05:54	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/12/20 05:54	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/12/20 05:54	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/12/20 05:54	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/12/20 05:54	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/12/20 05:54	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/12/20 05:54	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	12/12/20 05:54	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 05:54	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/12/20 05:54	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/12/20 05:54	EPA 8260D	

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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
S-2 (A0L0273-15)				Matrix: Water		Batch: 0120449		
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/12/20 05:54	EPA 8260D	
Trichloroethene (TCE)	1.13	---	0.400	ug/L	1	12/12/20 05:54	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/12/20 05:54	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/12/20 05:54	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/12/20 05:54	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/12/20 05:54</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 05:54</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/12/20 05:54</i>	<i>EPA 8260D</i>



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ANALYTICAL SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS2-40 (A0L0273-01)				Matrix: Water		Batch: 0120370		
Ammonia as N	68.6	---	0.400	mg/L	20	12/10/20 11:47	SM 4500-NH3 G	B-02
MGMS2-60 (A0L0273-02RE1)				Matrix: Water		Batch: 0120443		
Ammonia as N	0.136	---	0.0200	mg/L	1	12/11/20 17:22	SM 4500-NH3 G	
MGMS2-110 (A0L0273-03RE1)				Matrix: Water		Batch: 0120443		
Ammonia as N	0.0230	---	0.0200	mg/L	1	12/11/20 17:38	SM 4500-NH3 G	
MGMS2-132 (A0L0273-04RE1)				Matrix: Water		Batch: 0120443		
Ammonia as N	0.0230	---	0.0200	mg/L	1	12/11/20 17:40	SM 4500-NH3 G	
MGMS1-110 (A0L0273-05RE1)				Matrix: Water		Batch: 0120443		
Ammonia as N	0.237	---	0.0200	mg/L	1	12/11/20 17:41	SM 4500-NH3 G	
MW-3 (A0L0273-06RE1)				Matrix: Water		Batch: 0120443		
Ammonia as N	ND	---	0.0200	mg/L	1	12/11/20 17:43	SM 4500-NH3 G	
MW-1 (A0L0273-07RE1)				Matrix: Water		Batch: 0120370		
Ammonia as N	417	---	2.00	mg/L	100	12/10/20 13:28	SM 4500-NH3 G	B-02
MW-12 (A0L0273-08RE1)				Matrix: Water		Batch: 0120370		
Ammonia as N	12.8	---	0.160	mg/L	8	12/10/20 13:31	SM 4500-NH3 G	B-02
MW-12 Dup (A0L0273-09RE1)				Matrix: Water		Batch: 0120370		
Ammonia as N	13.0	---	0.160	mg/L	8	12/10/20 13:33	SM 4500-NH3 G	B-02
MW-19 (A0L0273-10)				Matrix: Water		Batch: 0120370		
Ammonia as N	180	---	0.800	mg/L	40	12/10/20 12:08	SM 4500-NH3 G	B-02
MW-19 Dup (A0L0273-11)				Matrix: Water		Batch: 0120370		
Ammonia as N	176	---	0.800	mg/L	40	12/10/20 12:09	SM 4500-NH3 G	B-02
MW-13 (A0L0273-12)				Matrix: Water		Batch: 0120370		
Ammonia as N	39.8	---	0.200	mg/L	10	12/10/20 12:11	SM 4500-NH3 G	B-02
MW-17 (A0L0273-13RE1)				Matrix: Water		Batch: 0120443		

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6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

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ANALYTICAL SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-17 (A0L0273-13RE1)				Matrix: Water		Batch: 0120443		
Ammonia as N	0.481	---	0.0200	mg/L	1	12/11/20 17:44	SM 4500-NH3 G	
S-1 (A0L0273-14RE2)				Matrix: Water		Batch: 0120443		
Ammonia as N	0.0210	---	0.0200	mg/L	1	12/11/20 17:46	SM 4500-NH3 G	
S-2 (A0L0273-15)				Matrix: Water		Batch: 0120370		
Ammonia as N	6.85	---	0.0400	mg/L	2	12/10/20 12:15	SM 4500-NH3 G	B-02

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS2-40 (A0L0273-01)				Matrix: Water				
Batch: 0120321								
Nitrite-Nitrogen	0.385	---	0.250	mg/L	1	12/09/20 11:09	EPA 300.0	
MGMS2-40 (A0L0273-01RE1)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	28.5	---	2.50	mg/L	10	12/09/20 21:34	EPA 300.0	
MGMS2-60 (A0L0273-02)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	0.558	---	0.250	mg/L	1	12/09/20 12:13	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 12:13	EPA 300.0	
MGMS2-110 (A0L0273-03)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	0.333	---	0.250	mg/L	1	12/09/20 13:18	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 13:18	EPA 300.0	
MGMS2-132 (A0L0273-04)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 13:40	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 13:40	EPA 300.0	
MGMS1-110 (A0L0273-05)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 14:44	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 14:44	EPA 300.0	
MW-3 (A0L0273-06)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	9.16	---	1.25	mg/L	5	12/09/20 15:06	EPA 300.0	
MW-3 (A0L0273-06RE1)				Matrix: Water				
Batch: 0120321								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 15:28	EPA 300.0	
MW-1 (A0L0273-07)				Matrix: Water				

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-1 (A0L0273-07)				Matrix: Water				
Batch: 0120321								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 15:49	EPA 300.0	
MW-1 (A0L0273-07RE1)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	71.9	---	2.50	mg/L	10	12/09/20 22:39	EPA 300.0	M-02
MW-12 (A0L0273-08)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	49.1	---	2.50	mg/L	10	12/09/20 16:11	EPA 300.0	
MW-12 (A0L0273-08RE1)				Matrix: Water				
Batch: 0120321								
Nitrite-Nitrogen	0.364	---	0.250	mg/L	1	12/09/20 16:32	EPA 300.0	
MW-12 Dup (A0L0273-09)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	49.9	---	2.50	mg/L	10	12/09/20 16:54	EPA 300.0	
MW-12 Dup (A0L0273-09RE1)				Matrix: Water				
Batch: 0120321								
Nitrite-Nitrogen	0.380	---	0.250	mg/L	1	12/09/20 17:15	EPA 300.0	
MW-19 (A0L0273-10RE1)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	147	---	5.00	mg/L	20	12/10/20 04:03	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 17:59	EPA 300.0	
MW-19 Dup (A0L0273-11RE1)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	157	---	5.00	mg/L	20	12/10/20 09:55	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 19:25	EPA 300.0	
MW-13 (A0L0273-12)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 19:46	EPA 300.0	

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-13 (A0L0273-12)				Matrix: Water				
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 19:46	EPA 300.0	
MW-17 (A0L0273-13RE1)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	24.3	---	1.25	mg/L	5	12/10/20 10:17	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 20:29	EPA 300.0	
S-1 (A0L0273-14)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	1.40	---	0.250	mg/L	1	12/09/20 20:51	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 20:51	EPA 300.0	
S-2 (A0L0273-15)				Matrix: Water				
Batch: 0120321								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 21:13	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/09/20 21:13	EPA 300.0	



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ANALYTICAL SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS2-40 (A0L0273-01)				Matrix: Water		Batch: 0120394		
Total Organic Carbon	5.37	---	1.00	mg/L	1	12/10/20 16:54	SM 5310 C	
MW-12 (A0L0273-08RE1)				Matrix: Water		Batch: 0120394		
Total Organic Carbon	4.53	---	1.00	mg/L	1	12/11/20 14:19	SM 5310 C	
MW-12 Dup (A0L0273-09RE1)				Matrix: Water		Batch: 0120394		
Total Organic Carbon	4.60	---	1.00	mg/L	1	12/11/20 14:52	SM 5310 C	
MW-19 (A0L0273-10)				Matrix: Water		Batch: 0120394		
Total Organic Carbon	17.2	---	1.00	mg/L	1	12/10/20 19:36	SM 5310 C	
MW-19 Dup (A0L0273-11)				Matrix: Water		Batch: 0120394		
Total Organic Carbon	17.3	---	1.00	mg/L	1	12/10/20 20:09	SM 5310 C	
MW-13 (A0L0273-12)				Matrix: Water		Batch: 0120394		
Total Organic Carbon	23.2	---	1.00	mg/L	1	12/10/20 21:52	SM 5310 C	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120449 - EPA 5030B						Water						
Blank (0120449-BLK1)		Prepared: 12/11/20 20:00		Analyzed: 12/12/20 00:00								
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromoform	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---

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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120449 - EPA 5030B												
Water												
Blank (0120449-BLK1)	Prepared: 12/11/20 20:00 Analyzed: 12/12/20 00:00											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)	Recovery: 103 %		Limits: 80-120 %		Dilution: 1x							
Toluene-d8 (Surr)	103 %		80-120 %		"							
4-Bromofluorobenzene (Surr)	102 %		80-120 %		"							

LCS (0120449-BS1)												
Prepared: 12/11/20 20:00 Analyzed: 12/11/20 23:05												
EPA 8260D												
Bromobenzene	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Bromochloromethane	22.2	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
Bromodichloromethane	22.3	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
Bromoform	21.1	---	2.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
Bromomethane	21.4	---	5.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
Carbon tetrachloride	20.1	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Chlorobenzene	20.9	---	0.500	ug/L	1	20.0	---	104	80 - 120%	---	---	
Chloroethane	19.5	---	5.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
Chloroform	22.2	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
Chloromethane	29.3	---	5.00	ug/L	1	20.0	---	147	80 - 120%	---	---	Q-56
2-Chlorotoluene	19.0	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
4-Chlorotoluene	19.7	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
Dibromochloromethane	21.8	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	18.6	---	5.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
Dibromomethane	22.8	---	1.00	ug/L	1	20.0	---	114	80 - 120%	---	---	
1,2-Dichlorobenzene	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120449 - EPA 5030B												
Water												
LCS (0120449-BS1)	Prepared: 12/11/20 20:00 Analyzed: 12/11/20 23:05											
1,3-Dichlorobenzene	20.6	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
1,4-Dichlorobenzene	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Dichlorodifluoromethane	19.4	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,1-Dichloroethane	20.9	---	0.400	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	22.7	---	0.400	ug/L	1	20.0	---	114	80 - 120%	---	---	
1,1-Dichloroethene	20.0	---	0.400	ug/L	1	20.0	---	100	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.6	---	0.400	ug/L	1	20.0	---	103	80 - 120%	---	---	
trans-1,2-Dichloroethene	21.3	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,2-Dichloropropane	21.2	---	0.500	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,3-Dichloropropane	21.1	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
2,2-Dichloropropane	15.8	---	1.00	ug/L	1	20.0	---	79	80 - 120%	---	---	Q-55
1,1-Dichloropropene	19.2	---	1.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
cis-1,3-Dichloropropene	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
trans-1,3-Dichloropropene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Hexachlorobutadiene	18.6	---	5.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
Methylene chloride	20.9	---	10.0	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	21.4	---	0.400	ug/L	1	20.0	---	107	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	22.9	---	0.500	ug/L	1	20.0	---	115	80 - 120%	---	---	
Tetrachloroethene (PCE)	19.4	---	0.400	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,2,3-Trichlorobenzene	21.8	---	2.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,2,4-Trichlorobenzene	19.3	---	2.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
1,1,1-Trichloroethane	19.3	---	0.400	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,1,2-Trichloroethane	21.8	---	0.500	ug/L	1	20.0	---	109	80 - 120%	---	---	
Trichloroethene (TCE)	19.3	---	0.400	ug/L	1	20.0	---	96	80 - 120%	---	---	
Trichlorofluoromethane	26.2	---	2.00	ug/L	1	20.0	---	131	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	20.8	---	1.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
Vinyl chloride	21.3	---	0.400	ug/L	1	20.0	---	107	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr)	Recovery: 100 %		Limits: 80-120 %		Dilution: 1x							
Toluene-d8 (Surr)	98 %		80-120 %		"							
4-Bromofluorobenzene (Surr)	92 %		80-120 %		"							

Duplicate (0120449-DUP1) Prepared: 12/11/20 20:00 Analyzed: 12/12/20 06:21

QC Source Sample: S-2 (A0L0273-15)

EPA 8260D

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120449 - EPA 5030B												
Water												
Duplicate (0120449-DUP1)			Prepared: 12/11/20 20:00 Analyzed: 12/12/20 06:21									
QC Source Sample: S-2 (A0L0273-15)												
Bromobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Chloromethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromomethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	7.67	---	0.400	ug/L	1	---	7.72	---	---	0.7	30%	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	32.5	---	0.400	ug/L	1	---	31.4	---	---	4	30%	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	0.325	---	---	***	30%	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Methylene chloride	ND	---	10.0	ug/L	1	---	ND	---	---	---	30%	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120449 - EPA 5030B												
Water												
Duplicate (0120449-DUP1)			Prepared: 12/11/20 20:00 Analyzed: 12/12/20 06:21									
QC Source Sample: S-2 (A0L0273-15)												
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	1.12	---	0.400	ug/L	1	---	1.13	---	---	0.9	30%	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	---	0.400	ug/L	1	---	0.281	---	---	***	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>					
<i>Toluene-d8 (Surr)</i>			<i>103 %</i>		<i>80-120 %</i>		<i>"</i>					
<i>4-Bromofluorobenzene (Surr)</i>			<i>103 %</i>		<i>80-120 %</i>		<i>"</i>					

Matrix Spike (0120449-MS1)												
Prepared: 12/11/20 20:00 Analyzed: 12/12/20 01:21												
QC Source Sample: MGMS2-60 (A0L0273-02)												
EPA 8260D												
Bromobenzene	19.7	---	0.500	ug/L	1	20.0	ND	99	80 - 120%	---	---	
Bromochloromethane	21.6	---	1.00	ug/L	1	20.0	ND	108	78 - 123%	---	---	
Bromodichloromethane	21.8	---	1.00	ug/L	1	20.0	ND	109	79 - 125%	---	---	
Bromoform	20.6	---	2.00	ug/L	1	20.0	ND	103	66 - 130%	---	---	
Bromomethane	21.6	---	5.00	ug/L	1	20.0	ND	108	53 - 141%	---	---	
Carbon tetrachloride	22.3	---	1.00	ug/L	1	20.0	ND	111	72 - 136%	---	---	
Chlorobenzene	20.5	---	0.500	ug/L	1	20.0	ND	102	80 - 120%	---	---	
Chloroethane	20.5	---	5.00	ug/L	1	20.0	ND	102	60 - 138%	---	---	
Chloroform	21.8	---	1.00	ug/L	1	20.0	ND	109	79 - 124%	---	---	
Chloromethane	29.4	---	5.00	ug/L	1	20.0	ND	147	50 - 139%	---	---	Q-54b
2-Chlorotoluene	19.3	---	1.00	ug/L	1	20.0	ND	97	79 - 122%	---	---	
4-Chlorotoluene	19.4	---	1.00	ug/L	1	20.0	ND	97	78 - 122%	---	---	
Dibromochloromethane	21.1	---	1.00	ug/L	1	20.0	ND	106	74 - 126%	---	---	
1,2-Dibromo-3-chloropropane	17.5	---	5.00	ug/L	1	20.0	ND	87	62 - 128%	---	---	
1,2-Dibromoethane (EDB)	19.1	---	1.00	ug/L	1	20.0	ND	95	77 - 121%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120449 - EPA 5030B						Water						
Matrix Spike (0120449-MS1)			Prepared: 12/11/20 20:00 Analyzed: 12/12/20 01:21									
QC Source Sample: MGMS2-60 (A0L0273-02)												
Dibromomethane	22.2	---	1.00	ug/L	1	20.0	ND	111	79 - 123%	---	---	
1,2-Dichlorobenzene	20.5	---	0.500	ug/L	1	20.0	ND	102	80 - 120%	---	---	
1,3-Dichlorobenzene	20.3	---	0.500	ug/L	1	20.0	ND	102	80 - 120%	---	---	
1,4-Dichlorobenzene	20.1	---	0.500	ug/L	1	20.0	ND	101	79 - 120%	---	---	
Dichlorodifluoromethane	23.8	---	1.00	ug/L	1	20.0	ND	119	32 - 152%	---	---	
1,1-Dichloroethane	21.9	---	0.400	ug/L	1	20.0	0.860	105	77 - 125%	---	---	
1,2-Dichloroethane (EDC)	22.2	---	0.400	ug/L	1	20.0	ND	111	73 - 128%	---	---	
1,1-Dichloroethene	22.0	---	0.400	ug/L	1	20.0	ND	110	71 - 131%	---	---	
cis-1,2-Dichloroethene	41.7	---	0.400	ug/L	1	20.0	20.2	108	78 - 123%	---	---	
trans-1,2-Dichloroethene	21.6	---	0.400	ug/L	1	20.0	ND	108	75 - 124%	---	---	
1,2-Dichloropropane	20.5	---	0.500	ug/L	1	20.0	ND	102	78 - 122%	---	---	
1,3-Dichloropropane	20.5	---	1.00	ug/L	1	20.0	ND	102	80 - 120%	---	---	
2,2-Dichloropropane	15.0	---	1.00	ug/L	1	20.0	ND	75	60 - 139%	---	---	Q-54c
1,1-Dichloropropene	20.6	---	1.00	ug/L	1	20.0	ND	103	79 - 125%	---	---	
cis-1,3-Dichloropropene	17.6	---	1.00	ug/L	1	20.0	ND	88	75 - 124%	---	---	
trans-1,3-Dichloropropene	18.9	---	1.00	ug/L	1	20.0	ND	95	73 - 127%	---	---	
Hexachlorobutadiene	20.3	---	5.00	ug/L	1	20.0	ND	101	66 - 134%	---	---	
Methylene chloride	20.6	---	10.0	ug/L	1	20.0	ND	103	74 - 124%	---	---	
1,1,1,2-Tetrachloroethane	21.8	---	0.400	ug/L	1	20.0	ND	109	78 - 124%	---	---	
1,1,2,2-Tetrachloroethane	22.4	---	0.500	ug/L	1	20.0	ND	112	71 - 121%	---	---	
Tetrachloroethene (PCE)	42.6	---	0.400	ug/L	1	20.0	21.8	104	74 - 129%	---	---	
1,2,3-Trichlorobenzene	21.0	---	2.00	ug/L	1	20.0	ND	105	69 - 129%	---	---	
1,2,4-Trichlorobenzene	19.2	---	2.00	ug/L	1	20.0	ND	96	69 - 130%	---	---	
1,1,1-Trichloroethane	20.8	---	0.400	ug/L	1	20.0	ND	104	74 - 131%	---	---	
1,1,2-Trichloroethane	21.0	---	0.500	ug/L	1	20.0	ND	105	80 - 120%	---	---	
Trichloroethene (TCE)	30.2	---	0.400	ug/L	1	20.0	10.5	98	79 - 123%	---	---	
Trichlorofluoromethane	30.8	---	2.00	ug/L	1	20.0	ND	154	65 - 141%	---	---	Q-54
1,2,3-Trichloropropane	19.7	---	1.00	ug/L	1	20.0	ND	98	73 - 122%	---	---	
Vinyl chloride	23.9	---	0.400	ug/L	1	20.0	0.757	116	58 - 137%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 101 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>94 %</i>		<i>80-120 %</i>		<i>"</i>						

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120473 - EPA 5030B						Water						
Blank (0120473-BLK1)	Prepared: 12/14/20 08:00					Analyzed: 12/14/20 11:32						
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromoform	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---

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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120473 - EPA 5030B						Water						
Blank (0120473-BLK1)	Prepared: 12/14/20 08:00			Analyzed: 12/14/20 11:32								
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>	<i>Recovery:</i>		<i>102 %</i>	<i>Limits:</i>		<i>80-120 %</i>		<i>Dilution: 1x</i>				
<i>Toluene-d8 (Surr)</i>			<i>103 %</i>			<i>80-120 %</i>		<i>"</i>				
<i>4-Bromofluorobenzene (Surr)</i>			<i>102 %</i>			<i>80-120 %</i>		<i>"</i>				

LCS (0120473-BS1)						Prepared: 12/14/20 08:00 Analyzed: 12/14/20 10:10						
EPA 8260D												
Bromobenzene	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Bromochloromethane	21.9	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Bromodichloromethane	21.5	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Bromoform	20.8	---	2.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
Bromomethane	20.0	---	5.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
Carbon tetrachloride	21.4	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
Chlorobenzene	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Chloroethane	18.6	---	5.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
Chloroform	21.1	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
Chloromethane	22.4	---	5.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
2-Chlorotoluene	18.3	---	1.00	ug/L	1	20.0	---	91	80 - 120%	---	---	
4-Chlorotoluene	19.0	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
Dibromochloromethane	21.7	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	18.8	---	5.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	19.1	---	1.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
Dibromomethane	22.2	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,2-Dichlorobenzene	19.4	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120473 - EPA 5030B												
Water												
LCS (0120473-BS1)	Prepared: 12/14/20 08:00 Analyzed: 12/14/20 10:10											
1,3-Dichlorobenzene	19.5	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,4-Dichlorobenzene	19.2	---	0.500	ug/L	1	20.0	---	96	80 - 120%	---	---	
Dichlorodifluoromethane	21.3	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
1,1-Dichloroethane	20.7	---	0.400	ug/L	1	20.0	---	103	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	21.6	---	0.400	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,1-Dichloroethene	21.5	---	0.400	ug/L	1	20.0	---	108	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.2	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
trans-1,2-Dichloroethene	20.5	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2-Dichloropropane	20.2	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,3-Dichloropropane	20.9	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
2,2-Dichloropropane	20.3	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,1-Dichloropropene	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
cis-1,3-Dichloropropene	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
trans-1,3-Dichloropropene	21.3	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
Hexachlorobutadiene	19.7	---	5.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
Methylene chloride	20.2	---	10.0	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	21.6	---	0.400	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	22.7	---	0.500	ug/L	1	20.0	---	113	80 - 120%	---	---	
Tetrachloroethene (PCE)	19.5	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,2,3-Trichlorobenzene	20.2	---	2.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,2,4-Trichlorobenzene	18.3	---	2.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
1,1,1-Trichloroethane	19.5	---	0.400	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,1,2-Trichloroethane	21.4	---	0.500	ug/L	1	20.0	---	107	80 - 120%	---	---	
Trichloroethene (TCE)	18.0	---	0.400	ug/L	1	20.0	---	90	80 - 120%	---	---	
Trichlorofluoromethane	28.8	---	2.00	ug/L	1	20.0	---	144	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Vinyl chloride	21.7	---	0.400	ug/L	1	20.0	---	109	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr) Recovery: 100 % Limits: 80-120 % Dilution: 1x												
Toluene-d8 (Surr) 100 % 80-120 % "												
4-Bromofluorobenzene (Surr) 93 % 80-120 % "												



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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120370 - Method Prep: Aq						Water						
Blank (0120370-BLK1)		Prepared: 12/10/20 08:42 Analyzed: 12/10/20 11:20										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	---
LCS (0120370-BS1)		Prepared: 12/10/20 08:42 Analyzed: 12/10/20 11:21										
SM 4500-NH3 G												
Ammonia as N	2.00	---	0.0200	mg/L	1	2.00	---	100	87 - 116%	---	---	---

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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC % REC	% REC Limits	RPD RPD	RPD Limit	Notes
Batch 0120443 - Method Prep: Aq						Water						
Blank (0120443-BLK1)		Prepared: 12/11/20 12:31 Analyzed: 12/11/20 17:13										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	---
LCS (0120443-BS1)		Prepared: 12/11/20 12:31 Analyzed: 12/11/20 17:14										
SM 4500-NH3 G												
Ammonia as N	2.08	---	0.0200	mg/L	1	2.00	---	104	87 - 116%	---	---	---
Matrix Spike (0120443-MS1)		Prepared: 12/11/20 12:31 Analyzed: 12/11/20 17:23										
QC Source Sample: MGMS2-60 (A0L0273-02RE1)												
SM 4500-NH3 G												
Ammonia as N	2.59	---	0.0250	mg/L	1	2.50	0.136	98	87 - 116%	---	---	---
Matrix Spike Dup (0120443-MSD1)		Prepared: 12/11/20 12:31 Analyzed: 12/11/20 17:25										
QC Source Sample: MGMS2-60 (A0L0273-02RE1)												
SM 4500-NH3 G												
Ammonia as N	2.63	---	0.0250	mg/L	1	2.50	0.136	100	87 - 116%	2	13%	---



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QUALITY CONTROL (QC) SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120321 - Method Prep: Aq						Water						
Blank (0120321-BLK1)		Prepared: 12/09/20 08:43		Analyzed: 12/09/20 10:26								
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
LCS (0120321-BS1)		Prepared: 12/09/20 08:43		Analyzed: 12/09/20 10:47								
EPA 300.0												
Nitrate-Nitrogen	2.07	---	0.250	mg/L	1	2.00	---	103	90 - 110%	---	---	---
Nitrite-Nitrogen	2.07	---	0.250	mg/L	1	2.00	---	104	90 - 110%	---	---	---
Duplicate (0120321-DUP1)		Prepared: 12/09/20 08:43		Analyzed: 12/09/20 11:30								
QC Source Sample: MGMS2-40 (A0L0273-01)												
EPA 300.0												
Nitrite-Nitrogen	0.384	---	0.250	mg/L	1	---	0.385	---	---	0.4	10%	---
Duplicate (0120321-DUP2)		Prepared: 12/09/20 08:43		Analyzed: 12/09/20 12:35								
QC Source Sample: MGMS2-60 (A0L0273-02)												
EPA 300.0												
Nitrate-Nitrogen	0.546	---	0.250	mg/L	1	---	0.558	---	---	2	5%	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	---
Duplicate (0120321-DUP3)		Prepared: 12/09/20 08:43		Analyzed: 12/09/20 21:56								
QC Source Sample: MGMS2-40 (A0L0273-01RE1)												
EPA 300.0												
Nitrate-Nitrogen	28.5	---	2.50	mg/L	10	---	28.5	---	---	0.07	5%	Q-16
Matrix Spike (0120321-MS1)		Prepared: 12/09/20 08:43		Analyzed: 12/09/20 11:52								
QC Source Sample: MGMS2-40 (A0L0273-01)												
EPA 300.0												
Nitrite-Nitrogen	2.90	---	0.312	mg/L	1	2.50	0.385	101	82 - 117%	---	---	---
Matrix Spike (0120321-MS2)		Prepared: 12/09/20 08:43		Analyzed: 12/09/20 12:57								
QC Source Sample: MGMS2-60 (A0L0273-02)												
EPA 300.0												

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QUALITY CONTROL (QC) SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120321 - Method Prep: Aq						Water						
Matrix Spike (0120321-MS2)			Prepared: 12/09/20 08:43 Analyzed: 12/09/20 12:57									
QC Source Sample: MGMS2-60 (A0L0273-02)												
Nitrate-Nitrogen	3.15	---	0.312	mg/L	1	2.50	0.558	104	86 - 118%	---	---	
Nitrite-Nitrogen	2.59	---	0.312	mg/L	1	2.50	ND	104	82 - 117%	---	---	
Matrix Spike (0120321-MS3)			Prepared: 12/09/20 08:43 Analyzed: 12/09/20 22:17									
QC Source Sample: MGMS2-40 (A0L0273-01RE1)												
EPA 300.0												
Nitrate-Nitrogen	48.8	---	2.50	mg/L	10	20.0	28.5	102	86 - 118%	---	---	Q-16

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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120394 - Method Prep: Aq						Water						
Blank (0120394-BLK1)		Prepared: 12/10/20 11:47 Analyzed: 12/10/20 15:54										
SM 5310 C												
Total Organic Carbon	ND	---	1.00	mg/L	1	---	---	---	---	---	---	---
LCS (0120394-BS1)		Prepared: 12/10/20 11:47 Analyzed: 12/10/20 16:23										
SM 5310 C												
Total Organic Carbon	10.3	---	1.00	mg/L	1	10.0	---	103	90 - 114%	---	---	---
Duplicate (0120394-DUP1)		Prepared: 12/10/20 11:47 Analyzed: 12/10/20 17:25										
QC Source Sample: MGMS2-40 (A0L0273-01)												
SM 5310 C												
Total Organic Carbon	5.42	---	1.00	mg/L	1	---	5.37	---	---	1	10%	---
Matrix Spike (0120394-MS1)		Prepared: 12/10/20 11:47 Analyzed: 12/10/20 17:56										
QC Source Sample: MGMS2-40 (A0L0273-01)												
SM 5310 C												
Total Organic Carbon	16.1	---	1.01	mg/L	1	10.0	5.37	107	90 - 114%	---	---	---



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SAMPLE PREPARATION INFORMATION

Halogenated Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0120449</u>							
A0L0273-01	Water	EPA 8260D	12/08/20 08:25	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-02	Water	EPA 8260D	12/08/20 08:50	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-03	Water	EPA 8260D	12/08/20 09:20	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-04	Water	EPA 8260D	12/08/20 09:50	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-05	Water	EPA 8260D	12/08/20 10:40	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-06	Water	EPA 8260D	12/08/20 08:10	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-07	Water	EPA 8260D	12/08/20 09:04	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-08	Water	EPA 8260D	12/08/20 09:42	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-09	Water	EPA 8260D	12/08/20 09:42	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-10	Water	EPA 8260D	12/08/20 10:33	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-11	Water	EPA 8260D	12/08/20 10:33	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-13	Water	EPA 8260D	12/08/20 12:15	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-14	Water	EPA 8260D	12/08/20 13:12	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0273-15	Water	EPA 8260D	12/08/20 13:50	12/11/20 20:00	5mL/5mL	5mL/5mL	1.00
<u>Batch: 0120473</u>							
A0L0273-12RE1	Water	EPA 8260D	12/08/20 11:30	12/14/20 11:02	5mL/5mL	5mL/5mL	1.00

Ammonia by Gas Diffusion and Colorimetric Detection

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0120370</u>							
A0L0273-01	Water	SM 4500-NH3 G	12/08/20 08:25	12/10/20 08:42	10mL/10mL	10mL/10mL	1.00
A0L0273-07RE1	Water	SM 4500-NH3 G	12/08/20 09:04	12/10/20 08:42	10mL/10mL	10mL/10mL	1.00
A0L0273-08RE1	Water	SM 4500-NH3 G	12/08/20 09:42	12/10/20 08:42	10mL/10mL	10mL/10mL	1.00
A0L0273-09RE1	Water	SM 4500-NH3 G	12/08/20 09:42	12/10/20 08:42	10mL/10mL	10mL/10mL	1.00
A0L0273-10	Water	SM 4500-NH3 G	12/08/20 10:33	12/10/20 08:42	10mL/10mL	10mL/10mL	1.00
A0L0273-11	Water	SM 4500-NH3 G	12/08/20 10:33	12/10/20 08:42	10mL/10mL	10mL/10mL	1.00
A0L0273-12	Water	SM 4500-NH3 G	12/08/20 11:30	12/10/20 08:42	10mL/10mL	10mL/10mL	1.00
A0L0273-15	Water	SM 4500-NH3 G	12/08/20 13:50	12/10/20 08:42	10mL/10mL	10mL/10mL	1.00
<u>Batch: 0120443</u>							
A0L0273-02RE1	Water	SM 4500-NH3 G	12/08/20 08:50	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0273-03RE1	Water	SM 4500-NH3 G	12/08/20 09:20	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0273-04RE1	Water	SM 4500-NH3 G	12/08/20 09:50	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0273-05RE1	Water	SM 4500-NH3 G	12/08/20 10:40	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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SAMPLE PREPARATION INFORMATION

Ammonia by Gas Diffusion and Colorimetric Detection

Prep: Method Prep: Aq					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
A0L0273-06RE1	Water	SM 4500-NH3 G	12/08/20 08:10	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0273-13RE1	Water	SM 4500-NH3 G	12/08/20 12:15	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0273-14RE2	Water	SM 4500-NH3 G	12/08/20 13:12	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00

Anions by Ion Chromatography

Prep: Method Prep: Aq					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 0120321							
A0L0273-01	Water	EPA 300.0	12/08/20 08:25	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-01RE1	Water	EPA 300.0	12/08/20 08:25	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-02	Water	EPA 300.0	12/08/20 08:50	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-03	Water	EPA 300.0	12/08/20 09:20	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-04	Water	EPA 300.0	12/08/20 09:50	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-05	Water	EPA 300.0	12/08/20 10:40	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-06	Water	EPA 300.0	12/08/20 08:10	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-06RE1	Water	EPA 300.0	12/08/20 08:10	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-07	Water	EPA 300.0	12/08/20 09:04	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-07RE1	Water	EPA 300.0	12/08/20 09:04	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-08	Water	EPA 300.0	12/08/20 09:42	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-08RE1	Water	EPA 300.0	12/08/20 09:42	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-09	Water	EPA 300.0	12/08/20 09:42	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-09RE1	Water	EPA 300.0	12/08/20 09:42	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-10RE1	Water	EPA 300.0	12/08/20 10:33	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-11RE1	Water	EPA 300.0	12/08/20 10:33	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-12	Water	EPA 300.0	12/08/20 11:30	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-13RE1	Water	EPA 300.0	12/08/20 12:15	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-14	Water	EPA 300.0	12/08/20 13:12	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00
A0L0273-15	Water	EPA 300.0	12/08/20 13:50	12/09/20 08:43	5mL/5mL	5mL/5mL	1.00

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Prep: Method Prep: Aq					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 0120394							
A0L0273-01	Water	SM 5310 C	12/08/20 08:25	12/10/20 11:47	40mL/40mL	40mL/40mL	1.00
A0L0273-08RE1	Water	SM 5310 C	12/08/20 09:42	12/10/20 11:47	40mL/40mL	40mL/40mL	1.00

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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SAMPLE PREPARATION INFORMATION

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

<u>Prep: Method Prep: Aq</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
A0L0273-09RE1	Water	SM 5310 C	12/08/20 09:42	12/10/20 11:47	40mL/40mL	40mL/40mL	1.00
A0L0273-10	Water	SM 5310 C	12/08/20 10:33	12/10/20 11:47	40mL/40mL	40mL/40mL	1.00
A0L0273-11	Water	SM 5310 C	12/08/20 10:33	12/10/20 11:47	40mL/40mL	40mL/40mL	1.00
A0L0273-12	Water	SM 5310 C	12/08/20 11:30	12/10/20 11:47	40mL/40mL	40mL/40mL	1.00

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <u>Nustar-Vancouver</u> Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- B-02** Analyte detected in an associated blank at a level between one-half the MRL and the MRL. (See Notes and Conventions below.)
- M-02** Due to matrix interference, this analyte cannot be accurately quantified. The reported result is estimated.
- Q-16** Reanalysis of an original Batch QC sample.
- Q-54** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +11%. The results are reported as Estimated Values.
- Q-54b** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +27%. The results are reported as Estimated Values.
- Q-54c** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by -1%. The results are reported as Estimated Values.
- Q-55** Daily CCV/LCS recovery for this analyte was below the +/-20% criteria listed in EPA 8260, however there is adequate sensitivity to ensure detection at the reporting level.
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported.
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis. The Result Basis is listed following the units as "dry", "wet", or "" (blank) designation.
 - "dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
 - "wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
 - "" Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) are not included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation)
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
<u>All reported analytes are included in Apex Laboratories' current ORELAP scope.</u>					

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Lisa Domenighini, Client Services Manager

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Cascadia Associates

5820 SW Kelly Ave Unit B
Portland, OR 97239

Project: **Nustar-Vancouver**

Project Number: **Nustar Van 4Q20 GWM**

Project Manager: **Stephanie Salisbury**

Report ID:

A0L0273 - 12 29 20 0727

APEX LABS 6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323		CHAIN OF CUSTODY		Lab # A0L0273 of 1																						
Company: Cascadia Associates	Project Mgr: Stephanie Salisbury	Project Name: Nustar Van 4Q20 GWM	Project #:	COC # 1 of 1																						
Address: 5820 SW Kelly Ave, Portland	Phone: 503-906-0577	Email: ssalisbury@cascadialabs.com																								
Sampled by: LM / JUB	ANALYSIS REQUEST																									
Site Location:	ARCHIVE																									
OR WA CA AK ID																										
LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-DX	NWTPH-GX	8260 RTEK	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Volat Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	AL, Sb, As, Ba, Be, Bi, Br, Cd, Ca, Cr, Cu, Fe, Pb, Hg, Mn, Ni, P, Se, Ag, Na, Ti, V, Zn	TOTAL DISS. TCLP	TCLP Metals (8)	Ni/As/Chk	AMMUNA	TOC	Ethanol/Ether/Hexan		
MGM S2-40	12/8/20	825	GW	6							X											X				
MGM S2-60		850		5							X											X				
MGM S2-110		920		5							X											X				
MGM S2-132		950		5							X											X				
MGM S1-110		1040		5							X											X				
MW-13		810		5																						
MW-1		904		5																						
MW-12		942		7																						
MW-12 Dup		942		7																						
MW-19		1033		7																						
TAT Requested (circle)					1 Day 2 Day 3 Day					4 DAY 5 DAY Other: _____																
REINQUISHED BY:					RECEIVED BY:					SPECIAL INSTRUCTIONS:																
Signature: <i>[Signature]</i>					Signature: <i>[Signature]</i>					489 818-175																
Date: 12/8/20					Date: 12-8-2020																					
Printed Name: Jen Weatherford					Printed Name: Michael Weatherford																					
Time: 1400					Time: 1400																					
Company: Cascadia Assoc					Company: Apex Labs																					

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates

Project: Nustar-Vancouver

5820 SW Kelly Ave Unit B

Project Number: Nustar Van 4Q20 GWM

Portland, OR 97239

Project Manager: Stephanie Salisbury

Report ID:

A0L0273 - 12 29 20 0727

CHAIN OF CUSTODY

APEX LABS
6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

Company: Cascadia Assoc. Project Mgr: Stephanie Salisbury Project Name: Nustar Van 4Q20 GWM Lab # 400073 COC 2 of 2
 Address: 5820 Kelly Ave. Unit B, Portland Phone: _____ Email: stsalisbury

Sampled by: JW
 Site Location: OR WA CA
 AK ID _____

LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-CID	NWTPH-DX	NWTPH-GX	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vol. Full List	8082 PCBs	8081 Pest	R CRA Metals (8)	Priority Metals (13)	AL, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	TCLP Metals (8)	N502/NO3	NH3	TOC	Etanone/Ethene/Methane	Archive	
MW-19 Dip	12/2	10:30 (am)		7						X									X	X	X	X		
MW-13		11:20		7						X									X	X	X	X		
MW-17		12:15		5						X									X	X	X	X		
S-1		13:12		5						X									X	X	X	X		
S-2		13:50y		5						X									X	X	X	X		
Trip Blank																			X	X	X	X		

SPECIAL INSTRUCTIONS:
 * By RSL-175
 H = hold for PM - project mgr.

TAT Requested (circle)
 1 Day 2 Day 3 Day
 4 DAY 5 DAY Other: _____

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY: Signature: <u>[Signature]</u> Printed Name: <u>Jon Weatherford</u> Company: <u>Cascadia Assoc.</u>	RECEIVED BY: Signature: <u>[Signature]</u> Printed Name: <u>Mikael Marlowe</u> Company: <u>Apex Labs</u>
Date: <u>12/8/20</u> Time: <u>1:00</u>	Date: <u>12/8/20</u> Time: <u>1:00</u>

Apex Laboratories

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Lisa Domenighini



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0273 - 12 29 20 0727
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APEX LABS COOLER RECEIPT FORM

Client: Cascadia Associates Element WO#: A0 10273

Project/Project #: Nustar Van 4Q20 GWM

Delivery Info:
Date/time received: 12-8-2020 @ 1600 By: MK
Delivered by: Apex Client ESS FedEx UPS Swift Senvoy SDS Other

Cooler Inspection Date/time inspected: 12-8-2020 @ 1400 1740 By: MK
Chain of Custody included? Yes No ^{MA 12-8} Custody seals? Yes No

Signed/dated by client? Yes No
Signed/dated by Apex? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>4.5</u>						
Received on ice? (Y/N)	<u>Y</u>						
Temp. blanks? (Y/N)	<u>Y</u>						
Ice type: (Gel/Real/Other)	<u>Real</u>						
Condition:	<u>good</u>						

Cooler out of temp? (Y/N) Y Possible reason why: _____
If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA NA
Out of temperature samples form initiated? Yes/No/NA _____

Samples Inspection: Date/time inspected: 12/8/20 @ 1909 By: AKC
All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: MQMS2-40 7 Conts. provided, 6 on COC. TB #2492.

COC/container discrepancies form initiated? Yes No

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information:

Labeled by: AKC Witness: [Signature] Cooler Inspected by: AKC See Project Contact Form: Y

Lisa Domenighini

December 28, 2020

Apex Laboratories
ATTN: Lisa Domenighini
6700 S.W. Sandburg St.
Tigard, OR 97223



LA Cert #04140
EPA Methods TO3, TO14A, TO15, 25C/3C,
RSK-175

TX Cert T104704450-14-6
EPA Methods TO14A, TO15

UT Cert CA0133332015-3
EPA Methods TO3, TO14A, TO15, RSK-175

LABORATORY TEST RESULTS

Project Reference: A0L0273
Lab Number: L121006-01/06

Enclosed are results for sample(s) received 12/10/20 by Air Technology Laboratories. Sample was received intact and chilled to 4° C. Analyses were performed according to specifications on the chain of custody provided with the sample(s).

Report Narrative:

- Unless otherwise noted in the report, sample analyses were performed within method performance criteria and meet all requirements of the TNI Standards.
- The enclosed results relate only to the sample(s).

ATL appreciates the opportunity to provide testing services to your company. If you have any questions regarding these results, please call me at (626) 964-4032.

Sincerely,

A handwritten signature in blue ink, appearing to read "Mark Johnson", with a small downward-pointing arrow at the end.

Mark Johnson
Operations Manager
MJohnson@AirTechLabs.com

Note: The cover letter is an integral part of this analytical report.

SUBCONTRACT ORDER

8

L121006-01/06

Apex Laboratories

A0L0273

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Lisa Domenighini

RECEIVING LABORATORY:

Air Technology Laboratories, Inc
18501 E. Gale Ave Suite 130
City of Industry, CA 91748
Phone : (626) 964-4032
Fax: (626) 964-5832

7 Conts. provided, 6 on CoC.

ARC memo

Sample Name: **MGMS2-40** Water Sampled: **12/08/20 08:25** (A0L0273-01)

01

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	12/22/20 17:00	12/22/20 08:25	
<i>Containers Supplied:</i>			
(F)40 mL VOA - HCL			
(G)40 mL VOA - HCL			

Sample Name: **MW-12** Water Sampled: **12/08/20 09:42** (A0L0273-08)

02

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	12/22/20 17:00	12/22/20 09:42	
<i>Containers Supplied:</i>			
(F)40 mL VOA - HCL			
(G)40 mL VOA - HCL			

Sample Name: **MW-12 Dup** Water Sampled: **12/08/20 09:42** (A0L0273-09)

03

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	12/22/20 17:00	12/22/20 09:42	
<i>Containers Supplied:</i>			
(F)40 mL VOA - HCL			
(G)40 mL VOA - HCL			

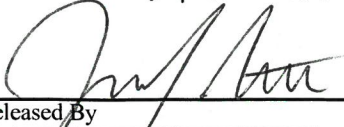
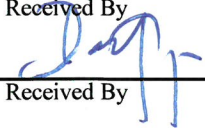
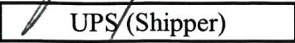
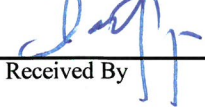
Sample Name: **MW-19** Water Sampled: **12/08/20 10:33** (A0L0273-10)

04

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	12/22/20 17:00	12/22/20 10:33	
<i>Containers Supplied:</i>			
(F)40 mL VOA - HCL			
(G)40 mL VOA - HCL			

Standard TAT

4°C

Released By	Date	Received By	Date
	12/9/20		12/10/20
Released By	Date	Received By	Date
			1045

SUBCONTRACT ORDER

Apex Laboratories

A0L0273

88

L121006-01/06

acc 12/11/20

Sample Name: MW-19 Dup Water Sampled: 12/08/20 10:33 (A0L0273-11)

06

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	12/22/20 17:00	12/22/20 10:33	
Containers Supplied: (F)40 mL VOA - HCL (G)40 mL VOA - HCL			

Sample Name: MW-13 Water Sampled: 12/08/20 11:30 (A0L0273-12)

06

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	12/22/20 17:00	12/22/20 11:30	
Containers Supplied: (F)40 mL VOA - HCL (G)40 mL VOA - HCL			

4°C

Released By: [Signature] Date: 12/9/20 Received By: [Signature] Date: 12/10/20

Released By: [Signature] Date: 12/9/20 Received By: [Signature] Date: 12/10/20

Client: Apex Laboratories
Attn: Lisa Domenighini
Project Name: NA
Project No.: A0L0273
Date Received: 12/10/20
Matrix: Water
Reporting Units: ug/L

RSK175

Lab No.:	L121006-01	L121006-02	L121006-03	L121006-04				
Client Sample I.D.:	MGMS2-40 (A0L0273-01)	MW-12 (A0L0273-08)	MW-12 DUP (A0L0273-09)	MW-19 (A0L0273-10)				
Date/Time Sampled:	12/8/20 8:25	12/8/20 9:42	12/8/20 9:42	12/8/20 10:33				
Date/Time Analyzed:	12/21/20 9:34	12/21/20 9:46	12/21/20 10:06	12/21/20 10:20				
QC Batch No.:	201221GC8A1	201221GC8A1	201221GC8A1	201221GC8A1				
Analyst Initials:	CM	CM	CM	CM				
Dilution Factor:	1.0	1.0	1.0	1.0				
ANALYTE	Result ug/L	RL ug/L	Result ug/L	RL ug/L	Result ug/L	RL ug/L	Result ug/L	RL ug/L
Ethene	2.0	1.0	3.5	1.0	3.6	1.0	ND	1.0
Ethane	2.2	1.0	22	1.0	25	1.0	28	1.0
Methane	3.2	1.0	6,700	1.0	8,100	1.0	5,000	1.0

ND = Not Detected (below RL)
 RL = Reporting Limit

Reviewed/Approved By: *Mark Johnson*
 Mark Johnson
 Operations Manager

Date 12/28/20

The cover letter is an integral part of this analytical report



Client: Apex Laboratories
Attn: Lisa Domenighini
Project Name: NA
Project No.: A0L0273
Date Received: 12/10/20
Matrix: Water
Reporting Units: ug/L

RSK175

Lab No.:	L121006-05	L121006-06		
Client Sample I.D.:	MW-19 DUP (A0L0273-11)	MW-13 (A0L0273-12)		
Date/Time Sampled:	12/8/20 10:33	12/8/20 11:30		
Date/Time Analyzed:	12/21/20 10:33	12/21/20 10:48		
QC Batch No.:	201221GC8A1	201221GC8A1		
Analyst Initials:	CM	CM		
Dilution Factor:	1.0	1.0		
ANALYTE	Result ug/L	RL ug/L	Result ug/L	RL ug/L
Ethene	ND	1.0	ND	1.0
Ethane	26	1.0	68	1.0
Methane	4,800	1.0	5,700	1.0

ND = Not Detected (below RL)
 RL = Reporting Limit

Reviewed/Approved By: _____


Mark Johnson
 Operations Manager

Date 12/28/20

The cover letter is an integral part of this analytical report



QC Batch No: 201221GC8A1

Matrix: Water

Reporting Units: ug/L

RSK 175
LABORATORY CONTROL SAMPLE SUMMARY

Lab No.:	METHOD BLANK			LCS		LCSD					
Date/Time Analyzed:	12/21/20 8:53			12/21/20 9:07		12/21/20 9:19					
Analyst Initials:	CM			CM		CM					
Dilution Factor:	1.1			1.0		1.0		Limits			
ANALYTE	Result ug/L	RL ug/L	SPIKE AMT. ug/L	Result ug/L	% Rec.	Result ug/L	% Rec.	RPD %	Low %Rec	High %Rec	Max. RPD
Ethene	ND	1.0	1,150	1,330	116	1,240	108	7.0	70	130	30
Ethane	ND	1.0	1,200	1,400	114	1,360	111	3.2	70	130	30
Methane	ND	1.0	650	715	109	698	107	2.5	70	130	30

ND = Not Detected (below RL)

RL = Reporting Limit

Reviewed/Approved By: Mark Johnson
Operations Manager

Date: 12/28/20

The cover letter is an integral part of this analytical report





Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Tuesday, January 5, 2021

Stephanie Salisbury
Cascadia Associates
5820 SW Kelly Ave Unit B
Portland, OR 97239

RE: A0L0354 - Nustar-Vancouver - Nustar Van 4Q20 GWM

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A0L0354, which was received by the laboratory on 12/10/2020 at 3:45:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	0.3 degC	Cooler #2	2.4 degC
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This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-24i	A0L0354-01	Water	12/10/20 09:30	12/10/20 15:45
MGMS1-43	A0L0354-02	Water	12/10/20 11:40	12/10/20 15:45
MGMS1-60	A0L0354-03	Water	12/10/20 12:20	12/10/20 15:45
MW-19i	A0L0354-04	Water	12/10/20 08:24	12/10/20 15:45
MW-15	A0L0354-05	Water	12/10/20 09:15	12/10/20 15:45
MW-8	A0L0354-06	Water	12/10/20 10:17	12/10/20 15:45
MW-5	A0L0354-07	Water	12/10/20 11:27	12/10/20 15:45
MGMS3-132	A0L0354-08	Water	12/10/20 13:11	12/10/20 15:45
MGMS3-110	A0L0354-09	Water	12/10/20 13:35	12/10/20 15:45
MGMS3-60	A0L0354-10	Water	12/10/20 14:06	12/10/20 15:45
MGMS3-40	A0L0354-11	Water	12/10/20 14:40	12/10/20 15:45
MGMS3-40 Dup	A0L0354-12	Water	12/10/20 14:40	12/10/20 15:45

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates

5820 SW Kelly Ave Unit B
Portland, OR 97239

Project: Nustar-Vancouver

Project Number: Nustar Van 4Q20 GWM

Project Manager: Stephanie Salisbury

Report ID:

A0L0354 - 01 05 21 0725

ANALYTICAL CASE NARRATIVE

Work Order: A0L0354

Subcontract

This report is not complete without the attached subcontract laboratory report for RSK 175 from Air Technology.

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-24i (A0L0354-01)				Matrix: Water		Batch: 0120732		
Bromobenzene	ND	---	0.500	ug/L	1	12/20/20 06:45	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/20/20 06:45	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/20/20 06:45	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/20/20 06:45	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/20/20 06:45	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/20/20 06:45	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/20/20 06:45	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 06:45	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 06:45	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 06:45	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
1,1-Dichloroethane	1.73	---	0.400	ug/L	1	12/20/20 06:45	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/20/20 06:45	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 06:45	EPA 8260D	
cis-1,2-Dichloroethene	20.0	---	0.400	ug/L	1	12/20/20 06:45	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 06:45	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/20/20 06:45	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	Q-30
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/20/20 06:45	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/20/20 06:45	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/20/20 06:45	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/20/20 06:45	EPA 8260D	
Tetrachloroethene (PCE)	29.7	---	0.400	ug/L	1	12/20/20 06:45	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 06:45	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 06:45	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/20/20 06:45	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-24i (A0L0354-01)				Matrix: Water		Batch: 0120732		
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/20/20 06:45	EPA 8260D	
Trichloroethene (TCE)	13.0	---	0.400	ug/L	1	12/20/20 06:45	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/20/20 06:45	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/20/20 06:45	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/20/20 06:45	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/20/20 06:45</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 06:45</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 06:45</i>	<i>EPA 8260D</i>

MGMS1-43 (A0L0354-02)				Matrix: Water		Batch: 0120749		
Bromobenzene	ND	---	25.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Bromochloromethane	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Bromodichloromethane	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Bromoform	ND	---	100	ug/L	50	12/21/20 19:15	EPA 8260D	
Bromomethane	ND	---	250	ug/L	50	12/21/20 19:15	EPA 8260D	
Carbon tetrachloride	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Chlorobenzene	ND	---	25.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Chloroethane	ND	---	250	ug/L	50	12/21/20 19:15	EPA 8260D	
Chloroform	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Chloromethane	ND	---	250	ug/L	50	12/21/20 19:15	EPA 8260D	
2-Chlorotoluene	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
4-Chlorotoluene	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Dibromochloromethane	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	250	ug/L	50	12/21/20 19:15	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Dibromomethane	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
1,2-Dichlorobenzene	ND	---	25.0	ug/L	50	12/21/20 19:15	EPA 8260D	
1,3-Dichlorobenzene	ND	---	25.0	ug/L	50	12/21/20 19:15	EPA 8260D	
1,4-Dichlorobenzene	ND	---	25.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Dichlorodifluoromethane	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
1,1-Dichloroethane	131	---	20.0	ug/L	50	12/21/20 19:15	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	20.0	ug/L	50	12/21/20 19:15	EPA 8260D	
1,1-Dichloroethene	ND	---	20.0	ug/L	50	12/21/20 19:15	EPA 8260D	
cis-1,2-Dichloroethene	2620	---	20.0	ug/L	50	12/21/20 19:15	EPA 8260D	
trans-1,2-Dichloroethene	34.3	---	20.0	ug/L	50	12/21/20 19:15	EPA 8260D	
1,2-Dichloropropane	ND	---	25.0	ug/L	50	12/21/20 19:15	EPA 8260D	
1,3-Dichloropropane	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
2,2-Dichloropropane	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS1-43 (A0L0354-02)				Matrix: Water		Batch: 0120749		
1,1-Dichloropropene	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Hexachlorobutadiene	ND	---	250	ug/L	50	12/21/20 19:15	EPA 8260D	
Methylene chloride	ND	---	500	ug/L	50	12/21/20 19:15	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	20.0	ug/L	50	12/21/20 19:15	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	25.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Tetrachloroethene (PCE)	151	---	20.0	ug/L	50	12/21/20 19:15	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	100	ug/L	50	12/21/20 19:15	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	100	ug/L	50	12/21/20 19:15	EPA 8260D	
1,1,1-Trichloroethane	ND	---	20.0	ug/L	50	12/21/20 19:15	EPA 8260D	
1,1,2-Trichloroethane	ND	---	25.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Trichloroethene (TCE)	294	---	20.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Trichlorofluoromethane	ND	---	100	ug/L	50	12/21/20 19:15	EPA 8260D	
1,2,3-Trichloropropane	ND	---	50.0	ug/L	50	12/21/20 19:15	EPA 8260D	
Vinyl chloride	40.6	---	20.0	ug/L	50	12/21/20 19:15	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>12/21/20 19:15</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>	<i>1</i>	<i>12/21/20 19:15</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>	<i>1</i>	<i>12/21/20 19:15</i>	<i>EPA 8260D</i>	

MGMS1-60 (A0L0354-03)				Matrix: Water		Batch: 0120732		
Bromobenzene	ND	---	0.500	ug/L	1	12/20/20 07:12	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/20/20 07:12	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/20/20 07:12	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/20/20 07:12	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/20/20 07:12	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/20/20 07:12	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/20/20 07:12	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 07:12	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS1-60 (A0L0354-03)				Matrix: Water		Batch: 0120732		
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 07:12	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 07:12	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
1,1-Dichloroethane	1.54	---	0.400	ug/L	1	12/20/20 07:12	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/20/20 07:12	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 07:12	EPA 8260D	
cis-1,2-Dichloroethene	13.1	---	0.400	ug/L	1	12/20/20 07:12	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 07:12	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/20/20 07:12	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	Q-30
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/20/20 07:12	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/20/20 07:12	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/20/20 07:12	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/20/20 07:12	EPA 8260D	
Tetrachloroethene (PCE)	20.3	---	0.400	ug/L	1	12/20/20 07:12	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 07:12	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 07:12	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/20/20 07:12	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/20/20 07:12	EPA 8260D	
Trichloroethene (TCE)	10.0	---	0.400	ug/L	1	12/20/20 07:12	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/20/20 07:12	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/20/20 07:12	EPA 8260D	
Vinyl chloride	0.640	---	0.400	ug/L	1	12/20/20 07:12	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/20/20 07:12</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 07:12</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 07:12</i>	<i>EPA 8260D</i>

MW-19i (A0L0354-04)				Matrix: Water		Batch: 0120732		
Bromobenzene	ND	---	0.500	ug/L	1	12/20/20 07:39	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/20/20 07:39	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/20/20 07:39	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-19i (A0L0354-04)				Matrix: Water		Batch: 0120732		
Chlorobenzene	ND	---	0.500	ug/L	1	12/20/20 07:39	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/20/20 07:39	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/20/20 07:39	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/20/20 07:39	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 07:39	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 07:39	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 07:39	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/20/20 07:39	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/20/20 07:39	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 07:39	EPA 8260D	
cis-1,2-Dichloroethene	0.489	---	0.400	ug/L	1	12/20/20 07:39	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 07:39	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/20/20 07:39	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	Q-30
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/20/20 07:39	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/20/20 07:39	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/20/20 07:39	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/20/20 07:39	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	12/20/20 07:39	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 07:39	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 07:39	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/20/20 07:39	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/20/20 07:39	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	12/20/20 07:39	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/20/20 07:39	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/20/20 07:39	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/20/20 07:39	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-19i (A0L0354-04)				Matrix: Water		Batch: 0120732		
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>		<i>12/20/20 07:39</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>	<i>80-120 %</i>	<i>1</i>		<i>12/20/20 07:39</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>	<i>80-120 %</i>	<i>1</i>		<i>12/20/20 07:39</i>	<i>EPA 8260D</i>	

MW-15 (A0L0354-05)				Matrix: Water		Batch: 0120732		
Bromobenzene	ND	---	0.500	ug/L	1	12/20/20 08:07	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/20/20 08:07	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/20/20 08:07	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/20/20 08:07	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/20/20 08:07	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/20/20 08:07	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/20/20 08:07	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 08:07	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 08:07	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 08:07	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/20/20 08:07	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/20/20 08:07	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 08:07	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 08:07	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 08:07	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/20/20 08:07	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	Q-30
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/20/20 08:07	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/20/20 08:07	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/20/20 08:07	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-15 (A0L0354-05)				Matrix: Water		Batch: 0120732		
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/20/20 08:07	EPA 8260D	
Tetrachloroethene (PCE)	0.599	---	0.400	ug/L	1	12/20/20 08:07	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 08:07	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 08:07	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/20/20 08:07	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/20/20 08:07	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	12/20/20 08:07	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/20/20 08:07	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/20/20 08:07	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/20/20 08:07	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/20/20 08:07</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 08:07</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 08:07</i>	<i>EPA 8260D</i>

MW-8 (A0L0354-06)				Matrix: Water		Batch: 0120732		
Bromobenzene	ND	---	0.500	ug/L	1	12/20/20 08:34	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/20/20 08:34	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/20/20 08:34	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/20/20 08:34	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/20/20 08:34	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/20/20 08:34	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/20/20 08:34	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 08:34	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 08:34	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 08:34	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/20/20 08:34	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/20/20 08:34	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 08:34	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-8 (A0L0354-06)				Matrix: Water		Batch: 0120732		
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 08:34	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 08:34	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/20/20 08:34	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	Q-30
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/20/20 08:34	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/20/20 08:34	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/20/20 08:34	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/20/20 08:34	EPA 8260D	
Tetrachloroethene (PCE)	3.97	---	0.400	ug/L	1	12/20/20 08:34	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 08:34	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 08:34	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/20/20 08:34	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/20/20 08:34	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	12/20/20 08:34	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/20/20 08:34	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/20/20 08:34	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/20/20 08:34	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/20/20 08:34</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 08:34</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 08:34</i>	<i>EPA 8260D</i>

MW-5 (A0L0354-07)				Matrix: Water		Batch: 0120732		
Bromobenzene	ND	---	0.500	ug/L	1	12/20/20 09:01	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/20/20 09:01	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/20/20 09:01	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/20/20 09:01	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/20/20 09:01	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/20/20 09:01	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-5 (A0L0354-07)				Matrix: Water		Batch: 0120732		
Dibromochloromethane	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/20/20 09:01	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 09:01	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 09:01	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 09:01	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
1,1-Dichloroethane	0.499	---	0.400	ug/L	1	12/20/20 09:01	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/20/20 09:01	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 09:01	EPA 8260D	
cis-1,2-Dichloroethene	38.4	---	0.400	ug/L	1	12/20/20 09:01	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 09:01	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/20/20 09:01	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	Q-30
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/20/20 09:01	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/20/20 09:01	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/20/20 09:01	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/20/20 09:01	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	12/20/20 09:01	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 09:01	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 09:01	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/20/20 09:01	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/20/20 09:01	EPA 8260D	
Trichloroethene (TCE)	3.67	---	0.400	ug/L	1	12/20/20 09:01	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/20/20 09:01	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/20/20 09:01	EPA 8260D	
Vinyl chloride	4.77	---	0.400	ug/L	1	12/20/20 09:01	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/20/20 09:01</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 09:01</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 09:01</i>	<i>EPA 8260D</i>

MGMS3-132 (A0L0354-08)				Matrix: Water		Batch: 0120732		
Bromobenzene	ND	---	0.500	ug/L	1	12/20/20 09:28	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS3-132 (A0L0354-08)				Matrix: Water		Batch: 0120732		
Bromochloromethane	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/20/20 09:28	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/20/20 09:28	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/20/20 09:28	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/20/20 09:28	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/20/20 09:28	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/20/20 09:28	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 09:28	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 09:28	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 09:28	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/20/20 09:28	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/20/20 09:28	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 09:28	EPA 8260D	
cis-1,2-Dichloroethene	2.73	---	0.400	ug/L	1	12/20/20 09:28	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 09:28	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/20/20 09:28	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	Q-30
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/20/20 09:28	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/20/20 09:28	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/20/20 09:28	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/20/20 09:28	EPA 8260D	
Tetrachloroethene (PCE)	3.61	---	0.400	ug/L	1	12/20/20 09:28	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 09:28	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 09:28	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/20/20 09:28	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/20/20 09:28	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS3-132 (A0L0354-08)				Matrix: Water		Batch: 0120732		
Trichloroethene (TCE)	2.46	---	0.400	ug/L	1	12/20/20 09:28	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/20/20 09:28	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/20/20 09:28	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/20/20 09:28	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/20/20 09:28</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 09:28</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 09:28</i>	<i>EPA 8260D</i>

MGMS3-110 (A0L0354-09)				Matrix: Water		Batch: 0120732		
Bromobenzene	ND	---	0.500	ug/L	1	12/20/20 09:55	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/20/20 09:55	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/20/20 09:55	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/20/20 09:55	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/20/20 09:55	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/20/20 09:55	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/20/20 09:55	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 09:55	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 09:55	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 09:55	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/20/20 09:55	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/20/20 09:55	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 09:55	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 09:55	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 09:55	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/20/20 09:55	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	Q-30
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS3-110 (A0L0354-09)				Matrix: Water		Batch: 0120732		
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/20/20 09:55	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/20/20 09:55	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/20/20 09:55	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/20/20 09:55	EPA 8260D	
Tetrachloroethene (PCE)	1.45	---	0.400	ug/L	1	12/20/20 09:55	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 09:55	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 09:55	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/20/20 09:55	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/20/20 09:55	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	12/20/20 09:55	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/20/20 09:55	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/20/20 09:55	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/20/20 09:55	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/20/20 09:55</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 09:55</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 09:55</i>	<i>EPA 8260D</i>

MGMS3-60 (A0L0354-10)				Matrix: Water		Batch: 0120732		
Bromobenzene	ND	---	0.500	ug/L	1	12/20/20 10:23	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/20/20 10:23	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/20/20 10:23	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/20/20 10:23	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/20/20 10:23	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/20/20 10:23	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/20/20 10:23	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 10:23	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 10:23	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS3-60 (A0L0354-10)				Matrix: Water		Batch: 0120732		
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/20/20 10:23	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/20/20 10:23	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/20/20 10:23	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 10:23	EPA 8260D	
cis-1,2-Dichloroethene	5.76	---	0.400	ug/L	1	12/20/20 10:23	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/20/20 10:23	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/20/20 10:23	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	Q-30
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/20/20 10:23	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/20/20 10:23	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/20/20 10:23	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/20/20 10:23	EPA 8260D	
Tetrachloroethene (PCE)	1.86	---	0.400	ug/L	1	12/20/20 10:23	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 10:23	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/20/20 10:23	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/20/20 10:23	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/20/20 10:23	EPA 8260D	
Trichloroethene (TCE)	1.11	---	0.400	ug/L	1	12/20/20 10:23	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/20/20 10:23	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/20/20 10:23	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/20/20 10:23	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/20/20 10:23</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 10:23</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/20/20 10:23</i>	<i>EPA 8260D</i>

MGMS3-40 (A0L0354-11)				Matrix: Water		Batch: 0120749		
Bromobenzene	ND	---	10.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Bromochloromethane	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Bromodichloromethane	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Bromoform	ND	---	40.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Bromomethane	ND	---	100	ug/L	20	12/21/20 19:42	EPA 8260D	
Carbon tetrachloride	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Chlorobenzene	ND	---	10.0	ug/L	20	12/21/20 19:42	EPA 8260D	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS3-40 (A0L0354-11)				Matrix: Water		Batch: 0120749		
Chloroethane	ND	---	100	ug/L	20	12/21/20 19:42	EPA 8260D	
Chloroform	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Chloromethane	ND	---	100	ug/L	20	12/21/20 19:42	EPA 8260D	
2-Chlorotoluene	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
4-Chlorotoluene	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Dibromochloromethane	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	100	ug/L	20	12/21/20 19:42	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Dibromomethane	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
1,2-Dichlorobenzene	ND	---	10.0	ug/L	20	12/21/20 19:42	EPA 8260D	
1,3-Dichlorobenzene	ND	---	10.0	ug/L	20	12/21/20 19:42	EPA 8260D	
1,4-Dichlorobenzene	ND	---	10.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Dichlorodifluoromethane	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
1,1-Dichloroethane	ND	---	8.00	ug/L	20	12/21/20 19:42	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	8.00	ug/L	20	12/21/20 19:42	EPA 8260D	
1,1-Dichloroethene	ND	---	8.00	ug/L	20	12/21/20 19:42	EPA 8260D	
cis-1,2-Dichloroethene	104	---	8.00	ug/L	20	12/21/20 19:42	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	8.00	ug/L	20	12/21/20 19:42	EPA 8260D	
1,2-Dichloropropane	ND	---	10.0	ug/L	20	12/21/20 19:42	EPA 8260D	
1,3-Dichloropropane	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
2,2-Dichloropropane	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
1,1-Dichloropropene	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Hexachlorobutadiene	ND	---	100	ug/L	20	12/21/20 19:42	EPA 8260D	
Methylene chloride	ND	---	200	ug/L	20	12/21/20 19:42	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	8.00	ug/L	20	12/21/20 19:42	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	10.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	8.00	ug/L	20	12/21/20 19:42	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	40.0	ug/L	20	12/21/20 19:42	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	40.0	ug/L	20	12/21/20 19:42	EPA 8260D	
1,1,1-Trichloroethane	ND	---	8.00	ug/L	20	12/21/20 19:42	EPA 8260D	
1,1,2-Trichloroethane	ND	---	10.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Trichloroethene (TCE)	ND	---	8.00	ug/L	20	12/21/20 19:42	EPA 8260D	
Trichlorofluoromethane	ND	---	40.0	ug/L	20	12/21/20 19:42	EPA 8260D	
1,2,3-Trichloropropane	ND	---	20.0	ug/L	20	12/21/20 19:42	EPA 8260D	
Vinyl chloride	131	---	8.00	ug/L	20	12/21/20 19:42	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/21/20 19:42</i>	<i>EPA 8260D</i>

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS3-40 (A0L0354-11)				Matrix: Water		Batch: 0120749		
<i>Surrogate: Toluene-d8 (Surr)</i>			Recovery: 105 %	Limits: 80-120 %	1	12/21/20 19:42	EPA 8260D	
<i>4-Bromofluorobenzene (Surr)</i>			104 %	80-120 %	1	12/21/20 19:42	EPA 8260D	

MGMS3-40 Dup (A0L0354-12)				Matrix: Water		Batch: 0120749		
Bromobenzene	ND	---	10.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Bromochloromethane	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Bromodichloromethane	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Bromoform	ND	---	40.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Bromomethane	ND	---	100	ug/L	20	12/21/20 20:09	EPA 8260D	
Carbon tetrachloride	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Chlorobenzene	ND	---	10.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Chloroethane	ND	---	100	ug/L	20	12/21/20 20:09	EPA 8260D	
Chloroform	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Chloromethane	ND	---	100	ug/L	20	12/21/20 20:09	EPA 8260D	
2-Chlorotoluene	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
4-Chlorotoluene	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Dibromochloromethane	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	100	ug/L	20	12/21/20 20:09	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Dibromomethane	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
1,2-Dichlorobenzene	ND	---	10.0	ug/L	20	12/21/20 20:09	EPA 8260D	
1,3-Dichlorobenzene	ND	---	10.0	ug/L	20	12/21/20 20:09	EPA 8260D	
1,4-Dichlorobenzene	ND	---	10.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Dichlorodifluoromethane	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
1,1-Dichloroethane	ND	---	8.00	ug/L	20	12/21/20 20:09	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	8.00	ug/L	20	12/21/20 20:09	EPA 8260D	
1,1-Dichloroethene	ND	---	8.00	ug/L	20	12/21/20 20:09	EPA 8260D	
cis-1,2-Dichloroethene	125	---	8.00	ug/L	20	12/21/20 20:09	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	8.00	ug/L	20	12/21/20 20:09	EPA 8260D	
1,2-Dichloropropane	ND	---	10.0	ug/L	20	12/21/20 20:09	EPA 8260D	
1,3-Dichloropropane	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
2,2-Dichloropropane	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
1,1-Dichloropropene	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Hexachlorobutadiene	ND	---	100	ug/L	20	12/21/20 20:09	EPA 8260D	
Methylene chloride	ND	---	200	ug/L	20	12/21/20 20:09	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	8.00	ug/L	20	12/21/20 20:09	EPA 8260D	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS3-40 Dup (A0L0354-12)				Matrix: Water		Batch: 0120749		
1,1,2,2-Tetrachloroethane	ND	---	10.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	8.00	ug/L	20	12/21/20 20:09	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	40.0	ug/L	20	12/21/20 20:09	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	40.0	ug/L	20	12/21/20 20:09	EPA 8260D	
1,1,1-Trichloroethane	ND	---	8.00	ug/L	20	12/21/20 20:09	EPA 8260D	
1,1,2-Trichloroethane	ND	---	10.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Trichloroethene (TCE)	ND	---	8.00	ug/L	20	12/21/20 20:09	EPA 8260D	
Trichlorofluoromethane	ND	---	40.0	ug/L	20	12/21/20 20:09	EPA 8260D	
1,2,3-Trichloropropane	ND	---	20.0	ug/L	20	12/21/20 20:09	EPA 8260D	
Vinyl chloride	155	---	8.00	ug/L	20	12/21/20 20:09	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/21/20 20:09</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/21/20 20:09</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/21/20 20:09</i>	<i>EPA 8260D</i>



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-24i (A0L0354-01)				Matrix: Water		Batch: 0120443		
Ammonia as N	ND	---	0.0200	mg/L	1	12/11/20 18:10	SM 4500-NH3 G	
MGMS1-43 (A0L0354-02RE3)				Matrix: Water		Batch: 0120443		
Ammonia as N	190	---	1.00	mg/L	50	12/11/20 19:23	SM 4500-NH3 G	
MGMS1-60 (A0L0354-03RE1)				Matrix: Water		Batch: 0120636		
Ammonia as N	ND	---	0.0200	mg/L	1	12/17/20 14:08	SM 4500-NH3 G	
MW-19i (A0L0354-04RE2)				Matrix: Water		Batch: 0120444		
Ammonia as N	0.226	---	0.0200	mg/L	1	12/11/20 19:26	SM 4500-NH3 G	
MW-15 (A0L0354-05)				Matrix: Water		Batch: 0120444		
Ammonia as N	ND	---	0.0200	mg/L	1	12/11/20 17:26	SM 4500-NH3 G	
MW-8 (A0L0354-06)				Matrix: Water		Batch: 0120444		
Ammonia as N	ND	---	0.0200	mg/L	1	12/11/20 18:23	SM 4500-NH3 G	
MW-5 (A0L0354-07RE1)				Matrix: Water		Batch: 0120444		
Ammonia as N	0.294	---	0.0200	mg/L	1	12/11/20 19:05	SM 4500-NH3 G	
MGMS3-132 (A0L0354-08)				Matrix: Water		Batch: 0120444		
Ammonia as N	ND	---	0.0200	mg/L	1	12/11/20 18:26	SM 4500-NH3 G	
MGMS3-110 (A0L0354-09)				Matrix: Water		Batch: 0120444		
Ammonia as N	ND	---	0.0200	mg/L	1	12/11/20 18:28	SM 4500-NH3 G	
MGMS3-60 (A0L0354-10)				Matrix: Water		Batch: 0120444		
Ammonia as N	ND	---	0.0200	mg/L	1	12/11/20 18:29	SM 4500-NH3 G	
MGMS3-40 (A0L0354-11)				Matrix: Water		Batch: 0120444		
Ammonia as N	1.73	---	0.0200	mg/L	1	12/11/20 18:31	SM 4500-NH3 G	
MGMS3-40 Dup (A0L0354-12)				Matrix: Water		Batch: 0120444		
Ammonia as N	1.76	---	0.0200	mg/L	1	12/11/20 18:32	SM 4500-NH3 G	

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Lisa Domenighini, Client Services Manager

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-24i (A0L0354-01RE1)				Matrix: Water				
Batch: 0120429								
Nitrate-Nitrogen	9.40	---	0.250	mg/L	1	12/11/20 11:41	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 11:41	EPA 300.0	
MGMS1-43 (A0L0354-02)				Matrix: Water				
Batch: 0120429								
Nitrate-Nitrogen	10.8	---	1.25	mg/L	5	12/11/20 12:03	EPA 300.0	
MGMS1-43 (A0L0354-02RE1)				Matrix: Water				
Batch: 0120429								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 12:24	EPA 300.0	
MGMS1-60 (A0L0354-03)				Matrix: Water				
Batch: 0120429								
Nitrate-Nitrogen	1.46	---	0.250	mg/L	1	12/11/20 12:46	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 12:46	EPA 300.0	
MW-19i (A0L0354-04)				Matrix: Water				
Batch: 0120429								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 13:07	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 13:07	EPA 300.0	
MW-15 (A0L0354-05)				Matrix: Water				
Batch: 0120429								
Nitrate-Nitrogen	5.85	---	1.25	mg/L	5	12/11/20 14:55	EPA 300.0	
MW-15 (A0L0354-05RE1)				Matrix: Water				
Batch: 0120429								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 15:17	EPA 300.0	
MW-8 (A0L0354-06)				Matrix: Water				
Batch: 0120429								
Nitrate-Nitrogen	276	---	12.5	mg/L	50	12/11/20 15:38	EPA 300.0	
MW-8 (A0L0354-06RE1)				Matrix: Water				
Batch: 0120429								

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-8 (A0L0354-06RE1)				Matrix: Water				
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 16:00	EPA 300.0	
MW-5 (A0L0354-07)				Matrix: Water				
Batch: 0120429								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 16:22	EPA 300.0	Q-42
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 16:22	EPA 300.0	
MGMS3-132 (A0L0354-08)				Matrix: Water				
Batch: 0120429								
Nitrate-Nitrogen	0.412	---	0.250	mg/L	1	12/11/20 17:26	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 17:26	EPA 300.0	
MGMS3-110 (A0L0354-09)				Matrix: Water				
Batch: 0120429								
Nitrate-Nitrogen	0.389	---	0.250	mg/L	1	12/11/20 17:48	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 17:48	EPA 300.0	
MGMS3-60 (A0L0354-10)				Matrix: Water				
Batch: 0120429								
Nitrate-Nitrogen	0.310	---	0.250	mg/L	1	12/11/20 18:53	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 18:53	EPA 300.0	
MGMS3-40 (A0L0354-11)				Matrix: Water				
Batch: 0120429								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 19:14	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 19:14	EPA 300.0	
MGMS3-40 Dup (A0L0354-12)				Matrix: Water				
Batch: 0120429								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 19:36	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 19:36	EPA 300.0	

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6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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ANALYTICAL SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MGMS1-43 (A0L0354-02)				Matrix: Water		Batch: 0120476		
Total Organic Carbon	5.51	---	1.00	mg/L	1	12/14/20 21:23	SM 5310 C	
MGMS3-40 (A0L0354-11)				Matrix: Water		Batch: 0120476		
Total Organic Carbon	3.44	---	1.00	mg/L	1	12/14/20 22:56	SM 5310 C	
MGMS3-40 Dup (A0L0354-12)				Matrix: Water		Batch: 0120476		
Total Organic Carbon	3.49	---	1.00	mg/L	1	12/14/20 23:27	SM 5310 C	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120732 - EPA 5030B						Water						
Blank (0120732-BLK1)		Prepared: 12/19/20 20:00			Analyzed: 12/20/20 00:24							
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromoform	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	Q-30
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120732 - EPA 5030B						Water						
Blank (0120732-BLK1)	Prepared: 12/19/20 20:00		Analyzed: 12/20/20 00:24									
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>	<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>							
<i>Toluene-d8 (Surr)</i>	<i>104 %</i>		<i>80-120 %</i>		<i>"</i>							
<i>4-Bromofluorobenzene (Surr)</i>	<i>104 %</i>		<i>80-120 %</i>		<i>"</i>							

LCS (0120732-BS1)		Prepared: 12/19/20 20:00		Analyzed: 12/19/20 23:30								
EPA 8260D												
Bromobenzene	20.2	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
Bromochloromethane	21.5	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Bromodichloromethane	21.0	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
Bromoform	19.5	---	2.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
Bromomethane	23.5	---	5.00	ug/L	1	20.0	---	118	80 - 120%	---	---	
Carbon tetrachloride	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
Chlorobenzene	20.6	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
Chloroethane	20.0	---	5.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
Chloroform	21.7	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Chloromethane	26.7	---	5.00	ug/L	1	20.0	---	133	80 - 120%	---	---	Q-56
2-Chlorotoluene	19.4	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
4-Chlorotoluene	20.1	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Dibromochloromethane	20.8	---	1.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	17.4	---	5.00	ug/L	1	20.0	---	87	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	19.4	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
Dibromomethane	22.2	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,2-Dichlorobenzene	20.1	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120732 - EPA 5030B												
Water												
LCS (0120732-BS1)	Prepared: 12/19/20 20:00 Analyzed: 12/19/20 23:30											
1,3-Dichlorobenzene	20.2	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,4-Dichlorobenzene	19.9	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Dichlorodifluoromethane	20.6	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
1,1-Dichloroethane	21.2	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	22.2	---	0.400	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,1-Dichloroethene	21.7	---	0.400	ug/L	1	20.0	---	108	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.8	---	0.400	ug/L	1	20.0	---	104	80 - 120%	---	---	
trans-1,2-Dichloroethene	21.3	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,2-Dichloropropane	20.7	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
1,3-Dichloropropane	21.5	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
2,2-Dichloropropane	13.3	---	1.00	ug/L	1	20.0	---	67	80 - 120%	---	---	Q-30
1,1-Dichloropropene	19.7	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
cis-1,3-Dichloropropene	17.9	---	1.00	ug/L	1	20.0	---	90	80 - 120%	---	---	
trans-1,3-Dichloropropene	19.4	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
Hexachlorobutadiene	18.4	---	5.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
Methylene chloride	21.1	---	10.0	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	21.5	---	0.400	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	23.4	---	0.500	ug/L	1	20.0	---	117	80 - 120%	---	---	
Tetrachloroethene (PCE)	19.4	---	0.400	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,2,3-Trichlorobenzene	18.7	---	2.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
1,2,4-Trichlorobenzene	16.1	---	2.00	ug/L	1	20.0	---	80	80 - 120%	---	---	
1,1,1-Trichloroethane	19.4	---	0.400	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,1,2-Trichloroethane	22.2	---	0.500	ug/L	1	20.0	---	111	80 - 120%	---	---	
Trichloroethene (TCE)	18.1	---	0.400	ug/L	1	20.0	---	91	80 - 120%	---	---	
Trichlorofluoromethane	28.6	---	2.00	ug/L	1	20.0	---	143	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	21.1	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
Vinyl chloride	22.4	---	0.400	ug/L	1	20.0	---	112	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr) Recovery: 99 % Limits: 80-120 % Dilution: 1x												
Toluene-d8 (Surr) 101 % 80-120 % "												
4-Bromofluorobenzene (Surr) 93 % 80-120 % "												

Duplicate (0120732-DUP1) Prepared: 12/19/20 20:00 Analyzed: 12/20/20 10:50

QC Source Sample: MGMS3-60 (A0L0354-10)
EPA 8260D

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120732 - EPA 5030B						Water						
Duplicate (0120732-DUP1)		Prepared: 12/19/20 20:00		Analyzed: 12/20/20 10:50								
QC Source Sample: MGMS3-60 (A0L0354-10)												
Bromobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Chloromethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromomethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	5.95	---	0.400	ug/L	1	---	5.76	---	---	3	30%	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	Q-30
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Methylene chloride	ND	---	10.0	ug/L	1	---	ND	---	---	---	30%	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120732 - EPA 5030B						Water						
Duplicate (0120732-DUP1)		Prepared: 12/19/20 20:00		Analyzed: 12/20/20 10:50								
QC Source Sample: MGMS3-60 (A0L0354-10)												
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	1.78	---	0.400	ug/L	1	---	1.86	---	---	5	30%	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	1.06	---	0.400	ug/L	1	---	1.11	---	---	5	30%	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>"</i>						



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120749 - EPA 5030B						Water						
Blank (0120749-BLK1)		Prepared: 12/21/20 07:30 Analyzed: 12/21/20 11:02										
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromoform	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120749 - EPA 5030B												
Water												
Blank (0120749-BLK1)	Prepared: 12/21/20 07:30 Analyzed: 12/21/20 11:02											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)	Recovery:		102 %	Limits:	80-120 %	Dilution:		1x				
Toluene-d8 (Surr)			106 %	80-120 %				"				
4-Bromofluorobenzene (Surr)			103 %	80-120 %				"				

LCS (0120749-BS1)												
Prepared: 12/21/20 07:30 Analyzed: 12/21/20 09:15												
EPA 8260D												
Bromobenzene	20.1	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Bromochloromethane	21.7	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Bromodichloromethane	21.9	---	1.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
Bromoform	20.1	---	2.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Bromomethane	21.9	---	5.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Carbon tetrachloride	21.5	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Chlorobenzene	20.3	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Chloroethane	18.7	---	5.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
Chloroform	21.9	---	1.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
Chloromethane	26.2	---	5.00	ug/L	1	20.0	---	131	80 - 120%	---	---	Q-56
2-Chlorotoluene	18.7	---	1.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
4-Chlorotoluene	19.7	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
Dibromochloromethane	21.0	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	17.8	---	5.00	ug/L	1	20.0	---	89	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	19.4	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
Dibromomethane	22.5	---	1.00	ug/L	1	20.0	---	113	80 - 120%	---	---	
1,2-Dichlorobenzene	19.6	---	0.500	ug/L	1	20.0	---	98	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120749 - EPA 5030B												
						Water						
LCS (0120749-BS1)	Prepared: 12/21/20 07:30					Analyzed: 12/21/20 09:15						
1,3-Dichlorobenzene	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,4-Dichlorobenzene	19.5	---	0.500	ug/L	1	20.0	---	98	80 - 120%	---	---	
Dichlorodifluoromethane	21.5	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,1-Dichloroethane	21.7	---	0.400	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	22.4	---	0.400	ug/L	1	20.0	---	112	80 - 120%	---	---	
1,1-Dichloroethene	22.6	---	0.400	ug/L	1	20.0	---	113	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.7	---	0.400	ug/L	1	20.0	---	104	80 - 120%	---	---	
trans-1,2-Dichloroethene	21.5	---	0.400	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,2-Dichloropropane	21.6	---	0.500	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,3-Dichloropropane	21.2	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
2,2-Dichloropropane	21.7	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,1-Dichloropropene	20.3	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
cis-1,3-Dichloropropene	19.7	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
trans-1,3-Dichloropropene	21.6	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Hexachlorobutadiene	19.0	---	5.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
Methylene chloride	21.1	---	10.0	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	21.8	---	0.400	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	23.3	---	0.500	ug/L	1	20.0	---	116	80 - 120%	---	---	
Tetrachloroethene (PCE)	19.7	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,2,3-Trichlorobenzene	18.2	---	2.00	ug/L	1	20.0	---	91	80 - 120%	---	---	
1,2,4-Trichlorobenzene	16.2	---	2.00	ug/L	1	20.0	---	81	80 - 120%	---	---	
1,1,1-Trichloroethane	20.1	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,1,2-Trichloroethane	21.7	---	0.500	ug/L	1	20.0	---	108	80 - 120%	---	---	
Trichloroethene (TCE)	18.3	---	0.400	ug/L	1	20.0	---	91	80 - 120%	---	---	
Trichlorofluoromethane	28.9	---	2.00	ug/L	1	20.0	---	144	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	20.3	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
Vinyl chloride	23.0	---	0.400	ug/L	1	20.0	---	115	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr) Recovery: 100 % Limits: 80-120 % Dilution: 1x												
Toluene-d8 (Surr) 99 % 80-120 % "												
4-Bromofluorobenzene (Surr) 92 % 80-120 % "												

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120443 - Method Prep: Aq						Water						
Blank (0120443-BLK1)		Prepared: 12/11/20 12:31 Analyzed: 12/11/20 17:13										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	
LCS (0120443-BS1)		Prepared: 12/11/20 12:31 Analyzed: 12/11/20 17:14										
SM 4500-NH3 G												
Ammonia as N	2.08	---	0.0200	mg/L	1	2.00	---	104	87 - 116%	---	---	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120444 - Method Prep: Aq						Water						
Blank (0120444-BLK1)		Prepared: 12/11/20 12:33 Analyzed: 12/11/20 17:17										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	
LCS (0120444-BS1)		Prepared: 12/11/20 12:33 Analyzed: 12/11/20 17:19										
SM 4500-NH3 G												
Ammonia as N	2.00	---	0.0200	mg/L	1	2.00	---	100	87 - 116%	---	---	
Matrix Spike (0120444-MS1)		Prepared: 12/11/20 12:33 Analyzed: 12/11/20 17:28										
QC Source Sample: MW-15 (A0L0354-05)												
SM 4500-NH3 G												
Ammonia as N	2.35	---	0.0250	mg/L	1	2.50	ND	94	87 - 116%	---	---	
Matrix Spike Dup (0120444-MSD1)		Prepared: 12/11/20 12:33 Analyzed: 12/11/20 17:29										
QC Source Sample: MW-15 (A0L0354-05)												
SM 4500-NH3 G												
Ammonia as N	2.44	---	0.0250	mg/L	1	2.50	ND	97	87 - 116%	3	13%	



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC % REC	% REC Limits	RPD RPD	RPD Limit	Notes
Batch 0120636 - Method Prep: Aq						Water						
Blank (0120636-BLK1)		Prepared: 12/17/20 12:13 Analyzed: 12/17/20 14:04										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	---
LCS (0120636-BS1)		Prepared: 12/17/20 12:13 Analyzed: 12/17/20 14:05										
SM 4500-NH3 G												
Ammonia as N	2.05	---	0.0200	mg/L	1	2.00	---	102	87 - 116%	---	---	---
Matrix Spike (0120636-MS1)		Prepared: 12/17/20 12:13 Analyzed: 12/17/20 14:10										
QC Source Sample: MGMS1-60 (A0L0354-03RE1)												
SM 4500-NH3 G												
Ammonia as N	2.12	---	0.0250	mg/L	1	2.50	ND	85	87 - 116%	---	---	Q-01
Matrix Spike Dup (0120636-MSD1)		Prepared: 12/17/20 12:13 Analyzed: 12/17/20 14:11										
QC Source Sample: MGMS1-60 (A0L0354-03RE1)												
SM 4500-NH3 G												
Ammonia as N	2.34	---	0.0250	mg/L	1	2.50	ND	93	87 - 116%	9	13%	---



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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QUALITY CONTROL (QC) SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120429 - Method Prep: Aq						Water						
Blank (0120429-BLK1)			Prepared: 12/11/20 09:22		Analyzed: 12/11/20 10:36							
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	
LCS (0120429-BS1)			Prepared: 12/11/20 09:22		Analyzed: 12/11/20 10:58							
EPA 300.0												
Nitrate-Nitrogen	2.10	---	0.250	mg/L	1	2.00	---	105	90 - 110%	---	---	
Nitrite-Nitrogen	2.09	---	0.250	mg/L	1	2.00	---	105	90 - 110%	---	---	
Duplicate (0120429-DUP1)			Prepared: 12/11/20 09:22		Analyzed: 12/11/20 13:29							
QC Source Sample: MW-19i (A0L0354-04)												
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	5%	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	
Duplicate (0120429-DUP2)			Prepared: 12/11/20 09:22		Analyzed: 12/11/20 16:43							
QC Source Sample: MW-5 (A0L0354-07)												
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	0.150	---	---	***	5%	Q-05
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	
Matrix Spike (0120429-MS1)			Prepared: 12/11/20 09:22		Analyzed: 12/11/20 14:34							
QC Source Sample: MW-19i (A0L0354-04)												
EPA 300.0												
Nitrate-Nitrogen	2.59	---	0.312	mg/L	1	2.50	ND	103	86 - 118%	---	---	
Nitrite-Nitrogen	2.59	---	0.312	mg/L	1	2.50	ND	103	82 - 117%	---	---	
Matrix Spike (0120429-MS2)			Prepared: 12/11/20 09:22		Analyzed: 12/11/20 17:05							
QC Source Sample: MW-5 (A0L0354-07)												
EPA 300.0												
Nitrate-Nitrogen	2.65	---	0.312	mg/L	1	2.50	ND	106	86 - 118%	---	---	
Nitrite-Nitrogen	2.52	---	0.312	mg/L	1	2.50	ND	101	82 - 117%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120476 - Method Prep: Aq						Water						
Blank (0120476-BLK1)		Prepared: 12/14/20 08:53 Analyzed: 12/14/20 15:16										
SM 5310 C												
Total Organic Carbon	ND	---	1.00	mg/L	1	---	---	---	---	---	---	
LCS (0120476-BS1)		Prepared: 12/14/20 08:53 Analyzed: 12/14/20 15:44										
SM 5310 C												
Total Organic Carbon	10.8	---	1.00	mg/L	1	10.0	---	108	90 - 114%	---	---	
Duplicate (0120476-DUP1)		Prepared: 12/14/20 08:53 Analyzed: 12/14/20 21:54										
QC Source Sample: MGMS1-43 (A0L0354-02)												
SM 5310 C												
Total Organic Carbon	5.54	---	1.00	mg/L	1	---	5.51	---	---	0.5	10%	
Matrix Spike (0120476-MS1)		Prepared: 12/14/20 08:53 Analyzed: 12/14/20 22:25										
QC Source Sample: MGMS1-43 (A0L0354-02)												
SM 5310 C												
Total Organic Carbon	16.2	---	1.01	mg/L	1	10.0	5.51	107	90 - 114%	---	---	



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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SAMPLE PREPARATION INFORMATION

Halogenated Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0120732</u>							
A0L0354-01	Water	EPA 8260D	12/10/20 09:30	12/19/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0354-03	Water	EPA 8260D	12/10/20 12:20	12/19/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0354-04	Water	EPA 8260D	12/10/20 08:24	12/19/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0354-05	Water	EPA 8260D	12/10/20 09:15	12/19/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0354-06	Water	EPA 8260D	12/10/20 10:17	12/19/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0354-07	Water	EPA 8260D	12/10/20 11:27	12/19/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0354-08	Water	EPA 8260D	12/10/20 13:11	12/19/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0354-09	Water	EPA 8260D	12/10/20 13:35	12/19/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0354-10	Water	EPA 8260D	12/10/20 14:06	12/19/20 20:00	5mL/5mL	5mL/5mL	1.00
<u>Batch: 0120749</u>							
A0L0354-02	Water	EPA 8260D	12/10/20 11:40	12/21/20 12:15	5mL/5mL	5mL/5mL	1.00
A0L0354-11	Water	EPA 8260D	12/10/20 14:40	12/21/20 12:15	5mL/5mL	5mL/5mL	1.00
A0L0354-12	Water	EPA 8260D	12/10/20 14:40	12/21/20 12:15	5mL/5mL	5mL/5mL	1.00

Ammonia by Gas Diffusion and Colorimetric Detection

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 0120443</u>							
A0L0354-01	Water	SM 4500-NH3 G	12/10/20 09:30	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0354-02RE3	Water	SM 4500-NH3 G	12/10/20 11:40	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
<u>Batch: 0120444</u>							
A0L0354-04RE2	Water	SM 4500-NH3 G	12/10/20 08:24	12/11/20 12:33	10mL/10mL	10mL/10mL	1.00
A0L0354-05	Water	SM 4500-NH3 G	12/10/20 09:15	12/11/20 12:33	10mL/10mL	10mL/10mL	1.00
A0L0354-06	Water	SM 4500-NH3 G	12/10/20 10:17	12/11/20 12:33	10mL/10mL	10mL/10mL	1.00
A0L0354-07RE1	Water	SM 4500-NH3 G	12/10/20 11:27	12/11/20 12:33	10mL/10mL	10mL/10mL	1.00
A0L0354-08	Water	SM 4500-NH3 G	12/10/20 13:11	12/11/20 12:33	10mL/10mL	10mL/10mL	1.00
A0L0354-09	Water	SM 4500-NH3 G	12/10/20 13:35	12/11/20 12:33	10mL/10mL	10mL/10mL	1.00
A0L0354-10	Water	SM 4500-NH3 G	12/10/20 14:06	12/11/20 12:33	10mL/10mL	10mL/10mL	1.00
A0L0354-11	Water	SM 4500-NH3 G	12/10/20 14:40	12/11/20 12:33	10mL/10mL	10mL/10mL	1.00
A0L0354-12	Water	SM 4500-NH3 G	12/10/20 14:40	12/11/20 12:33	10mL/10mL	10mL/10mL	1.00
<u>Batch: 0120636</u>							
A0L0354-03RE1	Water	SM 4500-NH3 G	12/10/20 12:20	12/17/20 12:13	10mL/10mL	10mL/10mL	1.00

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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SAMPLE PREPARATION INFORMATION

Anions by Ion Chromatography

<u>Prep: Method Prep: Aq</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 0120429</u>							
A0L0354-01RE1	Water	EPA 300.0	12/10/20 09:30	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-02	Water	EPA 300.0	12/10/20 11:40	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-02RE1	Water	EPA 300.0	12/10/20 11:40	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-03	Water	EPA 300.0	12/10/20 12:20	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-04	Water	EPA 300.0	12/10/20 08:24	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-05	Water	EPA 300.0	12/10/20 09:15	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-05RE1	Water	EPA 300.0	12/10/20 09:15	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-06	Water	EPA 300.0	12/10/20 10:17	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-06RE1	Water	EPA 300.0	12/10/20 10:17	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-07	Water	EPA 300.0	12/10/20 11:27	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-08	Water	EPA 300.0	12/10/20 13:11	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-09	Water	EPA 300.0	12/10/20 13:35	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-10	Water	EPA 300.0	12/10/20 14:06	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-11	Water	EPA 300.0	12/10/20 14:40	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00
A0L0354-12	Water	EPA 300.0	12/10/20 14:40	12/11/20 09:22	5mL/5mL	5mL/5mL	1.00

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

<u>Prep: Method Prep: Aq</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 0120476</u>							
A0L0354-02	Water	SM 5310 C	12/10/20 11:40	12/14/20 08:53	40mL/40mL	40mL/40mL	1.00
A0L0354-11	Water	SM 5310 C	12/10/20 14:40	12/14/20 08:53	40mL/40mL	40mL/40mL	1.00
A0L0354-12	Water	SM 5310 C	12/10/20 14:40	12/14/20 08:53	40mL/40mL	40mL/40mL	1.00



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <u>Nustar-Vancouver</u> Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	<u>Report ID:</u> A0L0354 - 01 05 21 0725
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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

- Q-01** Spike recovery and/or RPD is outside acceptance limits.
- Q-05** Analyses are not controlled on RPD values from sample and duplicate concentrations that are below 5 times the reporting level.
- Q-30** Recovery for Lab Control Spike (LCS) is below the lower control limit. Data may be biased low.
- Q-42** Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported.
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis. The Result Basis is listed following the units as "dry", "wet", or "" (blank) designation.
 - "dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
 - "wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
 - "" Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) are not included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
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ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0354 - 01 05 21 0725
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LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation)
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
<u>All reported analytes are included in Apex Laboratories' current ORELAP scope.</u>					

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Lisa Domenighini, Client Services Manager

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Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Cascadia Associates
 5820 SW Kelly Ave Unit B
 Portland, OR 97239

Project: **Nustar-Vancouver**
 Project Number: **Nustar Van 4Q20 GWM**
 Project Manager: **Stephanie Salisbury**

Report ID:
 A0L0354 - 01 05 21 0725

CHAIN OF CUSTODY

APEX LABS
 6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

Company: *Cascadia Associates* Project Mgr: *Stephanie Salisbury* Project Name: *Nustar Vancouver 4Q20* Lab # *A0L0354* COC *1* of *2*
 Address: *5820 Kelly Ave, Portland* Email: *step@casco-labs.com*

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCD	NWTPH-DX	NWTPH-CX	8260 BTEX	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	Al, Sb, As, Ba, Be, Bi, Br, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mn, Mg, Ni, Mo, Ni, K, Se, Ag, Na, Ti, V, Zn	TOTAL DISS. TCLP	TCLP Metals (8)	NH3	NO2/NO3	TAC	BSK-175*	Archive	
MW-24		12/10/20	9:30 AM	5								X										X					
MGMS-43			1:40		7																	X					
MGMS-60			12:20		5																						
MW-19			9:24		5																						
MW-15			9:15		5																						
MW-8			10:17		5																						
MW-5			11:27		5																						
MGMS-132			13:11		5																						
MGMS-110			13:55		5																						
MGMS-60			14:06		5																						

SPECIAL INSTRUCTIONS:
 * Ethene / one / return by RSL-175

RELINQUISHED BY:	RECEIVED BY:
Signature: <i>[Signature]</i> Date: <i>12/10/20</i>	Signature: <i>[Signature]</i> Date: <i>12/10/20</i>
Printed Name: <i>Don Weatherford</i> Time: <i>15:45</i>	Printed Name: <i>Filipe</i> Time: <i>15:45</i>
Company: <i>Cascadia</i>	Company: <i>Apex</i>

TAT Requested (circle): 1 Day 2 Day 3 Day 4 Day 5 Day Other: _____
 Normal Turn Around Time (TAT) = 10 Business Days

SAMPLES ARE HELD FOR 30 DAYS

Apex Laboratories

Lisa Domenighini

Lisa Domenighini, Client Services Manager

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Cascadia Associates

5820 SW Kelly Ave Unit B
 Portland, OR 97239

Project: Nustar-Vancouver

Project Number: Nustar Van 4Q20 GWM

Project Manager: Stephanie Salisbury

Report ID:

A0L0354 - 01 05 21 0725

CHAIN OF CUSTODY

APEX LABS
 6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

Lab # A0L0354 of 2

Company: Cascadia Associates Project Mgr: Stephanie Salisbury Project Name: Nustar Vancouver 4Q20 Project #:
 Address: 5820 Kelly Ave, Portland Phone: Email: Stephanie.Salisbury@CascadiaAssociates.com

Sampled by: JW/LW

Site Location: WA OR CA AK ID _____

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-DX	NWTPH-CX	8260 BTEX	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13) Al, Sb, As, Ba, Be, Cd, Cr, Cu, Mn, Mo, Ni, K, Se, Ag, Na, Tl, Cr, Co, Cu, Fe, Pb, Hg, Mg, Ni, Zn, V, Zn	TOTAL DISS. TCLP	TCMP Metals (8)	NH3	NO2/NO3	Loc	XSK-175*	Archive			
																										TAT Requested (circle) 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: _____ (Normal Turn Around Time (TAT) = 10 Business Days)		
<u>MGM53-40</u>		<u>12/10/20</u>	<u>1440</u>	<u>GM7</u>								<u>X</u>									<u>X</u>	<u>X</u>	<u>X</u>					
<u>MGM53-40 Dup</u>		<u>12/10/20</u>	<u>1440</u>	<u>17</u>								<u>X</u>									<u>X</u>	<u>X</u>	<u>X</u>					
<u>Trip Blank</u>												<u>H</u>									<u>H</u>	<u>H</u>	<u>H</u>					

SPECIAL INSTRUCTIONS:
X Ethene (ethene) feature by RSK-175
H - hold for project mgr.

RELINQUISHED BY:
 Signature: [Signature] Date: 12/10/20
 Printed Name: Stephanie Salisbury Time: 1545
 Company: Cascadia

RECEIVED BY:
 Signature: [Signature] Date: 12/10/20
 Printed Name: Eric Taylor Time: 1545
 Company: APEX

Lisa Domenighini



Cascadia Associates
5820 SW Kelly Ave Unit B
Portland, OR 97239

Project: Nustar-Vancouver
Project Number: Nustar Van 4Q20 GWM
Project Manager: Stephanie Salisbury

Report ID:
A0L0354 - 01 05 21 0725

APEX LABS COOLER RECEIPT FORM

Client: Cascadia Associates Element WO#: A0L0354

Project/Project #: Nustar Vancouver 4Q20

Delivery Info:

Date/time received: 12/10/20 @ 1545 By: EJ

Delivered by: Apex Client ESS FedEx UPS Swift Senvoy SDS Other

Cooler Inspection Date/time inspected: 12/10/20 @ 1635 By: EJ

Chain of Custody included? Yes No Custody seals? Yes No

Signed/dated by client? Yes No

Signed/dated by Apex? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>0.3</u>	<u>2.4</u>					
Received on ice? (Y/N)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
Temp. blanks? (Y/N)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
Ice type: (Gel/Real/Other)	<u>Real</u>	<u>Real</u>					
Condition:	<u>Good</u>	<u>Good</u>					

Cooler out of temp? (Y/N) Possible reason why: _____
If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA

Out of temperature samples form initiated? Yes/No/NA
Samples Inspection: Date/time inspected: 12/10/20 @ 1657 By: EJ

All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: MGMS3-110 H2SO4 poly reads MGMS3-132, matched by T, sup blank listed on CoC but not provided

COC/container discrepancies form initiated? Yes No

Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA

Comments: _____

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA

Comments: _____

Additional information: _____

Labeled by: [Signature] Witness: [Signature] Cooler Inspected by: [Signature] See Project Contact Form: Y

[Signature]

January 4, 2021

Apex Laboratories
ATTN: Lisa Domenighini
6700 S.W. Sandburg St.
Tigard, OR 97223



LA Cert #04140
EPA Methods TO3, TO14A, TO15, 25C/3C,
RSK-175

TX Cert T104704450-14-6
EPA Methods TO14A, TO15

UT Cert CA0133332015-3
EPA Methods TO3, TO14A, TO15, RSK-175

LABORATORY TEST RESULTS

Project Reference: A0L0354
Lab Number: L121505-01/03

Enclosed are results for sample(s) received 12/15/20 by Air Technology Laboratories. Sample was received intact and chilled to 2° C. Analyses were performed according to specifications on the chain of custody provided with the sample(s).

Report Narrative:

- Unless otherwise noted in the report, sample analyses were performed within method performance criteria and meet all requirements of the TNI Standards.
- The enclosed results relate only to the sample(s).

ATL appreciates the opportunity to provide testing services to your company. If you have any questions regarding these results, please call me at (626) 964-4032.

Sincerely,

A handwritten signature in blue ink, appearing to read "Mark Johnson".

Mark Johnson
Operations Manager
MJohnson@AirTechLabs.com

Note: The cover letter is an integral part of this analytical report.

SUBCONTRACT ORDER

Apex Laboratories

OB 12/10/20 A0L0354

L121505-01/03

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Lisa Domenighini

RECEIVING LABORATORY:

Air Technology Laboratories, Inc
18501 E. Gale Ave Suite 130
City of Industry, CA 91748
Phone : (626) 964-4032
Fax: (626) 964-5832

Sample Name: MGMS1-43 Water Sampled: 12/10/20 11:40 (A0L0354-02)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	OB 12/10/20 12/23/20 17:00	12/24/20 11:40	
Containers Supplied:			
(F) 40 mL VOA - HCL	12/31/20		
(G) 40 mL VOA - HCL			

Sample Name: MGMS3-40 Water Sampled: 12/10/20 14:40 (A0L0354-11)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	OB 12/10/20 12/23/20 17:00	12/24/20 14:40	
Containers Supplied:			
(F) 40 mL VOA - HCL	12/31/20		
(G) 40 mL VOA - HCL			


Sample Name: MGMS3-40 Dup Water Sampled: 12/10/20 14:40 (A0L0354-12)

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	OB 12/10/20 12/23/20 17:00	12/24/20 14:40	
Containers Supplied:			
(F) 40 mL VOA - HCL	12/31/20		
(G) 40 mL VOA - HCL			

Standard TAT

Tracking #: 1Z X47 20R 019005 2774 E0

2°C

Released By 	Date 12/14/20	Received By UPS (Shipper)	Date
Released By UPS (Shipper)	Date	Received By UPS [Signature]	Date 12/15/20 1825

Client: Apex Laboratories
 Attn: Lisa Domenighini
 Project Name: NA
 Project No.: A0L0354
 Date Received: 12/15/20
 Matrix: Water
 Reporting Units: ug/L

RSK175

Lab No.:	L121505-01	L121505-02	L121505-03				
Client Sample I.D.:	MGMS1-43 (A0L0354-02)	MGMS3-40 (A0L0354-11)	MGMS3-40 DUP (A0L0354-12)				
Date/Time Sampled:	12/10/20 11:40	12/10/20 14:40	12/10/20 14:40				
Date/Time Analyzed:	12/21/20 13:30	12/21/20 13:52	12/21/20 14:07				
QC Batch No.:	201221GC8A1	201221GC8A1	201221GC8A1				
Analyst Initials:	CM	CM	CM				
Dilution Factor:	1.0	1.0	1.0				
ANALYTE	Result ug/L	RL ug/L	Result ug/L	RL ug/L	Result ug/L	RL ug/L	
Ethene	ND	1.0	16	1.0	15	1.0	
Ethane	5.2	1.0	89	1.0	84	1.0	
Methane	92	1.0	7,600	1.0	7,300	1.0	

ND = Not Detected (below RL)

RL = Reporting Limit

Reviewed/Approved By: *Mark Johnson*
 Mark Johnson
 Operations Manager

Date 1/4/21

The cover letter is an integral part of this analytical report



QC Batch No: 201221GC8A1

Matrix: Water

Reporting Units: ug/L

**RSK 175
LABORATORY CONTROL SAMPLE SUMMARY**

Lab No.:	METHOD BLANK			LCS		LCSD					
Date/Time Analyzed:	12/21/20 8:53			12/21/20 9:07		12/21/20 9:19					
Analyst Initials:	CM			CM		CM					
Dilution Factor:	1.1			1.0		1.0					
								Limits			
ANALYTE	Result ug/L	RL ug/L	SPIKE AMT. ug/L	Result ug/L	% Rec.	Result ug/L	% Rec.	RPD %	Low %Rec	High %Rec	Max. RPD
Ethene	ND	1.0	1,150	1,330	116	1,240	108	7.0	70	130	30
Ethane	ND	1.0	1,200	1,400	114	1,360	111	3.2	70	130	30
Methane	ND	1.0	650	715	109	698	107	2.5	70	130	30

ND = Not Detected (below RL)

RL = Reporting Limit

Reviewed/Approved By: _____

M. Johnson
Mark Johnson
Operations Manager

Date _____

1/4/20

The cover letter is an integral part of this analytical report





Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Tuesday, December 29, 2020

Stephanie Salisbury
Cascadia Associates
5820 SW Kelly Ave Unit B
Portland, OR 97239

RE: A0L0311 - Nustar-Vancouver - Nustar Van 4Q20 GWM

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A0L0311, which was received by the laboratory on 12/9/2020 at 4:15:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	2.3 degC	Cooler #2	1.4 degC
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This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Cascadia Associates
5820 SW Kelly Ave Unit B
Portland, OR 97239

Project: Nustar-Vancouver
Project Number: Nustar Van 4Q20 GWM
Project Manager: Stephanie Salisbury

Report ID:
A0L0311 - 12 29 20 0744

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-9	A0L0311-01	Water	12/09/20 08:06	12/09/20 16:15
MW-7	A0L0311-02	Water	12/09/20 08:48	12/09/20 16:15
MW-7 DUP	A0L0311-03	Water	12/09/20 08:48	12/09/20 16:15
MW-6	A0L0311-04	Water	12/09/20 10:02	12/09/20 16:15
MW-21i-105	A0L0311-05	Water	12/09/20 10:52	12/09/20 16:15
MW-22i	A0L0311-06	Water	12/09/20 11:51	12/09/20 16:15
MW-10	A0L0311-07	Water	12/09/20 12:31	12/09/20 16:15
MW-14	A0L0311-08	Water	12/09/20 13:11	12/09/20 16:15
MW-2	A0L0311-09	Water	12/09/20 13:51	12/09/20 16:15
MP-1	A0L0311-10	Water	12/09/20 14:31	12/09/20 16:15
MW-23i	A0L0311-11	Water	12/09/20 08:10	12/09/20 16:15
MW-25i	A0L0311-12	Water	12/09/20 09:10	12/09/20 16:15
MW-26	A0L0311-13	Water	12/09/20 10:20	12/09/20 16:15
MW-18i	A0L0311-14	Water	12/09/20 11:10	12/09/20 16:15
MW-20i	A0L0311-15	Water	12/09/20 12:10	12/09/20 16:15
MW-16	A0L0311-16	Water	12/09/20 13:00	12/09/20 16:15
MW-21i-40	A0L0311-17	Water	12/09/20 13:40	12/09/20 16:15
EW-1	A0L0311-18	Water	12/09/20 14:40	12/09/20 16:15

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
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503-718-2323
ORELAP ID: OR100062

Cascadia Associates

5820 SW Kelly Ave Unit B
Portland, OR 97239

Project: Nustar-Vancouver

Project Number: Nustar Van 4Q20 GWM

Project Manager: Stephanie Salisbury

Report ID:

A0L0311 - 12 29 20 0744

ANALYTICAL CASE NARRATIVE

Work Order: A0L0311

Subcontract

This report is not complete without the attached subcontract laboratory report for RSK 175 from Air Technology.

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-9 (A0L0311-01)				Matrix: Water		Batch: 0120473		
Bromobenzene	ND	---	0.500	ug/L	1	12/14/20 19:26	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/14/20 19:26	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/14/20 19:26	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/14/20 19:26	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/14/20 19:26	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/14/20 19:26	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/14/20 19:26	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/14/20 19:26	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/14/20 19:26	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/14/20 19:26	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
1,1-Dichloroethane	6.49	---	0.400	ug/L	1	12/14/20 19:26	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/14/20 19:26	EPA 8260D	
1,1-Dichloroethene	1.63	---	0.400	ug/L	1	12/14/20 19:26	EPA 8260D	
trans-1,2-Dichloroethene	6.98	---	0.400	ug/L	1	12/14/20 19:26	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/14/20 19:26	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/14/20 19:26	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/14/20 19:26	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/14/20 19:26	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/14/20 19:26	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/14/20 19:26	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/14/20 19:26	EPA 8260D	
1,1,1-Trichloroethane	3.86	---	0.400	ug/L	1	12/14/20 19:26	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/14/20 19:26	EPA 8260D	
Trichloroethene (TCE)	158	---	0.400	ug/L	1	12/14/20 19:26	EPA 8260D	

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-9 (A0L0311-01)			Matrix: Water		Batch: 0120473			
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/14/20 19:26	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/14/20 19:26	EPA 8260D	
Vinyl chloride	2.68	---	0.400	ug/L	1	12/14/20 19:26	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 110 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/14/20 19:26</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/14/20 19:26</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/14/20 19:26</i>	<i>EPA 8260D</i>
MW-9 (A0L0311-01RE1)			Matrix: Water		Batch: 0120681			
cis-1,2-Dichloroethene	211	---	4.00	ug/L	10	12/18/20 18:49	EPA 8260D	
Tetrachloroethene (PCE)	262	---	4.00	ug/L	10	12/18/20 18:49	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/18/20 18:49</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/18/20 18:49</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/18/20 18:49</i>	<i>EPA 8260D</i>
MW-7 (A0L0311-02)			Matrix: Water		Batch: 0120473			
Bromobenzene	ND	---	0.500	ug/L	1	12/14/20 19:53	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/14/20 19:53	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/14/20 19:53	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/14/20 19:53	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/14/20 19:53	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/14/20 19:53	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/14/20 19:53	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/14/20 19:53	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/14/20 19:53	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/14/20 19:53	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
1,1-Dichloroethane	7.05	---	0.400	ug/L	1	12/14/20 19:53	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/14/20 19:53	EPA 8260D	
1,1-Dichloroethene	1.41	---	0.400	ug/L	1	12/14/20 19:53	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 (A0L0311-02)				Matrix: Water		Batch: 0120473		
cis-1,2-Dichloroethene	56.3	---	0.400	ug/L	1	12/14/20 19:53	EPA 8260D	
trans-1,2-Dichloroethene	0.552	---	0.400	ug/L	1	12/14/20 19:53	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/14/20 19:53	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/14/20 19:53	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/14/20 19:53	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/14/20 19:53	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/14/20 19:53	EPA 8260D	
Tetrachloroethene (PCE)	108	---	0.400	ug/L	1	12/14/20 19:53	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/14/20 19:53	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/14/20 19:53	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/14/20 19:53	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/14/20 19:53	EPA 8260D	
Trichloroethene (TCE)	45.4	---	0.400	ug/L	1	12/14/20 19:53	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/14/20 19:53	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/14/20 19:53	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/14/20 19:53	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 108 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/14/20 19:53</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/14/20 19:53</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/14/20 19:53</i>	<i>EPA 8260D</i>

MW-7 DUP (A0L0311-03)				Matrix: Water		Batch: 0120473		
Bromobenzene	ND	---	0.500	ug/L	1	12/14/20 20:20	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/14/20 20:20	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/14/20 20:20	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/14/20 20:20	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/14/20 20:20	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/14/20 20:20	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	

Apex Laboratories

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 DUP (A0L0311-03)				Matrix: Water		Batch: 0120473		
Dibromochloromethane	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/14/20 20:20	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/14/20 20:20	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/14/20 20:20	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/14/20 20:20	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
1,1-Dichloroethane	6.83	---	0.400	ug/L	1	12/14/20 20:20	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/14/20 20:20	EPA 8260D	
1,1-Dichloroethene	1.38	---	0.400	ug/L	1	12/14/20 20:20	EPA 8260D	
cis-1,2-Dichloroethene	55.6	---	0.400	ug/L	1	12/14/20 20:20	EPA 8260D	
trans-1,2-Dichloroethene	0.519	---	0.400	ug/L	1	12/14/20 20:20	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/14/20 20:20	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/14/20 20:20	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/14/20 20:20	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/14/20 20:20	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/14/20 20:20	EPA 8260D	
Tetrachloroethene (PCE)	106	---	0.400	ug/L	1	12/14/20 20:20	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/14/20 20:20	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/14/20 20:20	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/14/20 20:20	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/14/20 20:20	EPA 8260D	
Trichloroethene (TCE)	44.5	---	0.400	ug/L	1	12/14/20 20:20	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/14/20 20:20	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/14/20 20:20	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/14/20 20:20	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/14/20 20:20</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/14/20 20:20</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/14/20 20:20</i>	<i>EPA 8260D</i>

MW-6 (A0L0311-04RE1)				Matrix: Water		Batch: 0120681		
Bromobenzene	ND	---	0.500	ug/L	1	12/18/20 18:21	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-6 (A0L0311-04RE1)				Matrix: Water		Batch: 0120681		
Bromochloromethane	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/18/20 18:21	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/18/20 18:21	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/18/20 18:21	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/18/20 18:21	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/18/20 18:21	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/18/20 18:21	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/18/20 18:21	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/18/20 18:21	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/18/20 18:21	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/18/20 18:21	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/18/20 18:21	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/18/20 18:21	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/18/20 18:21	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/18/20 18:21	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/18/20 18:21	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/18/20 18:21	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/18/20 18:21	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/18/20 18:21	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/18/20 18:21	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	12/18/20 18:21	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/18/20 18:21	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/18/20 18:21	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/18/20 18:21	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/18/20 18:21	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-6 (A0L0311-04RE1)			Matrix: Water		Batch: 0120681			
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	12/18/20 18:21	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/18/20 18:21	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/18/20 18:21	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/18/20 18:21	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/18/20 18:21</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/18/20 18:21</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/18/20 18:21</i>	<i>EPA 8260D</i>

MW-21i-105 (A0L0311-05)			Matrix: Water		Batch: 0120511			
Bromobenzene	ND	---	0.500	ug/L	1	12/15/20 07:12	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/15/20 07:12	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/15/20 07:12	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/15/20 07:12	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/15/20 07:12	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/15/20 07:12	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/15/20 07:12	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 07:12	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 07:12	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 07:12	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/15/20 07:12	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/15/20 07:12	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 07:12	EPA 8260D	
cis-1,2-Dichloroethene	1.88	---	0.400	ug/L	1	12/15/20 07:12	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 07:12	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/15/20 07:12	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-21i-105 (A0L0311-05)				Matrix: Water		Batch: 0120511		
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/15/20 07:12	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/15/20 07:12	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/15/20 07:12	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/15/20 07:12	EPA 8260D	
Tetrachloroethene (PCE)	3.53	---	0.400	ug/L	1	12/15/20 07:12	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 07:12	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 07:12	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/15/20 07:12	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/15/20 07:12	EPA 8260D	
Trichloroethene (TCE)	1.62	---	0.400	ug/L	1	12/15/20 07:12	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/15/20 07:12	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/15/20 07:12	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/15/20 07:12	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/15/20 07:12</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 07:12</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 07:12</i>	<i>EPA 8260D</i>

MW-22i (A0L0311-06)				Matrix: Water		Batch: 0120511		
Bromobenzene	ND	---	0.500	ug/L	1	12/15/20 08:07	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/15/20 08:07	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/15/20 08:07	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/15/20 08:07	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/15/20 08:07	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/15/20 08:07	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/15/20 08:07	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 08:07	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 08:07	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-22i (A0L0311-06)				Matrix: Water		Batch: 0120511		
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 08:07	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
1,1-Dichloroethane	0.565	---	0.400	ug/L	1	12/15/20 08:07	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/15/20 08:07	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 08:07	EPA 8260D	
cis-1,2-Dichloroethene	15.6	---	0.400	ug/L	1	12/15/20 08:07	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 08:07	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/15/20 08:07	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/15/20 08:07	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/15/20 08:07	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/15/20 08:07	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/15/20 08:07	EPA 8260D	
Tetrachloroethene (PCE)	4.07	---	0.400	ug/L	1	12/15/20 08:07	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 08:07	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 08:07	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/15/20 08:07	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/15/20 08:07	EPA 8260D	
Trichloroethene (TCE)	7.86	---	0.400	ug/L	1	12/15/20 08:07	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/15/20 08:07	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/15/20 08:07	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/15/20 08:07	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/15/20 08:07</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 08:07</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 08:07</i>	<i>EPA 8260D</i>

MW-10 (A0L0311-07)				Matrix: Water		Batch: 0120511		
Bromobenzene	ND	---	0.500	ug/L	1	12/15/20 08:34	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/15/20 08:34	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/15/20 08:34	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/15/20 08:34	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-10 (A0L0311-07)				Matrix: Water		Batch: 0120511		
Chloroethane	ND	---	5.00	ug/L	1	12/15/20 08:34	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/15/20 08:34	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/15/20 08:34	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 08:34	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 08:34	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 08:34	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/15/20 08:34	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/15/20 08:34	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 08:34	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 08:34	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 08:34	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/15/20 08:34	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/15/20 08:34	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/15/20 08:34	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/15/20 08:34	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/15/20 08:34	EPA 8260D	
Tetrachloroethene (PCE)	2.40	---	0.400	ug/L	1	12/15/20 08:34	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 08:34	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 08:34	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/15/20 08:34	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/15/20 08:34	EPA 8260D	
Trichloroethene (TCE)	1.95	---	0.400	ug/L	1	12/15/20 08:34	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/15/20 08:34	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/15/20 08:34	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/15/20 08:34	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/15/20 08:34</i>	<i>EPA 8260D</i>

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-10 (A0L0311-07)				Matrix: Water		Batch: 0120511		
<i>Surrogate: Toluene-d8 (Surr)</i>		<i>Recovery: 103 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>		<i>12/15/20 08:34</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>	<i>80-120 %</i>	<i>1</i>		<i>12/15/20 08:34</i>	<i>EPA 8260D</i>	
MW-14 (A0L0311-08)				Matrix: Water		Batch: 0120473		
Bromobenzene	ND	---	2.50	ug/L	5	12/14/20 21:42	EPA 8260D	
Bromochloromethane	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
Bromodichloromethane	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
Bromoform	ND	---	10.0	ug/L	5	12/14/20 21:42	EPA 8260D	
Bromomethane	ND	---	25.0	ug/L	5	12/14/20 21:42	EPA 8260D	
Carbon tetrachloride	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
Chlorobenzene	ND	---	2.50	ug/L	5	12/14/20 21:42	EPA 8260D	
Chloroethane	ND	---	25.0	ug/L	5	12/14/20 21:42	EPA 8260D	
Chloroform	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
Chloromethane	ND	---	25.0	ug/L	5	12/14/20 21:42	EPA 8260D	
2-Chlorotoluene	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
4-Chlorotoluene	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
Dibromochloromethane	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	25.0	ug/L	5	12/14/20 21:42	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
Dibromomethane	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
1,2-Dichlorobenzene	ND	---	2.50	ug/L	5	12/14/20 21:42	EPA 8260D	
1,3-Dichlorobenzene	ND	---	2.50	ug/L	5	12/14/20 21:42	EPA 8260D	
1,4-Dichlorobenzene	ND	---	2.50	ug/L	5	12/14/20 21:42	EPA 8260D	
Dichlorodifluoromethane	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
1,1-Dichloroethane	7.77	---	2.00	ug/L	5	12/14/20 21:42	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	2.00	ug/L	5	12/14/20 21:42	EPA 8260D	
1,1-Dichloroethene	3.04	---	2.00	ug/L	5	12/14/20 21:42	EPA 8260D	
cis-1,2-Dichloroethene	180	---	2.00	ug/L	5	12/14/20 21:42	EPA 8260D	
trans-1,2-Dichloroethene	2.52	---	2.00	ug/L	5	12/14/20 21:42	EPA 8260D	
1,2-Dichloropropane	ND	---	2.50	ug/L	5	12/14/20 21:42	EPA 8260D	
1,3-Dichloropropane	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
2,2-Dichloropropane	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
1,1-Dichloropropene	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
Hexachlorobutadiene	ND	---	25.0	ug/L	5	12/14/20 21:42	EPA 8260D	
Methylene chloride	ND	---	50.0	ug/L	5	12/14/20 21:42	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	2.00	ug/L	5	12/14/20 21:42	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-14 (A0L0311-08)				Matrix: Water		Batch: 0120473		
1,1,2,2-Tetrachloroethane	ND	---	2.50	ug/L	5	12/14/20 21:42	EPA 8260D	
Tetrachloroethene (PCE)	109	---	2.00	ug/L	5	12/14/20 21:42	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	10.0	ug/L	5	12/14/20 21:42	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	10.0	ug/L	5	12/14/20 21:42	EPA 8260D	
1,1,1-Trichloroethane	ND	---	2.00	ug/L	5	12/14/20 21:42	EPA 8260D	
1,1,2-Trichloroethane	ND	---	2.50	ug/L	5	12/14/20 21:42	EPA 8260D	
Trichloroethene (TCE)	339	---	2.00	ug/L	5	12/14/20 21:42	EPA 8260D	
Trichlorofluoromethane	ND	---	10.0	ug/L	5	12/14/20 21:42	EPA 8260D	
1,2,3-Trichloropropane	ND	---	5.00	ug/L	5	12/14/20 21:42	EPA 8260D	
Vinyl chloride	ND	---	2.00	ug/L	5	12/14/20 21:42	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 108 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/14/20 21:42</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/14/20 21:42</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/14/20 21:42</i>	<i>EPA 8260D</i>

MW-2 (A0L0311-09)				Matrix: Water		Batch: 0120511		
Bromobenzene	ND	---	0.500	ug/L	1	12/15/20 09:01	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/15/20 09:01	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/15/20 09:01	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/15/20 09:01	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/15/20 09:01	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/15/20 09:01	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/15/20 09:01	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 09:01	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 09:01	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 09:01	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/15/20 09:01	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/15/20 09:01	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 09:01	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-2 (A0L0311-09)				Matrix: Water		Batch: 0120511		
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 09:01	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 09:01	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/15/20 09:01	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/15/20 09:01	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/15/20 09:01	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/15/20 09:01	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/15/20 09:01	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	12/15/20 09:01	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 09:01	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 09:01	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/15/20 09:01	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/15/20 09:01	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	12/15/20 09:01	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/15/20 09:01	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/15/20 09:01	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/15/20 09:01	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/15/20 09:01</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 09:01</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 09:01</i>	<i>EPA 8260D</i>

MP-1 (A0L0311-10RE1)				Matrix: Water		Batch: 0120681		
Bromobenzene	ND	---	1.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Bromochloromethane	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Bromodichloromethane	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Bromoform	ND	---	4.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Bromomethane	ND	---	10.0	ug/L	2	12/18/20 19:43	EPA 8260D	
Carbon tetrachloride	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Chlorobenzene	ND	---	1.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Chloroethane	ND	---	10.0	ug/L	2	12/18/20 19:43	EPA 8260D	
Chloroform	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Chloromethane	ND	---	10.0	ug/L	2	12/18/20 19:43	EPA 8260D	
2-Chlorotoluene	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
4-Chlorotoluene	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MP-1 (A0L0311-10RE1)				Matrix: Water		Batch: 0120681		
Dibromochloromethane	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	10.0	ug/L	2	12/18/20 19:43	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Dibromomethane	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
1,2-Dichlorobenzene	ND	---	1.00	ug/L	2	12/18/20 19:43	EPA 8260D	
1,3-Dichlorobenzene	ND	---	1.00	ug/L	2	12/18/20 19:43	EPA 8260D	
1,4-Dichlorobenzene	ND	---	1.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Dichlorodifluoromethane	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
1,1-Dichloroethane	1.15	---	0.800	ug/L	2	12/18/20 19:43	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.800	ug/L	2	12/18/20 19:43	EPA 8260D	
1,1-Dichloroethene	ND	---	0.800	ug/L	2	12/18/20 19:43	EPA 8260D	
cis-1,2-Dichloroethene	29.5	---	0.800	ug/L	2	12/18/20 19:43	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.800	ug/L	2	12/18/20 19:43	EPA 8260D	
1,2-Dichloropropane	ND	---	1.00	ug/L	2	12/18/20 19:43	EPA 8260D	
1,3-Dichloropropane	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
2,2-Dichloropropane	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
1,1-Dichloropropene	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Hexachlorobutadiene	ND	---	10.0	ug/L	2	12/18/20 19:43	EPA 8260D	
Methylene chloride	ND	---	20.0	ug/L	2	12/18/20 19:43	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.800	ug/L	2	12/18/20 19:43	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	1.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Tetrachloroethene (PCE)	362	---	0.800	ug/L	2	12/18/20 19:43	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	4.00	ug/L	2	12/18/20 19:43	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	4.00	ug/L	2	12/18/20 19:43	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.800	ug/L	2	12/18/20 19:43	EPA 8260D	
1,1,2-Trichloroethane	ND	---	1.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Trichloroethene (TCE)	41.3	---	0.800	ug/L	2	12/18/20 19:43	EPA 8260D	
Trichlorofluoromethane	ND	---	4.00	ug/L	2	12/18/20 19:43	EPA 8260D	
1,2,3-Trichloropropane	ND	---	2.00	ug/L	2	12/18/20 19:43	EPA 8260D	
Vinyl chloride	ND	---	0.800	ug/L	2	12/18/20 19:43	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>12/18/20 19:43</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>	<i>1</i>	<i>12/18/20 19:43</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>	<i>1</i>	<i>12/18/20 19:43</i>	<i>EPA 8260D</i>	

MW-23i (A0L0311-11)				Matrix: Water		Batch: 0120511		
Bromobenzene	ND	---	0.500	ug/L	1	12/15/20 09:28	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-23i (A0L0311-11)				Matrix: Water		Batch: 0120511		
Bromochloromethane	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/15/20 09:28	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/15/20 09:28	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/15/20 09:28	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/15/20 09:28	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/15/20 09:28	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/15/20 09:28	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 09:28	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 09:28	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 09:28	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/15/20 09:28	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/15/20 09:28	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 09:28	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 09:28	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 09:28	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/15/20 09:28	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/15/20 09:28	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/15/20 09:28	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/15/20 09:28	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/15/20 09:28	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	12/15/20 09:28	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 09:28	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 09:28	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/15/20 09:28	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/15/20 09:28	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-23i (A0L0311-11)				Matrix: Water		Batch: 0120511		
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	12/15/20 09:28	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/15/20 09:28	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/15/20 09:28	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/15/20 09:28	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/15/20 09:28</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 09:28</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 09:28</i>	<i>EPA 8260D</i>

MW-25i (A0L0311-12)				Matrix: Water		Batch: 0120511		
Bromobenzene	ND	---	0.500	ug/L	1	12/15/20 09:55	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/15/20 09:55	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/15/20 09:55	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/15/20 09:55	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/15/20 09:55	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/15/20 09:55	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/15/20 09:55	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 09:55	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 09:55	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 09:55	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/15/20 09:55	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/15/20 09:55	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 09:55	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 09:55	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 09:55	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/15/20 09:55	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
				Matrix: Water		Batch: 0120511		
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/15/20 09:55	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/15/20 09:55	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/15/20 09:55	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/15/20 09:55	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	12/15/20 09:55	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 09:55	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 09:55	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/15/20 09:55	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/15/20 09:55	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	12/15/20 09:55	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/15/20 09:55	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/15/20 09:55	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/15/20 09:55	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/15/20 09:55</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 09:55</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 09:55</i>	<i>EPA 8260D</i>

				Matrix: Water		Batch: 0120681		
Bromobenzene	ND	---	2.50	ug/L	5	12/18/20 19:16	EPA 8260D	
Bromochloromethane	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
Bromodichloromethane	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
Bromoform	ND	---	10.0	ug/L	5	12/18/20 19:16	EPA 8260D	
Bromomethane	ND	---	25.0	ug/L	5	12/18/20 19:16	EPA 8260D	
Carbon tetrachloride	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
Chlorobenzene	ND	---	2.50	ug/L	5	12/18/20 19:16	EPA 8260D	
Chloroethane	ND	---	25.0	ug/L	5	12/18/20 19:16	EPA 8260D	
Chloroform	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
Chloromethane	ND	---	25.0	ug/L	5	12/18/20 19:16	EPA 8260D	
2-Chlorotoluene	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
4-Chlorotoluene	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
Dibromochloromethane	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	25.0	ug/L	5	12/18/20 19:16	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
Dibromomethane	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
1,2-Dichlorobenzene	ND	---	2.50	ug/L	5	12/18/20 19:16	EPA 8260D	
1,3-Dichlorobenzene	ND	---	2.50	ug/L	5	12/18/20 19:16	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-26 (A0L0311-13RE1)				Matrix: Water		Batch: 0120681		
1,4-Dichlorobenzene	ND	---	2.50	ug/L	5	12/18/20 19:16	EPA 8260D	
Dichlorodifluoromethane	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
1,1-Dichloroethane	3.34	---	2.00	ug/L	5	12/18/20 19:16	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	2.00	ug/L	5	12/18/20 19:16	EPA 8260D	
1,1-Dichloroethene	ND	---	2.00	ug/L	5	12/18/20 19:16	EPA 8260D	
cis-1,2-Dichloroethene	64.3	---	2.00	ug/L	5	12/18/20 19:16	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	2.00	ug/L	5	12/18/20 19:16	EPA 8260D	
1,2-Dichloropropane	ND	---	2.50	ug/L	5	12/18/20 19:16	EPA 8260D	
1,3-Dichloropropane	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
2,2-Dichloropropane	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
1,1-Dichloropropene	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
Hexachlorobutadiene	ND	---	25.0	ug/L	5	12/18/20 19:16	EPA 8260D	
Methylene chloride	ND	---	50.0	ug/L	5	12/18/20 19:16	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	2.00	ug/L	5	12/18/20 19:16	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	2.50	ug/L	5	12/18/20 19:16	EPA 8260D	
Tetrachloroethene (PCE)	147	---	2.00	ug/L	5	12/18/20 19:16	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	10.0	ug/L	5	12/18/20 19:16	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	10.0	ug/L	5	12/18/20 19:16	EPA 8260D	
1,1,1-Trichloroethane	ND	---	2.00	ug/L	5	12/18/20 19:16	EPA 8260D	
1,1,2-Trichloroethane	ND	---	2.50	ug/L	5	12/18/20 19:16	EPA 8260D	
Trichloroethene (TCE)	218	---	2.00	ug/L	5	12/18/20 19:16	EPA 8260D	
Trichlorofluoromethane	ND	---	10.0	ug/L	5	12/18/20 19:16	EPA 8260D	
1,2,3-Trichloropropane	ND	---	5.00	ug/L	5	12/18/20 19:16	EPA 8260D	
Vinyl chloride	ND	---	2.00	ug/L	5	12/18/20 19:16	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/18/20 19:16</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/18/20 19:16</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/18/20 19:16</i>	<i>EPA 8260D</i>

MW-18i (A0L0311-14)				Matrix: Water		Batch: 0120511		
Bromobenzene	ND	---	0.500	ug/L	1	12/15/20 10:22	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/15/20 10:22	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/15/20 10:22	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/15/20 10:22	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-18i (A0L0311-14)				Matrix: Water		Batch: 0120511		
Chloroethane	ND	---	5.00	ug/L	1	12/15/20 10:22	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/15/20 10:22	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/15/20 10:22	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 10:22	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 10:22	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 10:22	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/15/20 10:22	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/15/20 10:22	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 10:22	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 10:22	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 10:22	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/15/20 10:22	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/15/20 10:22	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/15/20 10:22	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/15/20 10:22	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/15/20 10:22	EPA 8260D	
Tetrachloroethene (PCE)	0.764	---	0.400	ug/L	1	12/15/20 10:22	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 10:22	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 10:22	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/15/20 10:22	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/15/20 10:22	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	12/15/20 10:22	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/15/20 10:22	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/15/20 10:22	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/15/20 10:22	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/15/20 10:22</i>	<i>EPA 8260D</i>

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-18i (A0L0311-14)				Matrix: Water		Batch: 0120511		
<i>Surrogate: Toluene-d8 (Surr)</i>		<i>Recovery: 104 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>		<i>12/15/20 10:22</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>102 %</i>	<i>80-120 %</i>	<i>1</i>		<i>12/15/20 10:22</i>	<i>EPA 8260D</i>	
MW-20i (A0L0311-15)				Matrix: Water		Batch: 0120511		
Bromobenzene	ND	---	0.500	ug/L	1	12/15/20 10:50	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/15/20 10:50	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/15/20 10:50	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/15/20 10:50	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/15/20 10:50	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/15/20 10:50	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/15/20 10:50	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 10:50	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 10:50	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 10:50	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/15/20 10:50	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/15/20 10:50	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 10:50	EPA 8260D	
cis-1,2-Dichloroethene	10.0	---	0.400	ug/L	1	12/15/20 10:50	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 10:50	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/15/20 10:50	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/15/20 10:50	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/15/20 10:50	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/15/20 10:50	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-20i (A0L0311-15)				Matrix: Water		Batch: 0120511		
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/15/20 10:50	EPA 8260D	
Tetrachloroethene (PCE)	1.57	---	0.400	ug/L	1	12/15/20 10:50	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 10:50	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 10:50	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/15/20 10:50	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/15/20 10:50	EPA 8260D	
Trichloroethene (TCE)	0.856	---	0.400	ug/L	1	12/15/20 10:50	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/15/20 10:50	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/15/20 10:50	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/15/20 10:50	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/15/20 10:50</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 10:50</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 10:50</i>	<i>EPA 8260D</i>

MW-16 (A0L0311-16)				Matrix: Water		Batch: 0120511		
Bromobenzene	ND	---	0.500	ug/L	1	12/15/20 11:17	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/15/20 11:17	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/15/20 11:17	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/15/20 11:17	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/15/20 11:17	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/15/20 11:17	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/15/20 11:17	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 11:17	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 11:17	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 11:17	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/15/20 11:17	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/15/20 11:17	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 11:17	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-16 (A0L0311-16)				Matrix: Water		Batch: 0120511		
cis-1,2-Dichloroethene	15.7	---	0.400	ug/L	1	12/15/20 11:17	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 11:17	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/15/20 11:17	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/15/20 11:17	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/15/20 11:17	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/15/20 11:17	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/15/20 11:17	EPA 8260D	
Tetrachloroethene (PCE)	122	---	0.400	ug/L	1	12/15/20 11:17	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 11:17	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 11:17	EPA 8260D	
1,1,1-Trichloroethane	0.550	---	0.400	ug/L	1	12/15/20 11:17	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/15/20 11:17	EPA 8260D	
Trichloroethene (TCE)	15.5	---	0.400	ug/L	1	12/15/20 11:17	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/15/20 11:17	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/15/20 11:17	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/15/20 11:17	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/15/20 11:17</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 11:17</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 11:17</i>	<i>EPA 8260D</i>

MW-21i-40 (A0L0311-17)				Matrix: Water		Batch: 0120511		
Bromobenzene	ND	---	0.500	ug/L	1	12/15/20 11:44	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/15/20 11:44	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/15/20 11:44	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/15/20 11:44	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/15/20 11:44	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/15/20 11:44	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-21i-40 (A0L0311-17)				Matrix: Water		Batch: 0120511		
Dibromochloromethane	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/15/20 11:44	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 11:44	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 11:44	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 11:44	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
1,1-Dichloroethane	2.46	---	0.400	ug/L	1	12/15/20 11:44	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/15/20 11:44	EPA 8260D	
1,1-Dichloroethene	0.558	---	0.400	ug/L	1	12/15/20 11:44	EPA 8260D	
cis-1,2-Dichloroethene	53.3	---	0.400	ug/L	1	12/15/20 11:44	EPA 8260D	
trans-1,2-Dichloroethene	0.486	---	0.400	ug/L	1	12/15/20 11:44	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/15/20 11:44	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/15/20 11:44	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/15/20 11:44	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/15/20 11:44	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/15/20 11:44	EPA 8260D	
Tetrachloroethene (PCE)	30.0	---	0.400	ug/L	1	12/15/20 11:44	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 11:44	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 11:44	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	12/15/20 11:44	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/15/20 11:44	EPA 8260D	
Trichloroethene (TCE)	15.8	---	0.400	ug/L	1	12/15/20 11:44	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/15/20 11:44	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/15/20 11:44	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/15/20 11:44	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>12/15/20 11:44</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 11:44</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>104 %</i>		<i>80-120 %</i>		<i>1</i>	<i>12/15/20 11:44</i>	<i>EPA 8260D</i>

EW-1 (A0L0311-18)				Matrix: Water		Batch: 0120511		
Bromobenzene	ND	---	0.500	ug/L	1	12/15/20 12:11	EPA 8260D	

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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
EW-1 (A0L0311-18)				Matrix: Water		Batch: 0120511		
Bromochloromethane	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
Bromoform	ND	---	2.00	ug/L	1	12/15/20 12:11	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	12/15/20 12:11	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	12/15/20 12:11	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	12/15/20 12:11	EPA 8260D	
Chloroform	1.16	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	12/15/20 12:11	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	12/15/20 12:11	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 12:11	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 12:11	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	12/15/20 12:11	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	12/15/20 12:11	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	12/15/20 12:11	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 12:11	EPA 8260D	
cis-1,2-Dichloroethene	1.61	---	0.400	ug/L	1	12/15/20 12:11	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	12/15/20 12:11	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	12/15/20 12:11	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	12/15/20 12:11	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	12/15/20 12:11	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	12/15/20 12:11	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	12/15/20 12:11	EPA 8260D	
Tetrachloroethene (PCE)	32.2	---	0.400	ug/L	1	12/15/20 12:11	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 12:11	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	12/15/20 12:11	EPA 8260D	
1,1,1-Trichloroethane	0.766	---	0.400	ug/L	1	12/15/20 12:11	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	12/15/20 12:11	EPA 8260D	

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6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

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ANALYTICAL SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
EW-1 (A0L0311-18)				Matrix: Water		Batch: 0120511		
Trichloroethene (TCE)	8.64	---	0.400	ug/L	1	12/15/20 12:11	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	12/15/20 12:11	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	12/15/20 12:11	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	12/15/20 12:11	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 106 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>12/15/20 12:11</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>			<i>104 %</i>	<i>80-120 %</i>	<i>1</i>	<i>12/15/20 12:11</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>			<i>103 %</i>	<i>80-120 %</i>	<i>1</i>	<i>12/15/20 12:11</i>	<i>EPA 8260D</i>	

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ANALYTICAL SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-9 (A0L0311-01RE1)				Matrix: Water			Batch: 0120372	B-02
Ammonia as N	11.1	---	0.100	mg/L	5	12/10/20 13:48	SM 4500-NH3 G	
MW-7 (A0L0311-02RE1)				Matrix: Water			Batch: 0120372	B-02
Ammonia as N	34.5	---	0.200	mg/L	10	12/10/20 13:49	SM 4500-NH3 G	
MW-7 DUP (A0L0311-03RE1)				Matrix: Water			Batch: 0120372	B-02
Ammonia as N	33.3	---	0.200	mg/L	10	12/10/20 13:51	SM 4500-NH3 G	
MW-6 (A0L0311-04)				Matrix: Water			Batch: 0120372	
Ammonia as N	2.67	---	0.0200	mg/L	1	12/10/20 12:35	SM 4500-NH3 G	B-02
MW-21i-105 (A0L0311-05)				Matrix: Water			Batch: 0120372	
Ammonia as N	34.4	---	0.200	mg/L	10	12/10/20 12:36	SM 4500-NH3 G	B-02
MW-22i (A0L0311-06RE1)				Matrix: Water			Batch: 0120444	
Ammonia as N	0.339	---	0.0200	mg/L	1	12/11/20 18:39	SM 4500-NH3 G	
MW-10 (A0L0311-07)				Matrix: Water			Batch: 0120372	
Ammonia as N	37.7	---	0.200	mg/L	10	12/10/20 12:40	SM 4500-NH3 G	B-02
MW-14 (A0L0311-08)				Matrix: Water			Batch: 0120372	
Ammonia as N	21.3	---	0.200	mg/L	10	12/10/20 12:41	SM 4500-NH3 G	B-02
MW-2 (A0L0311-09)				Matrix: Water			Batch: 0120372	
Ammonia as N	9.78	---	0.0400	mg/L	2	12/10/20 12:43	SM 4500-NH3 G	B-02
MP-1 (A0L0311-10RE2)				Matrix: Water			Batch: 0120443	
Ammonia as N	1.95	---	0.0200	mg/L	1	12/11/20 17:47	SM 4500-NH3 G	
MW-23i (A0L0311-11RE1)				Matrix: Water			Batch: 0120443	
Ammonia as N	ND	---	0.0200	mg/L	1	12/11/20 17:49	SM 4500-NH3 G	
MW-25i (A0L0311-12RE1)				Matrix: Water			Batch: 0120443	
Ammonia as N	ND	---	0.0200	mg/L	1	12/11/20 17:50	SM 4500-NH3 G	
MW-26 (A0L0311-13RE1)				Matrix: Water			Batch: 0120372	B-02

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ANALYTICAL SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-26 (A0L0311-13RE1)				Matrix: Water			Batch: 0120372	B-02
Ammonia as N	41.1	---	0.200	mg/L	10	12/10/20 13:55	SM 4500-NH3 G	
MW-18i (A0L0311-14RE1)				Matrix: Water			Batch: 0120443	
Ammonia as N	ND	---	0.0200	mg/L	1	12/11/20 17:52	SM 4500-NH3 G	
MW-20i (A0L0311-15RE1)				Matrix: Water			Batch: 0120443	
Ammonia as N	0.176	---	0.0200	mg/L	1	12/11/20 18:01	SM 4500-NH3 G	
MW-16 (A0L0311-16RE1)				Matrix: Water			Batch: 0120443	
Ammonia as N	ND	---	0.0200	mg/L	1	12/11/20 18:02	SM 4500-NH3 G	
MW-21i-40 (A0L0311-17RE1)				Matrix: Water			Batch: 0120443	
Ammonia as N	ND	---	0.0200	mg/L	1	12/11/20 18:04	SM 4500-NH3 G	
EW-1 (A0L0311-18RE1)				Matrix: Water			Batch: 0120443	
Ammonia as N	0.177	---	0.0200	mg/L	1	12/11/20 18:05	SM 4500-NH3 G	

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-9 (A0L0311-01RE1) Matrix: Water								
Batch: 0120376								
Nitrate-Nitrogen	302	---	12.5	mg/L	50	12/11/20 01:44	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 12:05	EPA 300.0	
MW-7 (A0L0311-02) Matrix: Water								
Batch: 0120376								
Nitrate-Nitrogen	88.6	---	5.00	mg/L	20	12/10/20 12:26	EPA 300.0	
MW-7 (A0L0311-02RE1) Matrix: Water								
Batch: 0120376								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 12:48	EPA 300.0	
MW-7 DUP (A0L0311-03) Matrix: Water								
Batch: 0120376								
Nitrate-Nitrogen	88.9	---	5.00	mg/L	20	12/10/20 13:09	EPA 300.0	
MW-7 DUP (A0L0311-03RE1) Matrix: Water								
Batch: 0120376								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 14:14	EPA 300.0	
MW-6 (A0L0311-04) Matrix: Water								
Batch: 0120376								
Nitrate-Nitrogen	0.315	---	0.250	mg/L	1	12/10/20 14:35	EPA 300.0	Q-42
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 14:35	EPA 300.0	
MW-21i-105 (A0L0311-05) Matrix: Water								
Batch: 0120376								
Nitrate-Nitrogen	8.54	---	1.25	mg/L	5	12/10/20 15:40	EPA 300.0	
Nitrite-Nitrogen	5.76	---	1.25	mg/L	5	12/10/20 15:40	EPA 300.0	
MW-22i (A0L0311-06) Matrix: Water								
Batch: 0120376								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 16:02	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 16:02	EPA 300.0	
MW-10 (A0L0311-07RE1) Matrix: Water								

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-10 (A0L0311-07RE1)				Matrix: Water				
Batch: 0120376								
Nitrate-Nitrogen	515	---	25.0	mg/L	100	12/11/20 03:54	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 17:28	EPA 300.0	
MW-14 (A0L0311-08)				Matrix: Water				
Batch: 0120376								
Nitrate-Nitrogen	200	---	5.00	mg/L	20	12/10/20 18:33	EPA 300.0	
MW-14 (A0L0311-08RE1)				Matrix: Water				
Batch: 0120376								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 18:54	EPA 300.0	
MW-2 (A0L0311-09)				Matrix: Water				
Batch: 0120376								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 19:16	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 19:16	EPA 300.0	
MP-1 (A0L0311-10)				Matrix: Water				
Batch: 0120376								
Nitrate-Nitrogen	106	---	5.00	mg/L	20	12/10/20 19:38	EPA 300.0	
MP-1 (A0L0311-10RE1)				Matrix: Water				
Batch: 0120376								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 19:59	EPA 300.0	
MW-23i (A0L0311-11)				Matrix: Water				
Batch: 0120376								
Nitrate-Nitrogen	0.667	---	0.250	mg/L	1	12/10/20 20:21	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 20:21	EPA 300.0	
MW-25i (A0L0311-12)				Matrix: Water				
Batch: 0120376								
Nitrate-Nitrogen	0.485	---	0.250	mg/L	1	12/10/20 20:42	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 20:42	EPA 300.0	
MW-26 (A0L0311-13RE1)				Matrix: Water				

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ANALYTICAL SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-26 (A0L0311-13RE1)				Matrix: Water				
Batch: 0120376								
Nitrate-Nitrogen	484	---	25.0	mg/L	100	12/11/20 10:15	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 21:25	EPA 300.0	
MW-18i (A0L0311-14)				Matrix: Water				
Batch: 0120376								
Nitrate-Nitrogen	0.618	---	0.250	mg/L	1	12/10/20 21:47	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 21:47	EPA 300.0	
MW-20i (A0L0311-15)				Matrix: Water				
Batch: 0120376								
Nitrate-Nitrogen	0.643	---	0.250	mg/L	1	12/10/20 22:52	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 22:52	EPA 300.0	
MW-16 (A0L0311-16)				Matrix: Water				
Batch: 0120376								
Nitrate-Nitrogen	9.58	---	1.25	mg/L	5	12/10/20 23:13	EPA 300.0	
MW-16 (A0L0311-16RE1)				Matrix: Water				
Batch: 0120376								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/10/20 23:35	EPA 300.0	
MW-21i-40 (A0L0311-17)				Matrix: Water				
Batch: 0120376								
Nitrate-Nitrogen	6.15	---	1.25	mg/L	5	12/10/20 23:56	EPA 300.0	
MW-21i-40 (A0L0311-17RE1)				Matrix: Water				
Batch: 0120376								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 00:18	EPA 300.0	
EW-1 (A0L0311-18)				Matrix: Water				
Batch: 0120376								
Nitrate-Nitrogen	2.32	---	0.250	mg/L	1	12/11/20 00:39	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	12/11/20 00:39	EPA 300.0	

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Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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ANALYTICAL SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 (A0L0311-02)				Matrix: Water		Batch: 0120394		
Total Organic Carbon	8.45	---	1.00	mg/L	1	12/11/20 03:36	SM 5310 C	
MW-7 DUP (A0L0311-03)				Matrix: Water		Batch: 0120394		
Total Organic Carbon	8.42	---	1.00	mg/L	1	12/11/20 04:08	SM 5310 C	
MW-14 (A0L0311-08)				Matrix: Water		Batch: 0120394		
Total Organic Carbon	3.05	---	1.00	mg/L	1	12/11/20 04:41	SM 5310 C	
MP-1 (A0L0311-10)				Matrix: Water		Batch: 0120394		
Total Organic Carbon	1.76	---	1.00	mg/L	1	12/11/20 05:14	SM 5310 C	
MW-26 (A0L0311-13)				Matrix: Water		Batch: 0120394		
Total Organic Carbon	4.04	---	1.00	mg/L	1	12/11/20 05:47	SM 5310 C	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120473 - EPA 5030B						Water						
Blank (0120473-BLK1)		Prepared: 12/14/20 08:00		Analyzed: 12/14/20 11:32								
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromoform	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120473 - EPA 5030B												
Water												
Blank (0120473-BLK1)	Prepared: 12/14/20 08:00 Analyzed: 12/14/20 11:32											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
Surr: 1,4-Difluorobenzene (Surr)	Recovery: 102 %		Limits: 80-120 %		Dilution: 1x							
Toluene-d8 (Surr)	103 %		80-120 %		"							
4-Bromofluorobenzene (Surr)	102 %		80-120 %		"							

LCS (0120473-BS1)												
Prepared: 12/14/20 08:00 Analyzed: 12/14/20 10:10												
EPA 8260D												
Bromobenzene	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Bromochloromethane	21.9	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Bromodichloromethane	21.5	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Bromoform	20.8	---	2.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
Bromomethane	20.0	---	5.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
Carbon tetrachloride	21.4	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
Chlorobenzene	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Chloroethane	18.6	---	5.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
Chloroform	21.1	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
Chloromethane	22.4	---	5.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
2-Chlorotoluene	18.3	---	1.00	ug/L	1	20.0	---	91	80 - 120%	---	---	
4-Chlorotoluene	19.0	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
Dibromochloromethane	21.7	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	18.8	---	5.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	19.1	---	1.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
Dibromomethane	22.2	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,2-Dichlorobenzene	19.4	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120473 - EPA 5030B												
Water												
LCS (0120473-BS1)	Prepared: 12/14/20 08:00 Analyzed: 12/14/20 10:10											
1,3-Dichlorobenzene	19.5	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,4-Dichlorobenzene	19.2	---	0.500	ug/L	1	20.0	---	96	80 - 120%	---	---	
Dichlorodifluoromethane	21.3	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
1,1-Dichloroethane	20.7	---	0.400	ug/L	1	20.0	---	103	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	21.6	---	0.400	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,1-Dichloroethene	21.5	---	0.400	ug/L	1	20.0	---	108	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.2	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
trans-1,2-Dichloroethene	20.5	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2-Dichloropropane	20.2	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,3-Dichloropropane	20.9	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
2,2-Dichloropropane	20.3	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,1-Dichloropropene	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
cis-1,3-Dichloropropene	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
trans-1,3-Dichloropropene	21.3	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
Hexachlorobutadiene	19.7	---	5.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
Methylene chloride	20.2	---	10.0	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	21.6	---	0.400	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	22.7	---	0.500	ug/L	1	20.0	---	113	80 - 120%	---	---	
Tetrachloroethene (PCE)	19.5	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,2,3-Trichlorobenzene	20.2	---	2.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,2,4-Trichlorobenzene	18.3	---	2.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
1,1,1-Trichloroethane	19.5	---	0.400	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,1,2-Trichloroethane	21.4	---	0.500	ug/L	1	20.0	---	107	80 - 120%	---	---	
Trichloroethene (TCE)	18.0	---	0.400	ug/L	1	20.0	---	90	80 - 120%	---	---	
Trichlorofluoromethane	28.8	---	2.00	ug/L	1	20.0	---	144	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Vinyl chloride	21.7	---	0.400	ug/L	1	20.0	---	109	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr) Recovery: 100 % Limits: 80-120 % Dilution: 1x												
Toluene-d8 (Surr) 100 % 80-120 % "												
4-Bromofluorobenzene (Surr) 93 % 80-120 % "												

Duplicate (0120473-DUP1) Prepared: 12/14/20 11:02 Analyzed: 12/14/20 22:09

QC Source Sample: MW-14 (A0L0311-08)

EPA 8260D

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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120473 - EPA 5030B						Water						
Duplicate (0120473-DUP1)			Prepared: 12/14/20 11:02			Analyzed: 12/14/20 22:09						
QC Source Sample: MW-14 (A0L0311-08)												
Bromobenzene	ND	---	2.50	ug/L	5	---	ND	---	---	---	30%	
Bromochloromethane	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
Bromodichloromethane	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
Bromoform	ND	---	10.0	ug/L	5	---	ND	---	---	---	30%	
Bromomethane	ND	---	25.0	ug/L	5	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
Chlorobenzene	ND	---	2.50	ug/L	5	---	ND	---	---	---	30%	
Chloroethane	ND	---	25.0	ug/L	5	---	ND	---	---	---	30%	
Chloroform	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
Chloromethane	ND	---	25.0	ug/L	5	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
4-Chlorotoluene	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
Dibromochloromethane	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	---	25.0	ug/L	5	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
Dibromomethane	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	---	2.50	ug/L	5	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	---	2.50	ug/L	5	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	---	2.50	ug/L	5	---	ND	---	---	---	30%	
Dichlorodifluoromethane	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
1,1-Dichloroethane	7.84	---	2.00	ug/L	5	---	7.77	---	---	0.9	30%	
1,2-Dichloroethane (EDC)	ND	---	2.00	ug/L	5	---	ND	---	---	---	30%	
1,1-Dichloroethene	3.15	---	2.00	ug/L	5	---	3.04	---	---	3	30%	
cis-1,2-Dichloroethene	186	---	2.00	ug/L	5	---	180	---	---	4	30%	
trans-1,2-Dichloroethene	2.64	---	2.00	ug/L	5	---	2.52	---	---	4	30%	
1,2-Dichloropropane	ND	---	2.50	ug/L	5	---	ND	---	---	---	30%	
1,3-Dichloropropane	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
2,2-Dichloropropane	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
1,1-Dichloropropene	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	---	25.0	ug/L	5	---	ND	---	---	---	30%	
Methylene chloride	ND	---	50.0	ug/L	5	---	ND	---	---	---	30%	

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120473 - EPA 5030B												
Water												
Duplicate (0120473-DUP1)			Prepared: 12/14/20 11:02 Analyzed: 12/14/20 22:09									
QC Source Sample: MW-14 (A0L0311-08)												
1,1,1,2-Tetrachloroethane	ND	---	2.00	ug/L	5	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	---	2.50	ug/L	5	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	111	---	2.00	ug/L	5	---	109	---	---	3	30%	
1,2,3-Trichlorobenzene	ND	---	10.0	ug/L	5	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	---	10.0	ug/L	5	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	---	2.00	ug/L	5	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	---	2.50	ug/L	5	---	ND	---	---	---	30%	
Trichloroethene (TCE)	353	---	2.00	ug/L	5	---	339	---	---	4	30%	
Trichlorofluoromethane	ND	---	10.0	ug/L	5	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	---	5.00	ug/L	5	---	ND	---	---	---	30%	
Vinyl chloride	ND	---	2.00	ug/L	5	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 109 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>					
<i>Toluene-d8 (Surr)</i>			<i>104 %</i>		<i>80-120 %</i>		<i>"</i>					
<i>4-Bromofluorobenzene (Surr)</i>			<i>103 %</i>		<i>80-120 %</i>		<i>"</i>					

Matrix Spike (0120473-MS1) Prepared: 12/14/20 11:02 Analyzed: 12/14/20 23:03 **T-02**

QC Source Sample: MW-26 (A0L0311-13)												
EPA 8260D												
Bromobenzene	102	---	2.50	ug/L	5	100	ND	102	80 - 120%	---	---	
Bromochloromethane	111	---	5.00	ug/L	5	100	ND	111	78 - 123%	---	---	
Bromodichloromethane	111	---	5.00	ug/L	5	100	ND	111	79 - 125%	---	---	
Bromoform	105	---	10.0	ug/L	5	100	ND	105	66 - 130%	---	---	
Bromomethane	117	---	25.0	ug/L	5	100	ND	117	53 - 141%	---	---	
Carbon tetrachloride	116	---	5.00	ug/L	5	100	ND	116	72 - 136%	---	---	
Chlorobenzene	108	---	2.50	ug/L	5	100	ND	108	80 - 120%	---	---	
Chloroethane	115	---	25.0	ug/L	5	100	ND	115	60 - 138%	---	---	
Chloroform	114	---	5.00	ug/L	5	100	ND	114	79 - 124%	---	---	
Chloromethane	122	---	25.0	ug/L	5	100	ND	122	50 - 139%	---	---	
2-Chlorotoluene	100	---	5.00	ug/L	5	100	ND	100	79 - 122%	---	---	
4-Chlorotoluene	101	---	5.00	ug/L	5	100	ND	101	78 - 122%	---	---	
Dibromochloromethane	110	---	5.00	ug/L	5	100	ND	110	74 - 126%	---	---	
1,2-Dibromo-3-chloropropane	86.8	---	25.0	ug/L	5	100	ND	87	62 - 128%	---	---	
1,2-Dibromoethane (EDB)	97.9	---	5.00	ug/L	5	100	ND	98	77 - 121%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120473 - EPA 5030B						Water						
Matrix Spike (0120473-MS1)			Prepared: 12/14/20 11:02				Analyzed: 12/14/20 23:03				T-02	
QC Source Sample: MW-26 (A0L0311-13)												
Dibromomethane	114	---	5.00	ug/L	5	100	ND	114	79 - 123%	---	---	
1,2-Dichlorobenzene	102	---	2.50	ug/L	5	100	ND	102	80 - 120%	---	---	
1,3-Dichlorobenzene	104	---	2.50	ug/L	5	100	ND	104	80 - 120%	---	---	
1,4-Dichlorobenzene	102	---	2.50	ug/L	5	100	ND	102	79 - 120%	---	---	
Dichlorodifluoromethane	118	---	5.00	ug/L	5	100	ND	118	32 - 152%	---	---	
1,1-Dichloroethane	114	---	2.00	ug/L	5	100	3.76	110	77 - 125%	---	---	
1,2-Dichloroethane (EDC)	113	---	2.00	ug/L	5	100	ND	113	73 - 128%	---	---	
1,1-Dichloroethene	117	---	2.00	ug/L	5	100	ND	117	71 - 131%	---	---	
cis-1,2-Dichloroethene	179	---	2.00	ug/L	5	100	66.5	112	78 - 123%	---	---	
trans-1,2-Dichloroethene	113	---	2.00	ug/L	5	100	1.46	112	75 - 124%	---	---	
1,2-Dichloropropane	106	---	2.50	ug/L	5	100	ND	106	78 - 122%	---	---	
1,3-Dichloropropane	107	---	5.00	ug/L	5	100	ND	107	80 - 120%	---	---	
2,2-Dichloropropane	81.7	---	5.00	ug/L	5	100	ND	82	60 - 139%	---	---	
1,1-Dichloropropene	107	---	5.00	ug/L	5	100	ND	107	79 - 125%	---	---	
cis-1,3-Dichloropropene	90.4	---	5.00	ug/L	5	100	ND	90	75 - 124%	---	---	
trans-1,3-Dichloropropene	102	---	5.00	ug/L	5	100	ND	102	73 - 127%	---	---	
Hexachlorobutadiene	102	---	25.0	ug/L	5	100	ND	102	66 - 134%	---	---	
Methylene chloride	106	---	50.0	ug/L	5	100	ND	106	74 - 124%	---	---	
1,1,1,2-Tetrachloroethane	111	---	2.00	ug/L	5	100	ND	111	78 - 124%	---	---	
1,1,2,2-Tetrachloroethane	116	---	2.50	ug/L	5	100	ND	116	71 - 121%	---	---	
Tetrachloroethene (PCE)	262	---	2.00	ug/L	5	100	154	109	74 - 129%	---	---	
1,2,3-Trichlorobenzene	101	---	10.0	ug/L	5	100	ND	101	69 - 129%	---	---	
1,2,4-Trichlorobenzene	88.3	---	10.0	ug/L	5	100	ND	88	69 - 130%	---	---	
1,1,1-Trichloroethane	108	---	2.00	ug/L	5	100	1.32	107	74 - 131%	---	---	
1,1,2-Trichloroethane	109	---	2.50	ug/L	5	100	ND	109	80 - 120%	---	---	
Trichloroethene (TCE)	337	---	2.00	ug/L	5	100	239	98	79 - 123%	---	---	
Trichlorofluoromethane	161	---	10.0	ug/L	5	100	ND	161	65 - 141%	---	---	Q-54a
1,2,3-Trichloropropane	102	---	5.00	ug/L	5	100	ND	102	73 - 122%	---	---	
Vinyl chloride	119	---	2.00	ug/L	5	100	ND	119	58 - 137%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>91 %</i>		<i>80-120 %</i>		<i>"</i>						

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120511 - EPA 5030B						Water						
Blank (0120511-BLK1)		Prepared: 12/14/20 20:00			Analyzed: 12/15/20 02:13							
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromoform	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
Bromomethane	8.36	---	5.00	ug/L	1	---	---	---	---	---	---	B
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	B-02
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120511 - EPA 5030B												
Water												
Blank (0120511-BLK1)	Prepared: 12/14/20 20:00 Analyzed: 12/15/20 02:13											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)	Recovery: 98 %		Limits: 80-120 %		Dilution: 1x							
Toluene-d8 (Surr)	109 %		80-120 %		"							
4-Bromofluorobenzene (Surr)	91 %		80-120 %		"							

LCS (0120511-BS1)	Prepared: 12/14/20 20:00 Analyzed: 12/15/20 01:19											
EPA 8260D												
Bromobenzene	20.6	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
Bromochloromethane	22.9	---	1.00	ug/L	1	20.0	---	114	80 - 120%	---	---	
Bromodichloromethane	22.8	---	1.00	ug/L	1	20.0	---	114	80 - 120%	---	---	
Bromoform	21.9	---	2.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Bromomethane	23.4	---	5.00	ug/L	1	20.0	---	117	80 - 120%	---	---	B
Carbon tetrachloride	22.2	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
Chlorobenzene	21.7	---	0.500	ug/L	1	20.0	---	109	80 - 120%	---	---	
Chloroethane	22.0	---	5.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
Chloroform	22.9	---	1.00	ug/L	1	20.0	---	114	80 - 120%	---	---	
Chloromethane	23.8	---	5.00	ug/L	1	20.0	---	119	80 - 120%	---	---	B-02
2-Chlorotoluene	19.9	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
4-Chlorotoluene	20.6	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
Dibromochloromethane	22.5	---	1.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	18.6	---	5.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.7	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
Dibromomethane	23.9	---	1.00	ug/L	1	20.0	---	119	80 - 120%	---	---	
1,2-Dichlorobenzene	20.9	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120511 - EPA 5030B												
Water												
LCS (0120511-BS1)	Prepared: 12/14/20 20:00 Analyzed: 12/15/20 01:19											
1,3-Dichlorobenzene	20.9	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,4-Dichlorobenzene	20.9	---	0.500	ug/L	1	20.0	---	104	80 - 120%	---	---	
Dichlorodifluoromethane	22.6	---	1.00	ug/L	1	20.0	---	113	80 - 120%	---	---	
1,1-Dichloroethane	22.0	---	0.400	ug/L	1	20.0	---	110	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	23.4	---	0.400	ug/L	1	20.0	---	117	80 - 120%	---	---	
1,1-Dichloroethene	22.3	---	0.400	ug/L	1	20.0	---	112	80 - 120%	---	---	
cis-1,2-Dichloroethene	21.3	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
trans-1,2-Dichloroethene	22.2	---	0.400	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,2-Dichloropropane	21.9	---	0.500	ug/L	1	20.0	---	110	80 - 120%	---	---	
1,3-Dichloropropane	22.5	---	1.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
2,2-Dichloropropane	15.3	---	1.00	ug/L	1	20.0	---	77	80 - 120%	---	---	Q-55
1,1-Dichloropropene	21.1	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
cis-1,3-Dichloropropene	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
trans-1,3-Dichloropropene	21.0	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
Hexachlorobutadiene	19.8	---	5.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
Methylene chloride	21.5	---	10.0	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	22.5	---	0.400	ug/L	1	20.0	---	112	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	23.5	---	0.500	ug/L	1	20.0	---	117	80 - 120%	---	---	
Tetrachloroethene (PCE)	21.1	---	0.400	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,2,3-Trichlorobenzene	20.0	---	2.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,2,4-Trichlorobenzene	17.7	---	2.00	ug/L	1	20.0	---	88	80 - 120%	---	---	
1,1,1-Trichloroethane	20.5	---	0.400	ug/L	1	20.0	---	103	80 - 120%	---	---	
1,1,2-Trichloroethane	23.3	---	0.500	ug/L	1	20.0	---	117	80 - 120%	---	---	
Trichloroethene (TCE)	19.7	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
Trichlorofluoromethane	31.0	---	2.00	ug/L	1	20.0	---	155	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	21.3	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
Vinyl chloride	23.0	---	0.400	ug/L	1	20.0	---	115	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr) Recovery: 99 % Limits: 80-120 % Dilution: 1x												
Toluene-d8 (Surr) 100 % 80-120 % "												
4-Bromofluorobenzene (Surr) 92 % 80-120 % "												

Duplicate (0120511-DUP1)	Prepared: 12/14/20 20:00 Analyzed: 12/15/20 07:40
QC Source Sample: MW-21i-105 (A0L0311-05)	
EPA 8260D	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120511 - EPA 5030B						Water						
Duplicate (0120511-DUP1)		Prepared: 12/14/20 20:00		Analyzed: 12/15/20 07:40								
QC Source Sample: MW-21i-105 (A0L0311-05)												
Bromobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Chloromethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Dibromomethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	1.93	---	0.400	ug/L	1	---	1.88	---	---	3	30%	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Methylene chloride	ND	---	10.0	ug/L	1	---	ND	---	---	---	30%	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120511 - EPA 5030B												
Water												
Duplicate (0120511-DUP1)			Prepared: 12/14/20 20:00 Analyzed: 12/15/20 07:40									
QC Source Sample: MW-21i-105 (A0L0311-05)												
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	3.38	---	0.400	ug/L	1	---	3.53	---	---	4	30%	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	1.48	---	0.400	ug/L	1	---	1.62	---	---	9	30%	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>					
<i>Toluene-d8 (Surr)</i>			<i>103 %</i>		<i>80-120 %</i>		<i>"</i>					
<i>4-Bromofluorobenzene (Surr)</i>			<i>102 %</i>		<i>80-120 %</i>		<i>"</i>					

Matrix Spike (0120511-MS1)												
Prepared: 12/14/20 20:00 Analyzed: 12/15/20 12:38												
QC Source Sample: EW-1 (A0L0311-18)												
EPA 8260D												
Bromobenzene	20.6	---	0.500	ug/L	1	20.0	ND	103	80 - 120%	---	---	
Bromochloromethane	22.7	---	1.00	ug/L	1	20.0	ND	113	78 - 123%	---	---	
Bromodichloromethane	22.4	---	1.00	ug/L	1	20.0	ND	112	79 - 125%	---	---	
Bromoform	21.4	---	2.00	ug/L	1	20.0	ND	107	66 - 130%	---	---	
Bromomethane	24.2	---	5.00	ug/L	1	20.0	ND	121	53 - 141%	---	---	B
Carbon tetrachloride	23.3	---	1.00	ug/L	1	20.0	ND	116	72 - 136%	---	---	
Chlorobenzene	21.8	---	0.500	ug/L	1	20.0	ND	109	80 - 120%	---	---	
Chloroethane	21.1	---	5.00	ug/L	1	20.0	ND	105	60 - 138%	---	---	
Chloroform	24.0	---	1.00	ug/L	1	20.0	1.16	114	79 - 124%	---	---	
Chloromethane	26.0	---	5.00	ug/L	1	20.0	ND	130	50 - 139%	---	---	B-02
2-Chlorotoluene	20.0	---	1.00	ug/L	1	20.0	ND	100	79 - 122%	---	---	
4-Chlorotoluene	19.9	---	1.00	ug/L	1	20.0	ND	99	78 - 122%	---	---	
Dibromochloromethane	22.1	---	1.00	ug/L	1	20.0	ND	111	74 - 126%	---	---	
1,2-Dibromo-3-chloropropane	17.8	---	5.00	ug/L	1	20.0	ND	89	62 - 128%	---	---	
1,2-Dibromoethane (EDB)	19.8	---	1.00	ug/L	1	20.0	ND	99	77 - 121%	---	---	

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120511 - EPA 5030B												
Water												
Matrix Spike (0120511-MS1)		Prepared: 12/14/20 20:00 Analyzed: 12/15/20 12:38										
QC Source Sample: EW-1 (A0L0311-18)												
Dibromomethane	23.0	---	1.00	ug/L	1	20.0	ND	115	79 - 123%	---	---	
1,2-Dichlorobenzene	20.7	---	0.500	ug/L	1	20.0	ND	103	80 - 120%	---	---	
1,3-Dichlorobenzene	20.8	---	0.500	ug/L	1	20.0	ND	104	80 - 120%	---	---	
1,4-Dichlorobenzene	20.6	---	0.500	ug/L	1	20.0	ND	103	79 - 120%	---	---	
Dichlorodifluoromethane	23.5	---	1.00	ug/L	1	20.0	ND	117	32 - 152%	---	---	
1,1-Dichloroethane	22.5	---	0.400	ug/L	1	20.0	ND	112	77 - 125%	---	---	
1,2-Dichloroethane (EDC)	23.2	---	0.400	ug/L	1	20.0	ND	116	73 - 128%	---	---	
1,1-Dichloroethene	23.0	---	0.400	ug/L	1	20.0	ND	115	71 - 131%	---	---	
cis-1,2-Dichloroethene	22.8	---	0.400	ug/L	1	20.0	1.61	106	78 - 123%	---	---	
trans-1,2-Dichloroethene	22.5	---	0.400	ug/L	1	20.0	ND	112	75 - 124%	---	---	
1,2-Dichloropropane	21.8	---	0.500	ug/L	1	20.0	ND	109	78 - 122%	---	---	
1,3-Dichloropropane	21.8	---	1.00	ug/L	1	20.0	ND	109	80 - 120%	---	---	
2,2-Dichloropropane	11.9	---	1.00	ug/L	1	20.0	ND	60	60 - 139%	---	---	Q-54c
1,1-Dichloropropene	21.1	---	1.00	ug/L	1	20.0	ND	106	79 - 125%	---	---	
cis-1,3-Dichloropropene	17.4	---	1.00	ug/L	1	20.0	ND	87	75 - 124%	---	---	
trans-1,3-Dichloropropene	19.6	---	1.00	ug/L	1	20.0	ND	98	73 - 127%	---	---	
Hexachlorobutadiene	19.9	---	5.00	ug/L	1	20.0	ND	99	66 - 134%	---	---	
Methylene chloride	21.3	---	10.0	ug/L	1	20.0	ND	107	74 - 124%	---	---	
1,1,1,2-Tetrachloroethane	22.8	---	0.400	ug/L	1	20.0	ND	114	78 - 124%	---	---	
1,1,2,2-Tetrachloroethane	23.6	---	0.500	ug/L	1	20.0	ND	118	71 - 121%	---	---	
Tetrachloroethene (PCE)	54.4	---	0.400	ug/L	1	20.0	32.2	111	74 - 129%	---	---	
1,2,3-Trichlorobenzene	20.2	---	2.00	ug/L	1	20.0	ND	101	69 - 129%	---	---	
1,2,4-Trichlorobenzene	18.1	---	2.00	ug/L	1	20.0	ND	91	69 - 130%	---	---	
1,1,1-Trichloroethane	22.3	---	0.400	ug/L	1	20.0	0.766	108	74 - 131%	---	---	
1,1,2-Trichloroethane	22.2	---	0.500	ug/L	1	20.0	ND	111	80 - 120%	---	---	
Trichloroethene (TCE)	29.0	---	0.400	ug/L	1	20.0	8.64	102	79 - 123%	---	---	
Trichlorofluoromethane	32.1	---	2.00	ug/L	1	20.0	ND	161	65 - 141%	---	---	Q-54b
1,2,3-Trichloropropane	20.7	---	1.00	ug/L	1	20.0	ND	104	73 - 122%	---	---	
Vinyl chloride	24.2	---	0.400	ug/L	1	20.0	ND	121	58 - 137%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>91 %</i>		<i>80-120 %</i>		<i>"</i>						

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120681 - EPA 5030B						Water						
Blank (0120681-BLK1)		Prepared: 12/18/20 07:35			Analyzed: 12/18/20 10:11							
EPA 8260D												
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromoform	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Methylene chloride	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---

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Lisa Domenighini, Client Services Manager



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120681 - EPA 5030B												
Water												
Blank (0120681-BLK1)	Prepared: 12/18/20 07:35 Analyzed: 12/18/20 10:11											
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
Surr: 1,4-Difluorobenzene (Surr)	Recovery:		102 %	Limits:	80-120 %	Dilution:		1x				
Toluene-d8 (Surr)			104 %	80-120 %				"				
4-Bromofluorobenzene (Surr)			103 %	80-120 %				"				

LCS (0120681-BS1)												
Prepared: 12/18/20 07:35 Analyzed: 12/18/20 09:09												
EPA 8260D												
Bromobenzene	20.6	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	---
Bromochloromethane	20.8	---	1.00	ug/L	1	20.0	---	104	80 - 120%	---	---	---
Bromodichloromethane	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	---
Bromoform	19.6	---	2.00	ug/L	1	20.0	---	98	80 - 120%	---	---	---
Bromomethane	21.8	---	5.00	ug/L	1	20.0	---	109	80 - 120%	---	---	---
Carbon tetrachloride	20.3	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	---
Chlorobenzene	20.1	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	---
Chloroethane	18.8	---	5.00	ug/L	1	20.0	---	94	80 - 120%	---	---	---
Chloroform	20.3	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	---
Chloromethane	21.0	---	5.00	ug/L	1	20.0	---	105	80 - 120%	---	---	---
2-Chlorotoluene	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	---
4-Chlorotoluene	20.7	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	---
Dibromochloromethane	20.5	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	---
1,2-Dibromo-3-chloropropane	17.7	---	5.00	ug/L	1	20.0	---	89	80 - 120%	---	---	---
1,2-Dibromoethane (EDB)	18.9	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	---
Dibromomethane	21.4	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	---
1,2-Dichlorobenzene	20.5	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	---

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Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Halogenated Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120681 - EPA 5030B												
Water												
LCS (0120681-BS1)	Prepared: 12/18/20 07:35 Analyzed: 12/18/20 09:09											
1,3-Dichlorobenzene	21.0	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,4-Dichlorobenzene	20.3	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
Dichlorodifluoromethane	16.8	---	1.00	ug/L	1	20.0	---	84	80 - 120%	---	---	
1,1-Dichloroethane	19.8	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	20.8	---	0.400	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,1-Dichloroethene	20.8	---	0.400	ug/L	1	20.0	---	104	80 - 120%	---	---	
cis-1,2-Dichloroethene	19.9	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
trans-1,2-Dichloroethene	20.3	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,2-Dichloropropane	20.1	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,3-Dichloropropane	20.8	---	1.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
2,2-Dichloropropane	20.8	---	1.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,1-Dichloropropene	20.0	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
cis-1,3-Dichloropropene	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
trans-1,3-Dichloropropene	20.9	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
Hexachlorobutadiene	21.7	---	5.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Methylene chloride	19.4	---	10.0	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	21.2	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	22.2	---	0.500	ug/L	1	20.0	---	111	80 - 120%	---	---	
Tetrachloroethene (PCE)	20.2	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,2,3-Trichlorobenzene	20.1	---	2.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,2,4-Trichlorobenzene	18.9	---	2.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
1,1,1-Trichloroethane	18.9	---	0.400	ug/L	1	20.0	---	94	80 - 120%	---	---	
1,1,2-Trichloroethane	21.3	---	0.500	ug/L	1	20.0	---	106	80 - 120%	---	---	
Trichloroethene (TCE)	18.5	---	0.400	ug/L	1	20.0	---	92	80 - 120%	---	---	
Trichlorofluoromethane	26.7	---	2.00	ug/L	1	20.0	---	133	80 - 120%	---	---	Q-56
1,2,3-Trichloropropane	20.6	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
Vinyl chloride	20.3	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr) Recovery: 99 % Limits: 80-120 % Dilution: 1x												
Toluene-d8 (Surr) 101 % 80-120 % "												
4-Bromofluorobenzene (Surr) 96 % 80-120 % "												



Apex Laboratories, LLC

6700 S.W. Sandburg Street
 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120372 - Method Prep: Aq						Water						
Blank (0120372-BLK1)		Prepared: 12/10/20 08:45 Analyzed: 12/10/20 11:24										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	---
LCS (0120372-BS1)		Prepared: 12/10/20 08:45 Analyzed: 12/10/20 11:26										
SM 4500-NH3 G												
Ammonia as N	1.98	---	0.0200	mg/L	1	2.00	---	99	87 - 116%	---	---	---

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 Tigard, OR 97223
 503-718-2323
 ORELAP ID: OR100062

Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120443 - Method Prep: Aq						Water						
Blank (0120443-BLK1)		Prepared: 12/11/20 12:31 Analyzed: 12/11/20 17:13										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	---
LCS (0120443-BS1)		Prepared: 12/11/20 12:31 Analyzed: 12/11/20 17:14										
SM 4500-NH3 G												
Ammonia as N	2.08	---	0.0200	mg/L	1	2.00	---	104	87 - 116%	---	---	---

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QUALITY CONTROL (QC) SAMPLE RESULTS

Ammonia by Gas Diffusion and Colorimetric Detection

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120444 - Method Prep: Aq						Water						
Blank (0120444-BLK1)		Prepared: 12/11/20 12:33 Analyzed: 12/11/20 17:17										
SM 4500-NH3 G												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	---
LCS (0120444-BS1)		Prepared: 12/11/20 12:33 Analyzed: 12/11/20 17:19										
SM 4500-NH3 G												
Ammonia as N	2.00	---	0.0200	mg/L	1	2.00	---	100	87 - 116%	---	---	---

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QUALITY CONTROL (QC) SAMPLE RESULTS

Anions by Ion Chromatography

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120376 - Method Prep: Aq						Water						
Blank (0120376-BLK1)		Prepared: 12/10/20 08:52		Analyzed: 12/10/20 10:38								
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
LCS (0120376-BS1)		Prepared: 12/10/20 08:52		Analyzed: 12/10/20 11:00								
EPA 300.0												
Nitrate-Nitrogen	2.07	---	0.250	mg/L	1	2.00	---	104	90 - 110%	---	---	---
Nitrite-Nitrogen	2.08	---	0.250	mg/L	1	2.00	---	104	90 - 110%	---	---	---
Duplicate (0120376-DUP1)		Prepared: 12/10/20 08:52		Analyzed: 12/10/20 14:57								
QC Source Sample: MW-6 (A0L0311-04)												
EPA 300.0												
Nitrate-Nitrogen	0.285	---	0.250	mg/L	1	---	0.315	---	---	10	5%	Q-05
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	---
Duplicate (0120376-DUP2)		Prepared: 12/10/20 08:52		Analyzed: 12/10/20 16:23								
QC Source Sample: MW-22i (A0L0311-06)												
EPA 300.0												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	5%	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	---
Matrix Spike (0120376-MS1)		Prepared: 12/10/20 08:52		Analyzed: 12/10/20 15:19								
QC Source Sample: MW-6 (A0L0311-04)												
EPA 300.0												
Nitrate-Nitrogen	2.85	---	0.312	mg/L	1	2.50	0.315	102	86 - 118%	---	---	---
Nitrite-Nitrogen	2.60	---	0.312	mg/L	1	2.50	ND	104	82 - 117%	---	---	---
Matrix Spike (0120376-MS2)		Prepared: 12/10/20 08:52		Analyzed: 12/10/20 16:45								
QC Source Sample: MW-22i (A0L0311-06)												
EPA 300.0												
Nitrate-Nitrogen	2.51	---	0.312	mg/L	1	2.50	ND	100	86 - 118%	---	---	---
Nitrite-Nitrogen	2.51	---	0.312	mg/L	1	2.50	ND	100	82 - 117%	---	---	---

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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120394 - Method Prep: Aq						Water						
Blank (0120394-BLK1)		Prepared: 12/10/20 11:47 Analyzed: 12/10/20 15:54										
SM 5310 C												
Total Organic Carbon	ND	---	1.00	mg/L	1	---	---	---	---	---	---	---
LCS (0120394-BS1)		Prepared: 12/10/20 11:47 Analyzed: 12/10/20 16:23										
SM 5310 C												
Total Organic Carbon	10.3	---	1.00	mg/L	1	10.0	---	103	90 - 114%	---	---	---

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SAMPLE PREPARATION INFORMATION

Halogenated Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0120473							
A0L0311-01	Water	EPA 8260D	12/09/20 08:06	12/14/20 11:02	5mL/5mL	5mL/5mL	1.00
A0L0311-02	Water	EPA 8260D	12/09/20 08:48	12/14/20 11:02	5mL/5mL	5mL/5mL	1.00
A0L0311-03	Water	EPA 8260D	12/09/20 08:48	12/14/20 11:02	5mL/5mL	5mL/5mL	1.00
A0L0311-08	Water	EPA 8260D	12/09/20 13:11	12/14/20 11:02	5mL/5mL	5mL/5mL	1.00
Batch: 0120511							
A0L0311-05	Water	EPA 8260D	12/09/20 10:52	12/14/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0311-06	Water	EPA 8260D	12/09/20 11:51	12/14/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0311-07	Water	EPA 8260D	12/09/20 12:31	12/14/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0311-09	Water	EPA 8260D	12/09/20 13:51	12/14/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0311-11	Water	EPA 8260D	12/09/20 08:10	12/14/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0311-12	Water	EPA 8260D	12/09/20 09:10	12/14/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0311-14	Water	EPA 8260D	12/09/20 11:10	12/14/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0311-15	Water	EPA 8260D	12/09/20 12:10	12/14/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0311-16	Water	EPA 8260D	12/09/20 13:00	12/14/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0311-17	Water	EPA 8260D	12/09/20 13:40	12/14/20 20:00	5mL/5mL	5mL/5mL	1.00
A0L0311-18	Water	EPA 8260D	12/09/20 14:40	12/14/20 20:00	5mL/5mL	5mL/5mL	1.00
Batch: 0120681							
A0L0311-01RE1	Water	EPA 8260D	12/09/20 08:06	12/18/20 08:33	5mL/5mL	5mL/5mL	1.00
A0L0311-04RE1	Water	EPA 8260D	12/09/20 10:02	12/18/20 08:33	5mL/5mL	5mL/5mL	1.00
A0L0311-10RE1	Water	EPA 8260D	12/09/20 14:31	12/18/20 08:33	5mL/5mL	5mL/5mL	1.00
A0L0311-13RE1	Water	EPA 8260D	12/09/20 10:20	12/18/20 08:33	5mL/5mL	5mL/5mL	1.00

Ammonia by Gas Diffusion and Colorimetric Detection

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0120372							
A0L0311-01RE1	Water	SM 4500-NH3 G	12/09/20 08:06	12/10/20 08:45	10mL/10mL	10mL/10mL	1.00
A0L0311-02RE1	Water	SM 4500-NH3 G	12/09/20 08:48	12/10/20 08:45	10mL/10mL	10mL/10mL	1.00
A0L0311-03RE1	Water	SM 4500-NH3 G	12/09/20 08:48	12/10/20 08:45	10mL/10mL	10mL/10mL	1.00
A0L0311-04	Water	SM 4500-NH3 G	12/09/20 10:02	12/10/20 08:45	10mL/10mL	10mL/10mL	1.00
A0L0311-05	Water	SM 4500-NH3 G	12/09/20 10:52	12/10/20 08:45	10mL/10mL	10mL/10mL	1.00
A0L0311-07	Water	SM 4500-NH3 G	12/09/20 12:31	12/10/20 08:45	10mL/10mL	10mL/10mL	1.00
A0L0311-08	Water	SM 4500-NH3 G	12/09/20 13:11	12/10/20 08:45	10mL/10mL	10mL/10mL	1.00
A0L0311-09	Water	SM 4500-NH3 G	12/09/20 13:51	12/10/20 08:45	10mL/10mL	10mL/10mL	1.00

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SAMPLE PREPARATION INFORMATION

Ammonia by Gas Diffusion and Colorimetric Detection

Prep: Method Prep: Aq					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
A0L0311-13RE1	Water	SM 4500-NH3 G	12/09/20 10:20	12/10/20 08:45	10mL/10mL	10mL/10mL	1.00
Batch: 0120443							
A0L0311-10RE2	Water	SM 4500-NH3 G	12/09/20 14:31	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0311-11RE1	Water	SM 4500-NH3 G	12/09/20 08:10	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0311-12RE1	Water	SM 4500-NH3 G	12/09/20 09:10	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0311-14RE1	Water	SM 4500-NH3 G	12/09/20 11:10	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0311-15RE1	Water	SM 4500-NH3 G	12/09/20 12:10	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0311-16RE1	Water	SM 4500-NH3 G	12/09/20 13:00	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0311-17RE1	Water	SM 4500-NH3 G	12/09/20 13:40	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
A0L0311-18RE1	Water	SM 4500-NH3 G	12/09/20 14:40	12/11/20 12:31	10mL/10mL	10mL/10mL	1.00
Batch: 0120444							
A0L0311-06RE1	Water	SM 4500-NH3 G	12/09/20 11:51	12/11/20 12:33	10mL/10mL	10mL/10mL	1.00

Anions by Ion Chromatography

Prep: Method Prep: Aq					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 0120376							
A0L0311-01RE1	Water	EPA 300.0	12/09/20 08:06	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-02	Water	EPA 300.0	12/09/20 08:48	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-02RE1	Water	EPA 300.0	12/09/20 08:48	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-03	Water	EPA 300.0	12/09/20 08:48	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-03RE1	Water	EPA 300.0	12/09/20 08:48	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-04	Water	EPA 300.0	12/09/20 10:02	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-05	Water	EPA 300.0	12/09/20 10:52	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-06	Water	EPA 300.0	12/09/20 11:51	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-07RE1	Water	EPA 300.0	12/09/20 12:31	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-08	Water	EPA 300.0	12/09/20 13:11	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-08RE1	Water	EPA 300.0	12/09/20 13:11	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-09	Water	EPA 300.0	12/09/20 13:51	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-10	Water	EPA 300.0	12/09/20 14:31	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-10RE1	Water	EPA 300.0	12/09/20 14:31	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-11	Water	EPA 300.0	12/09/20 08:10	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-12	Water	EPA 300.0	12/09/20 09:10	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-13RE1	Water	EPA 300.0	12/09/20 10:20	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-14	Water	EPA 300.0	12/09/20 11:10	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00

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SAMPLE PREPARATION INFORMATION

Anions by Ion Chromatography

<u>Prep: Method Prep: Aq</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
A0L0311-15	Water	EPA 300.0	12/09/20 12:10	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-16	Water	EPA 300.0	12/09/20 13:00	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-16RE1	Water	EPA 300.0	12/09/20 13:00	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-17	Water	EPA 300.0	12/09/20 13:40	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-17RE1	Water	EPA 300.0	12/09/20 13:40	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00
A0L0311-18	Water	EPA 300.0	12/09/20 14:40	12/10/20 08:52	5mL/5mL	5mL/5mL	1.00

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

<u>Prep: Method Prep: Aq</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 0120394</u>							
A0L0311-02	Water	SM 5310 C	12/09/20 08:48	12/10/20 11:47	40mL/40mL	40mL/40mL	1.00
A0L0311-03	Water	SM 5310 C	12/09/20 08:48	12/10/20 11:47	40mL/40mL	40mL/40mL	1.00
A0L0311-08	Water	SM 5310 C	12/09/20 13:11	12/10/20 11:47	40mL/40mL	40mL/40mL	1.00
A0L0311-10	Water	SM 5310 C	12/09/20 14:31	12/10/20 11:47	40mL/40mL	40mL/40mL	1.00
A0L0311-13	Water	SM 5310 C	12/09/20 10:20	12/10/20 11:47	40mL/40mL	40mL/40mL	1.00



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QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

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- B** Analyte detected in an associated blank at a level above the MRL. (See Notes and Conventions below.)
- B-02** Analyte detected in an associated blank at a level between one-half the MRL and the MRL. (See Notes and Conventions below.)
- Q-05** Analyses are not controlled on RPD values from sample and duplicate concentrations that are below 5 times the reporting level.
- Q-42** Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)
- Q-54a** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +24%. The results are reported as Estimated Values.
- Q-54b** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by +35%. The results are reported as Estimated Values.
- Q-54c** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by -3%. The results are reported as Estimated Values.
- Q-55** Daily CCV/LCS recovery for this analyte was below the +/-20% criteria listed in EPA 8260, however there is adequate sensitivity to ensure detection at the reporting level.
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260
- T-02** This Batch QC sample was analyzed outside of the method specified 12 hour analysis window. Results are estimated.

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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported.
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

- Basis: Results for soil samples are generally reported on a 100% dry weight basis. The Result Basis is listed following the units as "dry", "wet", or "" (blank) designation.
 - "dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.
 - "wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
 - "" Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) are not included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.



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REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <u>Nustar-Vancouver</u> Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
---	--	---

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation)
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
<u>All reported analytes are included in Apex Laboratories' current ORELAP scope.</u>					

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Lisa Domenighini, Client Services Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Cascadia Associates
5820 SW Kelly Ave Unit B
Portland, OR 97239

Project: Nustar-Vancouver
Project Number: Nustar Van 4Q20 GWM
Project Manager: Stephanie Salisbury

Report ID: A0L0311 - 12 29 20 0744

CHAIN OF CUSTODY
APEX LABS
6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323
Company: Cascadia Associates Project Mgr: Stephanie Salisbury Project Name: Nustar VAN 4Q20
Address: 5820 Kelly Ave Portland Phone: Email: sbsalisbury@cascadiaassociates.com
Scrapped by: JWS/LW
Site Location: OR WA CA AK ID
SAMPLE ID: MW-9, MW-7, MW-7 Deep, MW-6, MW-21-105, MW-22, MW-10, MW-14, MW-2, MP-1
DATE, TIME, MATRIX, # OF CONTAINERS, NWTPH-CID, NWTPH-DX, NWTPH-GX, 8260 BTEX, 8260 RBDM VOCs, 8260 Halo VOCs, 8260 VOCs Full List, 8270 SIM PAHs, 8270 Semi-Volat Full List, 8082 PCBs, 8081 Pest, RCRA Metals (8), Priority Metals (13), AL, Sn, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mn, Ni, Mo, Ni, K, Se, Ag, Na, Ti, Zn, TOTAL DISS. TCLP, TCLP Metals (8), NO2/NO3, NH3, TOC, PSE-175, Archive

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Handwritten signature of Lisa Domenighini

Lisa Domenighini, Client Services Manager



Cascadia Associates

5820 SW Kelly Ave Unit B

Portland, OR 97239

Project: Nustar-Vancouver

Project Number: Nustar Van 4Q20 GWM

Project Manager: Stephanie Salisbury

Report ID:

A0L0311 - 12 29 20 0744

APEX LABS
6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

CHAIN OF CUSTODY

Lab # A0L0311 COC 2 of 2

Company: <u>Cascadia</u>	Project Mgr: <u>Stephanie Salisbury</u>	Project Name: <u>Nustar Van 4Q20</u>	Project #:
Address: <u>5820 Kelly Ave</u>	Phone:	Email:	PO #:
Sampled by: <u>Lisa Sw</u>	ANALYSIS REQUEST		
Site Location: OR <u>WA</u> CA	LAB ID #	DATE	TIME
AK ID	MATRIX	# OF CONTAINERS	NWTPH-CD
SAMPLE ID	1 Day	2 Day	3 Day
MW-23i	129	810	910
MW-25i			
MW-26			1020
MW-18i			1110
MW-20i			1210
MW-16			1300
MW-21-40			1370
EW-1			1740
Trip Blank			

SPECIAL INSTRUCTIONS:
* Ethane, ethane, methane by PSK-175
H - hold for project mgr.

RELINQUISHED BY:	Signature: <u>[Signature]</u>	Date: <u>12-9-20</u>	RECEIVED BY:	Signature: <u>[Signature]</u>	Date:
Printed Name: <u>Jon Wetherford</u>	Time: <u>1615</u>	Printed Name:	Printed Name:	Time:	
Company: <u>Cascadia Assoc.</u>	Company: <u>Apex Labs</u>	Company:	Company:		



Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: Nustar-Vancouver Project Number: Nustar Van 4Q20 GWM Project Manager: Stephanie Salisbury	Report ID: A0L0311 - 12 29 20 0744
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APEX LABS COOLER RECEIPT FORM

Client: Cascadia Asc. Element WO#: A0 L0311

Project/Project #: Nustar Van. 4Q20

Delivery Info:
Date/time received: 12-9-2020 @ 1615 By: MK
Delivered by: Apex Client ESS FedEx UPS Swift Senvoy SDS Other

Cooler Inspection Date/time inspected: 12-9-2020 @ 1715 By: MK
Chain of Custody included? Yes No Custody seals? Yes No
Signed/dated by client? Yes No
Signed/dated by Apex? Yes No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>2.3</u>	<u>1.4</u>					
Received on ice? (Y/N)	<u>Y</u>	<u>Y</u>					
Temp. blanks? (Y/N)	<u>Y</u>	<u>Y</u>					
Ice type: (Gel/Real/Other) ^{MK}	<u>Real</u>	<u>Real</u>					
Condition:	<u>good</u>	<u>good</u>					

Cooler out of temp? (Y/N) Possible reason why: _____
If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA
Out of temperature samples form initiated? Yes/No/NA

Samples Inspection: Date/time inspected: 12/9/20 @ 17:45 By: MK
All samples intact? Yes No Comments: _____

Bottle labels/COCs agree? Yes No Comments: Don MW-6 labels read 12/3-

COC/container discrepancies form initiated? Yes No
Containers/volumes received appropriate for analysis? Yes No Comments: _____

Do VOA vials have visible headspace? Yes No NA
Comments: 15 vials have HS on MW-7 DUP

Water samples: pH checked: Yes No NA pH appropriate? Yes No NA
Comments: _____

Additional information: TB# 2492

Labeled by: LS Witness: [Signature] Cooler Inspected by: [Signature] See Project Contact Form: Y

Lisa Domenighini

December 28, 2020

Apex Laboratories
ATTN: Lisa Domenighini
6700 S.W. Sandburg St.
Tigard, OR 97223



LA Cert #04140
EPA Methods TO3, TO14A, TO15, 25C/3C,
RSK-175

TX Cert T104704450-14-6
EPA Methods TO14A, TO15

UT Cert CA0133332015-3
EPA Methods TO3, TO14A, TO15, RSK-175

LABORATORY TEST RESULTS

Project Reference: A0L0311
Lab Number: L121101-01/05

Enclosed are results for sample(s) received 12/11/20 by Air Technology Laboratories. Sample was received intact and chilled to 3° C. Analyses were performed according to specifications on the chain of custody provided with the sample(s).

Report Narrative:

- Unless otherwise noted in the report, sample analyses were performed within method performance criteria and meet all requirements of the TNI Standards.
- The enclosed results relate only to the sample(s).

ATL appreciates the opportunity to provide testing services to your company. If you have any questions regarding these results, please call me at (626) 964-4032.

Sincerely,

A handwritten signature in blue ink, appearing to read "Mark Johnson".

Mark Johnson
Operations Manager
MJohnson@AirTechLabs.com

Note: The cover letter is an integral part of this analytical report.

SUBCONTRACT ORDER

Apex Laboratories

A0L0311

ET

L/21101-81/05

SENDING LABORATORY:

Apex Laboratories
6700 S.W. Sandburg Street
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 336-0745
Project Manager: Lisa Domenighini

RECEIVING LABORATORY:

Air Technology Laboratories, Inc
18501 E. Gale Ave Suite 130
City of Industry, CA 91748
Phone : (626) 964-4032
Fax: (626) 964-5832

Sample Name: MW-7 **Water** **Sampled: 12/09/20 08:48** (A0L0311-02)

61

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	12/22/20 17:00	12/23/20 08:48	
<i>Containers Supplied:</i>			
(F)40 mL VOA - HCL			
(G)40 mL VOA - HCL			

Sample Name: MW-7 DUP **Water** **Sampled: 12/09/20 08:48** (A0L0311-03)

62

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	12/22/20 17:00	12/23/20 08:48	
<i>Containers Supplied:</i>			
(F)40 mL VOA - HCL			
(G)40 mL VOA - HCL			

Sample Name: MW-14 **Water** **Sampled: 12/09/20 13:11** (A0L0311-08)

63

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	12/22/20 17:00	12/23/20 13:11	
<i>Containers Supplied:</i>			
(F)40 mL VOA - HCL			
(G)40 mL VOA - HCL			


Sample Name: MP-1 **Water** **Sampled: 12/09/20 14:31** (A0L0311-10)

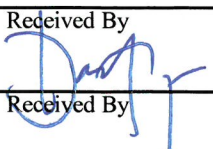
64

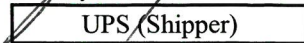
Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	12/22/20 17:00	12/23/20 14:31	
<i>Containers Supplied:</i>			
(F)40 mL VOA - HCL			
(G)40 mL VOA - HCL			

Standard TAT

3°C

Released By:  Date: 12/10/20

Received By:  Date: 12/10/20

Released By:  Date: _____

Received By: _____ Date: _____

UPS (Shipper)

UPS (Shipper)

SUBCONTRACT ORDER

Apex Laboratories

A0L0311

L121101-01/05

Sample Name: MW-26 Water Sampled: 12/09/20 10:20 (A0L0311-13)

4

Analysis	Due	Expires	Comments
RSK 175 Preserved (Meth, Eth, Eth) (Sub)	12/22/20 17:00	12/23/20 10:20	
Containers Supplied: (F)40 mL VOA - HCL (G)40 mL VOA - HCL			

Standard TAT

3°C

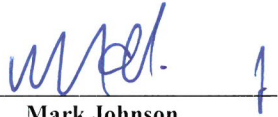
Released By: *[Signature]* Date: 12/10/20
 Received By: UPS (Shipper)
 Released By: UPS (Shipper) Date: 12/11/20
 Received By: *[Signature]* Date: 12/11/20

Client: Apex Laboratories
Attn: Lisa Domenighini
Project Name: NA
Project No.: A0L0311
Date Received: 12/11/20
Matrix: Water
Reporting Units: ug/L

RSK175

Lab No.:	L121101-01	L121101-02	L121101-03	L121101-04				
Client Sample I.D.:	MW-7 (A0L0311-02)	MW-7 DUP (A0L0311-03)	MW-14 (A0L0311-08)	MP-1 (A0L0311-10)				
Date/Time Sampled:	12/9/20 8:48	12/9/20 8:48	12/9/20 13:11	12/9/20 14:31				
Date/Time Analyzed:	12/21/20 12:29	12/21/20 12:40	12/21/20 12:53	12/21/20 13:06				
QC Batch No.:	201221GC8A1	201221GC8A1	201221GC8A1	201221GC8A1				
Analyst Initials:	CM	CM	CM	CM				
Dilution Factor:	1.0	1.0	1.0	1.0				
ANALYTE	Result ug/L	RL ug/L	Result ug/L	RL ug/L	Result ug/L	RL ug/L	Result ug/L	RL ug/L
Ethene	ND	1.0	ND	1.0	ND	1.0	ND	1.0
Ethane	1.2	1.0	1.1	1.0	ND	1.0	ND	1.0
Methane	2,700	1.0	2,800	1.0	8.0	1.0	8.5	1.0

ND = Not Detected (below RL)
 RL = Reporting Limit

Reviewed/Approved By: 
 Mark Johnson
 Operations Manager

Date 12/21/20

The cover letter is an integral part of this analytical report



Client: Apex Laboratories
Attn: Lisa Domenighini
Project Name: NA
Project No.: A0L0311
Date Received: 12/11/20
Matrix: Water
Reporting Units: ug/L

RSK175

Lab No.:	L121101-05					
Client Sample I.D.:	MW-26 (A0L0311-13)					
Date/Time Sampled:	12/9/20 10:20					
Date/Time Analyzed:	12/21/20 13:17					
QC Batch No.:	201221GC8A1					
Analyst Initials:	CM					
Dilution Factor:	1.0					
ANALYTE	Result ug/L	RL ug/L				
Ethene	ND	1.0				
Ethane	ND	1.0				
Methane	410	1.0				

ND = Not Detected (below RL)
 RL = Reporting Limit

Reviewed/Approved By: 
 Mark Johnson
 Operations Manager

Date 12/28/20

The cover letter is an integral part of this analytical report



QC Batch No: 201221GC8A1

Matrix: Water

Reporting Units: ug/L

RSK 175
LABORATORY CONTROL SAMPLE SUMMARY

Lab No.:	METHOD BLANK			LCS		LCSD					
Date/Time Analyzed:	12/21/20 8:53			12/21/20 9:07		12/21/20 9:19					
Analyst Initials:	CM			CM		CM					
Dilution Factor:	1.1			1.0		1.0		Limits			
ANALYTE	Result ug/L	RL ug/L	SPIKE AMT. ug/L	Result ug/L	% Rec.	Result ug/L	% Rec.	RPD %	Low %Rec	High %Rec	Max. RPD
Ethene	ND	1.0	1,150	1,330	116	1,240	108	7.0	70	130	30
Ethane	ND	1.0	1,200	1,400	114	1,360	111	3.2	70	130	30
Methane	ND	1.0	650	715	109	698	107	2.5	70	130	30

ND = Not Detected (below RL)

RL = Reporting Limit

Reviewed/Approved By: Mark Johnson
Mark Johnson
Operations Manager

Date: 12/28/20

The cover letter is an integral part of this analytical report



12/31/2020

Ms. Lindsay Wallis

Cascadia Associates, LLC

5820 SW Kelly Ave

Unit B

Portland OR 97239

Project Name: Nustar Vancouver O&M

Project #:

Workorder #: 2012440

Dear Ms. Lindsay Wallis

The following report includes the data for the above referenced project for sample(s) received on 12/16/2020 at Eurofins Air Toxics LLC.

The data and associated QC analyzed by TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics LLC. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Alexandra Winslow at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Alexandra Winslow

Project Manager

WORK ORDER #: 2012440

Work Order Summary

CLIENT:	Ms. Lindsay Wallis Cascadia Associates, LLC 5820 SW Kelly Ave Unit B Portland, OR 97239	BILL TO:	Ms. Lindsay Wallis Cascadia Associates, LLC 5820 SW Kelly Ave Unit B Portland, OR 97239
PHONE:	(503)906-6577	P.O. #	0060-002-004
FAX:	(503)906-6567	PROJECT #	Nustar Vancouver O&M
DATE RECEIVED:	12/16/2020	CONTACT:	Alexandra Winslow
DATE COMPLETED:	12/31/2020		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	SVE-South-PostCarbon-121420	TO-15	6.5 "Hg	4.9 psi
02A	SVE-South-PreCarbon-121420	TO-15	5.7 "Hg	4.9 psi
03A	Lab Blank	TO-15	NA	NA
04A	CCV	TO-15	NA	NA
05A	LCS	TO-15	NA	NA
05AA	LCSD	TO-15	NA	NA

CERTIFIED BY: 

 Technical Director

DATE: 12/31/20

Certification numbers: AZ Licensure AZ0775, FL NELAP – E87680, LA NELAP – 02089, NH NELAP - 209220, NJ NELAP - CA016, NY NELAP - 11291, TX NELAP - T104704434-20-16, UT NELAP – CA009332020-12, VA NELAP - 10615, WA NELAP - C935

Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)

Accreditation number: CA300005-014, Effective date: 10/18/2020, Expiration date: 10/17/2021.

Eurofins Air Toxics, LLC certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, LLC.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
 (916) 985-1000 . (800) 985-5955 . FAX (916) 351-8279

LABORATORY NARRATIVE
EPA Method TO-15
Cascadia Associates, LLC
Workorder# 2012440

Two 6 Liter Summa Canister samples were received on December 16, 2020. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

Dilution was performed on sample SVE-South-PreCarbon-121420 due to the presence of high level target species.

Definition of Data Qualifying Flags

Ten qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

M - Reported value may be biased due to apparent matrix interferences.

CN - See Case Narrative.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

**Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN**

Client Sample ID: SVE-South-PostCarbon-121420

Lab ID#: 2012440-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1-Dichloroethane	0.51	0.57	2.1	2.3
cis-1,2-Dichloroethene	0.68	47	2.7	180
1,1,1-Trichloroethane	0.51	1.6	2.8	8.9

Client Sample ID: SVE-South-PreCarbon-121420

Lab ID#: 2012440-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Methylene Chloride	21	47	72	160
cis-1,2-Dichloroethene	21	100	82	400
1,1,1-Trichloroethane	15	19	84	100
Trichloroethene	21	240	110	1300
Toluene	21	34	78	130
Tetrachloroethene	21	4800	140	32000



Air Toxics

Client Sample ID: SVE-South-PostCarbon-121420

Lab ID#: 2012440-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3122126	Date of Collection:	12/14/20 8:25:00 AM
Dil. Factor:	1.70	Date of Analysis:	12/22/20 01:31 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.68	Not Detected	3.4	Not Detected
Freon 114	0.68	Not Detected	4.8	Not Detected
Chloromethane	8.5	Not Detected	18	Not Detected
Vinyl Chloride	0.68	Not Detected	1.7	Not Detected
Bromomethane	1.4	Not Detected	5.3	Not Detected
Chloroethane	1.4	Not Detected	3.6	Not Detected
Freon 11	0.68	Not Detected	3.8	Not Detected
Freon 113	0.68	Not Detected	5.2	Not Detected
1,1-Dichloroethene	1.4	Not Detected	5.4	Not Detected
Acetone	8.5	Not Detected	20	Not Detected
Carbon Disulfide	3.4	Not Detected	10	Not Detected
Methylene Chloride	0.68	Not Detected	2.4	Not Detected
trans-1,2-Dichloroethene	0.68	Not Detected	2.7	Not Detected
1,1-Dichloroethane	0.51	0.57	2.1	2.3
2-Butanone (Methyl Ethyl Ketone)	1.4	Not Detected	4.0	Not Detected
cis-1,2-Dichloroethene	0.68	47	2.7	180
Chloroform	0.51	Not Detected	2.5	Not Detected
1,1,1-Trichloroethane	0.51	1.6	2.8	8.9
Carbon Tetrachloride	1.4	Not Detected	8.6	Not Detected
Benzene	0.68	Not Detected	2.2	Not Detected
1,2-Dichloroethane	0.68	Not Detected	2.8	Not Detected
Trichloroethene	0.68	Not Detected	3.6	Not Detected
1,2-Dichloropropane	0.68	Not Detected	3.1	Not Detected
Bromodichloromethane	0.51	Not Detected	3.4	Not Detected
cis-1,3-Dichloropropene	0.68	Not Detected	3.1	Not Detected
4-Methyl-2-pentanone	0.68	Not Detected	2.8	Not Detected
Toluene	0.68	Not Detected	2.6	Not Detected
trans-1,3-Dichloropropene	0.68	Not Detected	3.1	Not Detected
1,1,2-Trichloroethane	0.68	Not Detected	3.7	Not Detected
Tetrachloroethene	0.68	Not Detected	4.6	Not Detected
2-Hexanone	0.68	Not Detected	2.8	Not Detected
Dibromochloromethane	0.68	Not Detected	5.8	Not Detected
1,2-Dibromoethane (EDB)	1.4	Not Detected	10	Not Detected
Chlorobenzene	0.51	Not Detected	2.3	Not Detected
Ethyl Benzene	0.68	Not Detected	3.0	Not Detected
m,p-Xylene	1.4	Not Detected	5.9	Not Detected
o-Xylene	0.68	Not Detected	3.0	Not Detected
Styrene	0.68	Not Detected	2.9	Not Detected
Bromoform	0.68	Not Detected	7.0	Not Detected
1,1,2,2-Tetrachloroethane	0.68	Not Detected	4.7	Not Detected
4-Ethyltoluene	0.68	Not Detected	3.3	Not Detected
1,3,5-Trimethylbenzene	0.68	Not Detected	3.3	Not Detected



Air Toxics

Client Sample ID: SVE-South-PostCarbon-121420

Lab ID#: 2012440-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3122126	Date of Collection:	12/14/20 8:25:00 AM
Dil. Factor:	1.70	Date of Analysis:	12/22/20 01:31 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,2,4-Trimethylbenzene	1.4	Not Detected	6.7	Not Detected
1,3-Dichlorobenzene	0.68	Not Detected	4.1	Not Detected
1,4-Dichlorobenzene	0.68	Not Detected	4.1	Not Detected
alpha-Chlorotoluene	1.4	Not Detected	7.0	Not Detected
1,2-Dichlorobenzene	0.68	Not Detected	4.1	Not Detected
1,2,4-Trichlorobenzene	3.4	Not Detected	25	Not Detected
Hexachlorobutadiene	3.4	Not Detected	36	Not Detected
Vinyl Acetate	1.4	Not Detected	4.8	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	88	70-130
4-Bromofluorobenzene	104	70-130



Air Toxics

Client Sample ID: SVE-South-PreCarbon-121420

Lab ID#: 2012440-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3122127	Date of Collection:	12/14/20 8:38:00 AM
Dil. Factor:	51.5	Date of Analysis:	12/22/20 02:00 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	21	Not Detected	100	Not Detected
Freon 114	21	Not Detected	140	Not Detected
Chloromethane	260	Not Detected	530	Not Detected
Vinyl Chloride	21	Not Detected	53	Not Detected
Bromomethane	41	Not Detected	160	Not Detected
Chloroethane	41	Not Detected	110	Not Detected
Freon 11	21	Not Detected	120	Not Detected
Freon 113	21	Not Detected	160	Not Detected
1,1-Dichloroethene	41	Not Detected	160	Not Detected
Acetone	260	Not Detected	610	Not Detected
Carbon Disulfide	100	Not Detected	320	Not Detected
Methylene Chloride	21	47	72	160
trans-1,2-Dichloroethene	21	Not Detected	82	Not Detected
1,1-Dichloroethane	15	Not Detected	62	Not Detected
2-Butanone (Methyl Ethyl Ketone)	41	Not Detected	120	Not Detected
cis-1,2-Dichloroethene	21	100	82	400
Chloroform	15	Not Detected	75	Not Detected
1,1,1-Trichloroethane	15	19	84	100
Carbon Tetrachloride	41	Not Detected	260	Not Detected
Benzene	21	Not Detected	66	Not Detected
1,2-Dichloroethane	21	Not Detected	83	Not Detected
Trichloroethene	21	240	110	1300
1,2-Dichloropropane	21	Not Detected	95	Not Detected
Bromodichloromethane	15	Not Detected	100	Not Detected
cis-1,3-Dichloropropene	21	Not Detected	93	Not Detected
4-Methyl-2-pentanone	21	Not Detected	84	Not Detected
Toluene	21	34	78	130
trans-1,3-Dichloropropene	21	Not Detected	93	Not Detected
1,1,2-Trichloroethane	21	Not Detected	110	Not Detected
Tetrachloroethene	21	4800	140	32000
2-Hexanone	21	Not Detected	84	Not Detected
Dibromochloromethane	21	Not Detected	180	Not Detected
1,2-Dibromoethane (EDB)	41	Not Detected	320	Not Detected
Chlorobenzene	15	Not Detected	71	Not Detected
Ethyl Benzene	21	Not Detected	89	Not Detected
m,p-Xylene	41	Not Detected	180	Not Detected
o-Xylene	21	Not Detected	89	Not Detected
Styrene	21	Not Detected	88	Not Detected
Bromoform	21	Not Detected	210	Not Detected
1,1,2,2-Tetrachloroethane	21	Not Detected	140	Not Detected
4-Ethyltoluene	21	Not Detected	100	Not Detected
1,3,5-Trimethylbenzene	21	Not Detected	100	Not Detected



Air Toxics

Client Sample ID: SVE-South-PreCarbon-121420

Lab ID#: 2012440-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3122127	Date of Collection:	12/14/20 8:38:00 AM
Dil. Factor:	51.5	Date of Analysis:	12/22/20 02:00 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,2,4-Trimethylbenzene	41	Not Detected	200	Not Detected
1,3-Dichlorobenzene	21	Not Detected	120	Not Detected
1,4-Dichlorobenzene	21	Not Detected	120	Not Detected
alpha-Chlorotoluene	41	Not Detected	210	Not Detected
1,2-Dichlorobenzene	21	Not Detected	120	Not Detected
1,2,4-Trichlorobenzene	100	Not Detected	760	Not Detected
Hexachlorobutadiene	100	Not Detected	1100	Not Detected
Vinyl Acetate	41	Not Detected	140	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	90	70-130
4-Bromofluorobenzene	102	70-130



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 2012440-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3122106h	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/21/20 12:07 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.40	Not Detected	2.0	Not Detected
Freon 114	0.40	Not Detected	2.8	Not Detected
Chloromethane	5.0	Not Detected	10	Not Detected
Vinyl Chloride	0.40	Not Detected	1.0	Not Detected
Bromomethane	0.80	Not Detected	3.1	Not Detected
Chloroethane	0.80	Not Detected	2.1	Not Detected
Freon 11	0.40	Not Detected	2.2	Not Detected
Freon 113	0.40	Not Detected	3.1	Not Detected
1,1-Dichloroethene	0.80	Not Detected	3.2	Not Detected
Acetone	5.0	Not Detected	12	Not Detected
Carbon Disulfide	2.0	Not Detected	6.2	Not Detected
Methylene Chloride	0.40	Not Detected	1.4	Not Detected
trans-1,2-Dichloroethene	0.40	Not Detected	1.6	Not Detected
1,1-Dichloroethane	0.30	Not Detected	1.2	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.80	Not Detected	2.4	Not Detected
cis-1,2-Dichloroethene	0.40	Not Detected	1.6	Not Detected
Chloroform	0.30	Not Detected	1.5	Not Detected
1,1,1-Trichloroethane	0.30	Not Detected	1.6	Not Detected
Carbon Tetrachloride	0.80	Not Detected	5.0	Not Detected
Benzene	0.40	Not Detected	1.3	Not Detected
1,2-Dichloroethane	0.40	Not Detected	1.6	Not Detected
Trichloroethene	0.40	Not Detected	2.1	Not Detected
1,2-Dichloropropane	0.40	Not Detected	1.8	Not Detected
Bromodichloromethane	0.30	Not Detected	2.0	Not Detected
cis-1,3-Dichloropropene	0.40	Not Detected	1.8	Not Detected
4-Methyl-2-pentanone	0.40	Not Detected	1.6	Not Detected
Toluene	0.40	Not Detected	1.5	Not Detected
trans-1,3-Dichloropropene	0.40	Not Detected	1.8	Not Detected
1,1,2-Trichloroethane	0.40	Not Detected	2.2	Not Detected
Tetrachloroethene	0.40	Not Detected	2.7	Not Detected
2-Hexanone	0.40	Not Detected	1.6	Not Detected
Dibromochloromethane	0.40	Not Detected	3.4	Not Detected
1,2-Dibromoethane (EDB)	0.80	Not Detected	6.1	Not Detected
Chlorobenzene	0.30	Not Detected	1.4	Not Detected
Ethyl Benzene	0.40	Not Detected	1.7	Not Detected
m,p-Xylene	0.80	Not Detected	3.5	Not Detected
o-Xylene	0.40	Not Detected	1.7	Not Detected
Styrene	0.40	Not Detected	1.7	Not Detected
Bromoform	0.40	Not Detected	4.1	Not Detected
1,1,2,2-Tetrachloroethane	0.40	Not Detected	2.7	Not Detected
4-Ethyltoluene	0.40	Not Detected	2.0	Not Detected
1,3,5-Trimethylbenzene	0.40	Not Detected	2.0	Not Detected

Client Sample ID: Lab Blank

Lab ID#: 2012440-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3122106h	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/21/20 12:07 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,2,4-Trimethylbenzene	0.80	Not Detected	3.9	Not Detected
1,3-Dichlorobenzene	0.40	Not Detected	2.4	Not Detected
1,4-Dichlorobenzene	0.40	Not Detected	2.4	Not Detected
alpha-Chlorotoluene	0.80	Not Detected	4.1	Not Detected
1,2-Dichlorobenzene	0.40	Not Detected	2.4	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	21	Not Detected
Vinyl Acetate	0.80	Not Detected	2.8	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	91	70-130
4-Bromofluorobenzene	103	70-130

Client Sample ID: CCV

Lab ID#: 2012440-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3122102	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/21/20 10:16 AM

Compound	%Recovery
Freon 12	94
Freon 114	98
Chloromethane	73
Vinyl Chloride	79
Bromomethane	88
Chloroethane	82
Freon 11	98
Freon 113	99
1,1-Dichloroethene	86
Acetone	82
Carbon Disulfide	86
Methylene Chloride	87
trans-1,2-Dichloroethene	90
1,1-Dichloroethane	91
2-Butanone (Methyl Ethyl Ketone)	89
cis-1,2-Dichloroethene	93
Chloroform	93
1,1,1-Trichloroethane	96
Carbon Tetrachloride	103
Benzene	92
1,2-Dichloroethane	95
Trichloroethene	98
1,2-Dichloropropane	94
Bromodichloromethane	95
cis-1,3-Dichloropropene	95
4-Methyl-2-pentanone	92
Toluene	93
trans-1,3-Dichloropropene	93
1,1,2-Trichloroethane	96
Tetrachloroethene	105
2-Hexanone	93
Dibromochloromethane	102
1,2-Dibromoethane (EDB)	98
Chlorobenzene	98
Ethyl Benzene	101
m,p-Xylene	99
o-Xylene	99
Styrene	97
Bromoform	107
1,1,2,2-Tetrachloroethane	94
4-Ethyltoluene	102
1,3,5-Trimethylbenzene	102

Client Sample ID: CCV

Lab ID#: 2012440-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3122102	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/21/20 10:16 AM

Compound	%Recovery
1,2,4-Trimethylbenzene	97
1,3-Dichlorobenzene	105
1,4-Dichlorobenzene	106
alpha-Chlorotoluene	96
1,2-Dichlorobenzene	106
1,2,4-Trichlorobenzene	108
Hexachlorobutadiene	112
Vinyl Acetate	96

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	92	70-130
4-Bromofluorobenzene	104	70-130

Client Sample ID: LCS

Lab ID#: 2012440-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3122103	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/21/20 10:43 AM

Compound	%Recovery	Method Limits
Freon 12	96	70-130
Freon 114	101	70-130
Chloromethane	72	70-130
Vinyl Chloride	79	70-130
Bromomethane	90	70-130
Chloroethane	86	70-130
Freon 11	99	70-130
Freon 113	101	70-130
1,1-Dichloroethene	91	70-130
Acetone	82	70-130
Carbon Disulfide	88	70-130
Methylene Chloride	86	70-130
trans-1,2-Dichloroethene	93	70-130
1,1-Dichloroethane	92	70-130
2-Butanone (Methyl Ethyl Ketone)	92	70-130
cis-1,2-Dichloroethene	98	70-130
Chloroform	94	70-130
1,1,1-Trichloroethane	96	70-130
Carbon Tetrachloride	106	70-130
Benzene	95	70-130
1,2-Dichloroethane	97	70-130
Trichloroethene	100	70-130
1,2-Dichloropropane	97	70-130
Bromodichloromethane	97	70-130
cis-1,3-Dichloropropene	99	70-130
4-Methyl-2-pentanone	95	70-130
Toluene	95	70-130
trans-1,3-Dichloropropene	94	70-130
1,1,2-Trichloroethane	98	70-130
Tetrachloroethene	106	70-130
2-Hexanone	96	70-130
Dibromochloromethane	103	70-130
1,2-Dibromoethane (EDB)	102	70-130
Chlorobenzene	100	70-130
Ethyl Benzene	103	70-130
m,p-Xylene	103	70-130
o-Xylene	100	70-130
Styrene	99	70-130
Bromoform	109	70-130
1,1,2,2-Tetrachloroethane	96	70-130
4-Ethyltoluene	105	70-130
1,3,5-Trimethylbenzene	104	70-130

Client Sample ID: LCS

Lab ID#: 2012440-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3122103	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/21/20 10:43 AM

Compound	%Recovery	Method Limits
1,2,4-Trimethylbenzene	100	70-130
1,3-Dichlorobenzene	106	70-130
1,4-Dichlorobenzene	108	70-130
alpha-Chlorotoluene	98	70-130
1,2-Dichlorobenzene	106	70-130
1,2,4-Trichlorobenzene	122	70-130
Hexachlorobutadiene	126	70-130
Vinyl Acetate	101	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130
1,2-Dichloroethane-d4	91	70-130
4-Bromofluorobenzene	104	70-130

Client Sample ID: LCSD

Lab ID#: 2012440-05AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3122104	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/21/20 11:11 AM

Compound	%Recovery	Method Limits
Freon 12	95	70-130
Freon 114	100	70-130
Chloromethane	74	70-130
Vinyl Chloride	80	70-130
Bromomethane	90	70-130
Chloroethane	84	70-130
Freon 11	98	70-130
Freon 113	101	70-130
1,1-Dichloroethene	91	70-130
Acetone	83	70-130
Carbon Disulfide	88	70-130
Methylene Chloride	85	70-130
trans-1,2-Dichloroethene	92	70-130
1,1-Dichloroethane	92	70-130
2-Butanone (Methyl Ethyl Ketone)	93	70-130
cis-1,2-Dichloroethene	96	70-130
Chloroform	95	70-130
1,1,1-Trichloroethane	95	70-130
Carbon Tetrachloride	106	70-130
Benzene	95	70-130
1,2-Dichloroethane	96	70-130
Trichloroethene	99	70-130
1,2-Dichloropropane	95	70-130
Bromodichloromethane	96	70-130
cis-1,3-Dichloropropene	98	70-130
4-Methyl-2-pentanone	95	70-130
Toluene	94	70-130
trans-1,3-Dichloropropene	95	70-130
1,1,2-Trichloroethane	98	70-130
Tetrachloroethene	108	70-130
2-Hexanone	95	70-130
Dibromochloromethane	104	70-130
1,2-Dibromoethane (EDB)	103	70-130
Chlorobenzene	101	70-130
Ethyl Benzene	104	70-130
m,p-Xylene	104	70-130
o-Xylene	102	70-130
Styrene	100	70-130
Bromoform	110	70-130
1,1,2,2-Tetrachloroethane	96	70-130
4-Ethyltoluene	106	70-130
1,3,5-Trimethylbenzene	104	70-130

Client Sample ID: LCSD

Lab ID#: 2012440-05AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3122104	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/21/20 11:11 AM

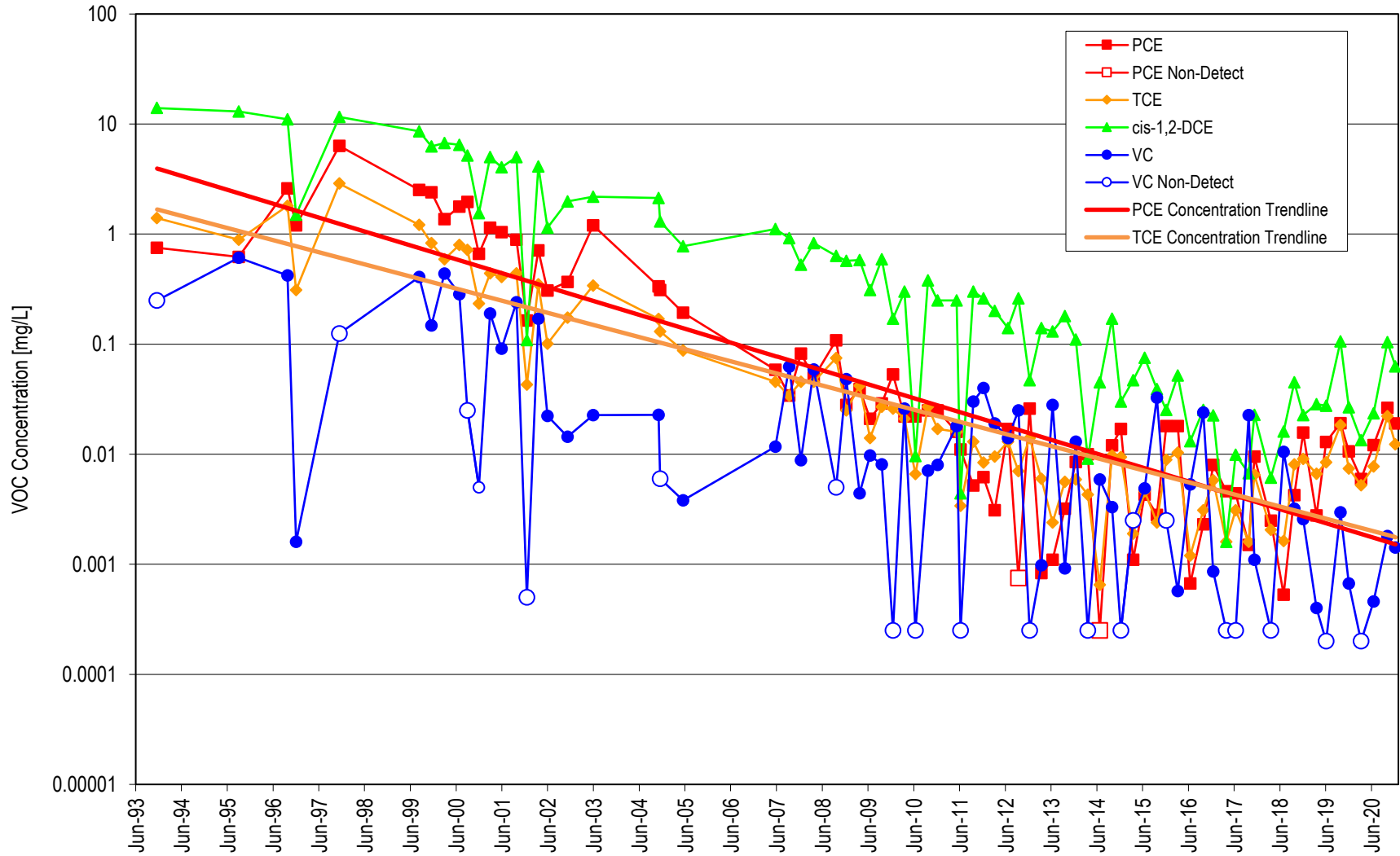
Compound	%Recovery	Method Limits
1,2,4-Trimethylbenzene	101	70-130
1,3-Dichlorobenzene	107	70-130
1,4-Dichlorobenzene	108	70-130
alpha-Chlorotoluene	99	70-130
1,2-Dichlorobenzene	106	70-130
1,2,4-Trichlorobenzene	124	70-130
Hexachlorobutadiene	129	70-130
Vinyl Acetate	101	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130
1,2-Dichloroethane-d4	91	70-130
4-Bromofluorobenzene	104	70-130

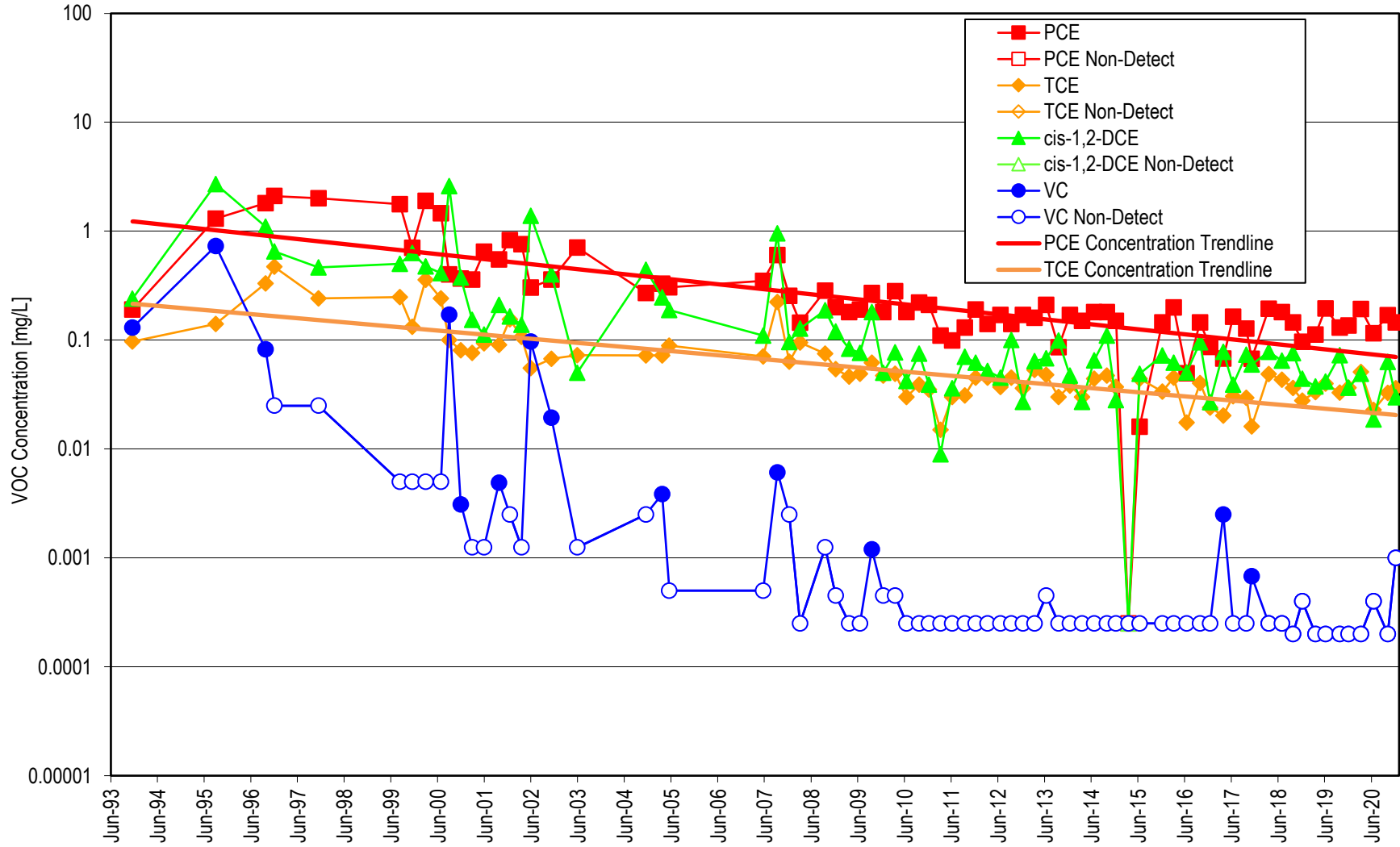
APPENDIX D
VOC CONCENTRATION TREND PLOTS

VOC Concentrations in MW-1



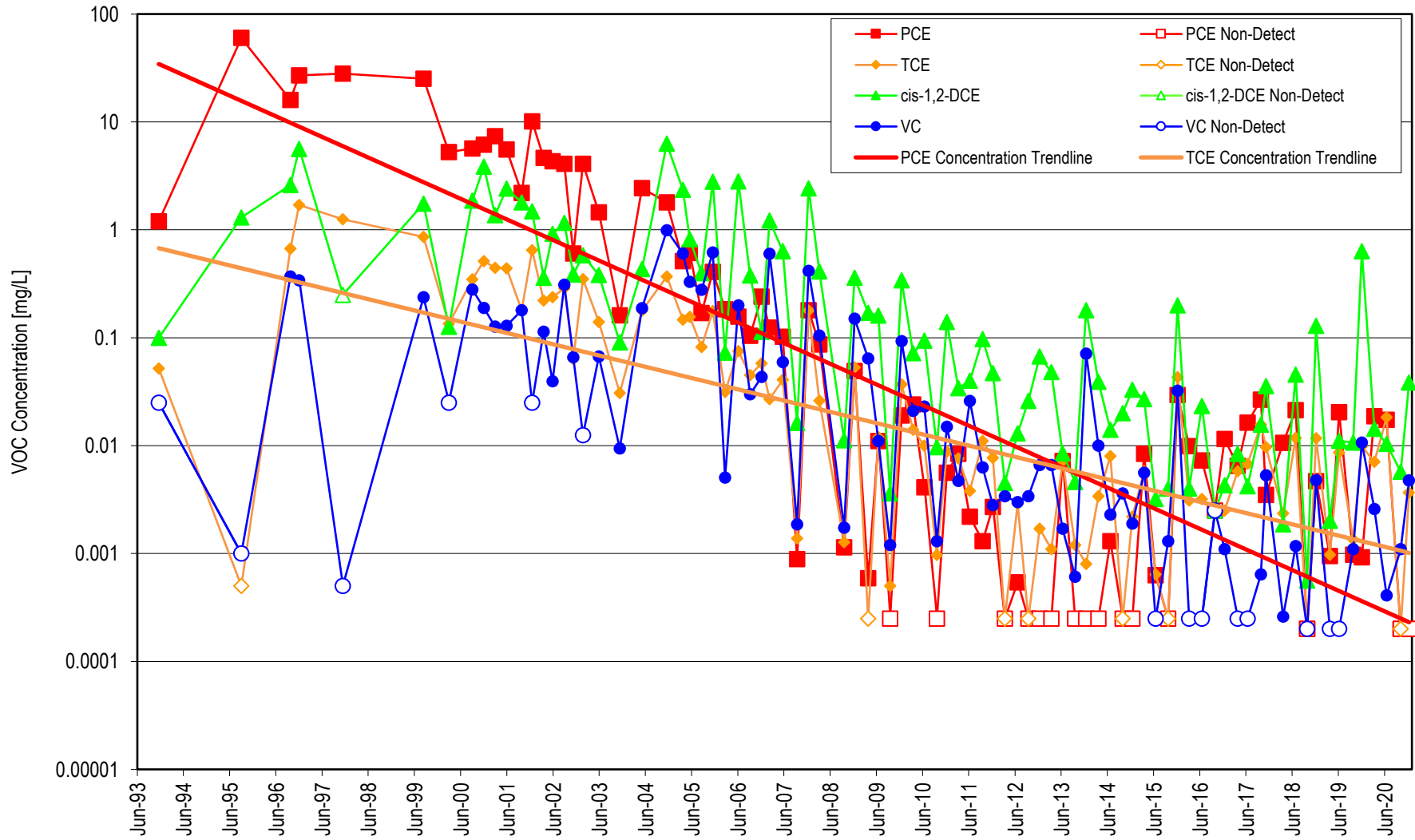
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-3



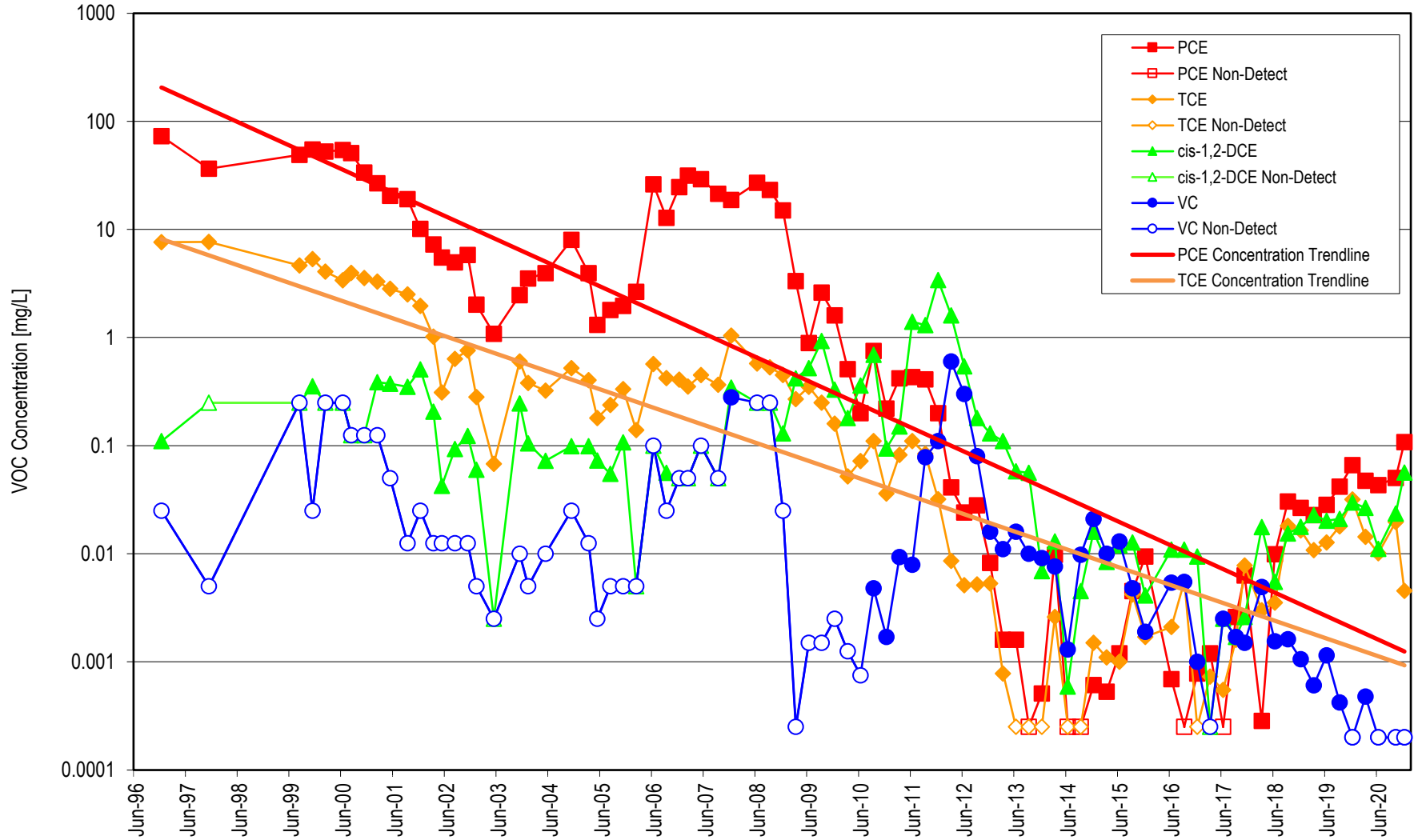
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-5



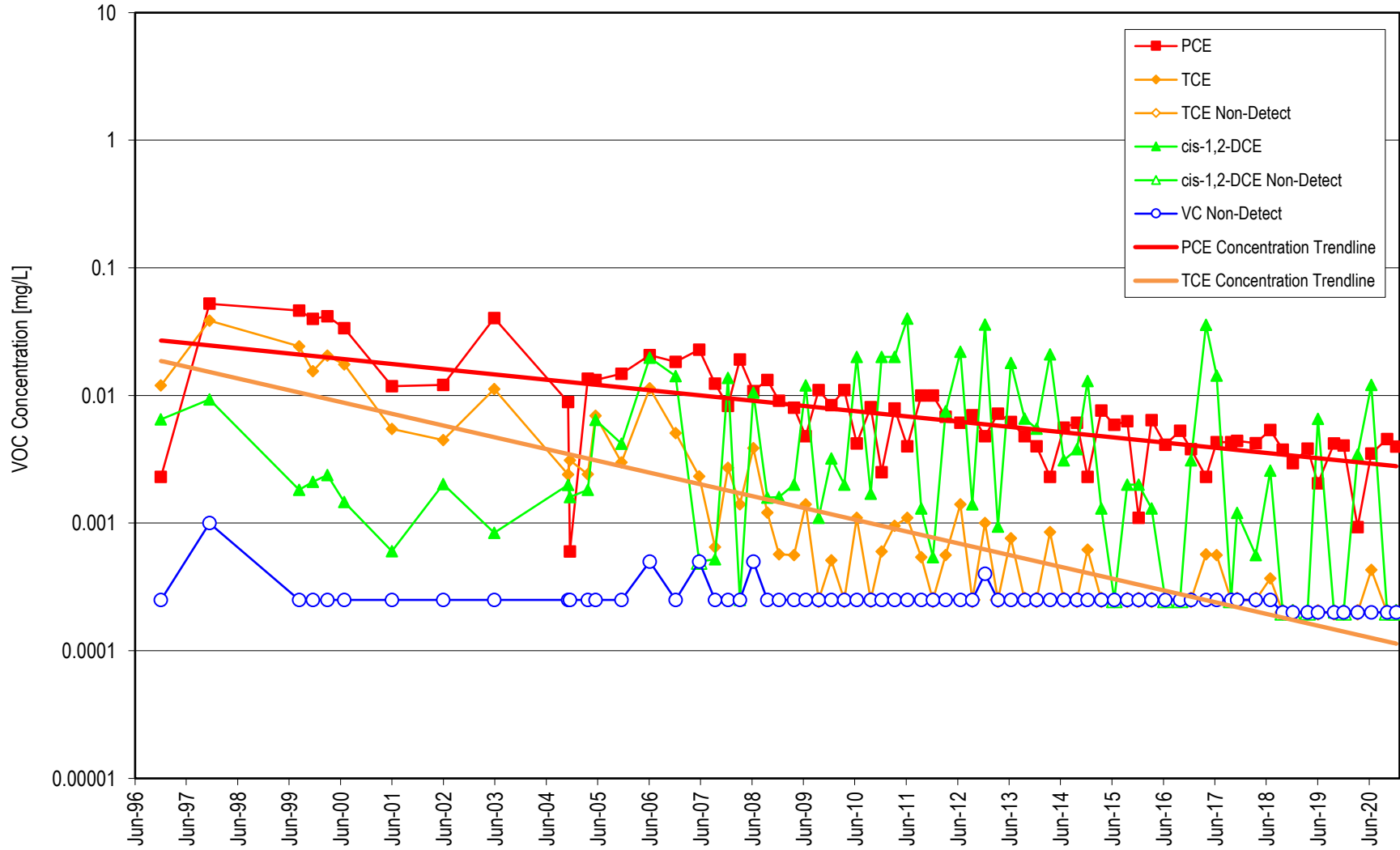
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-7



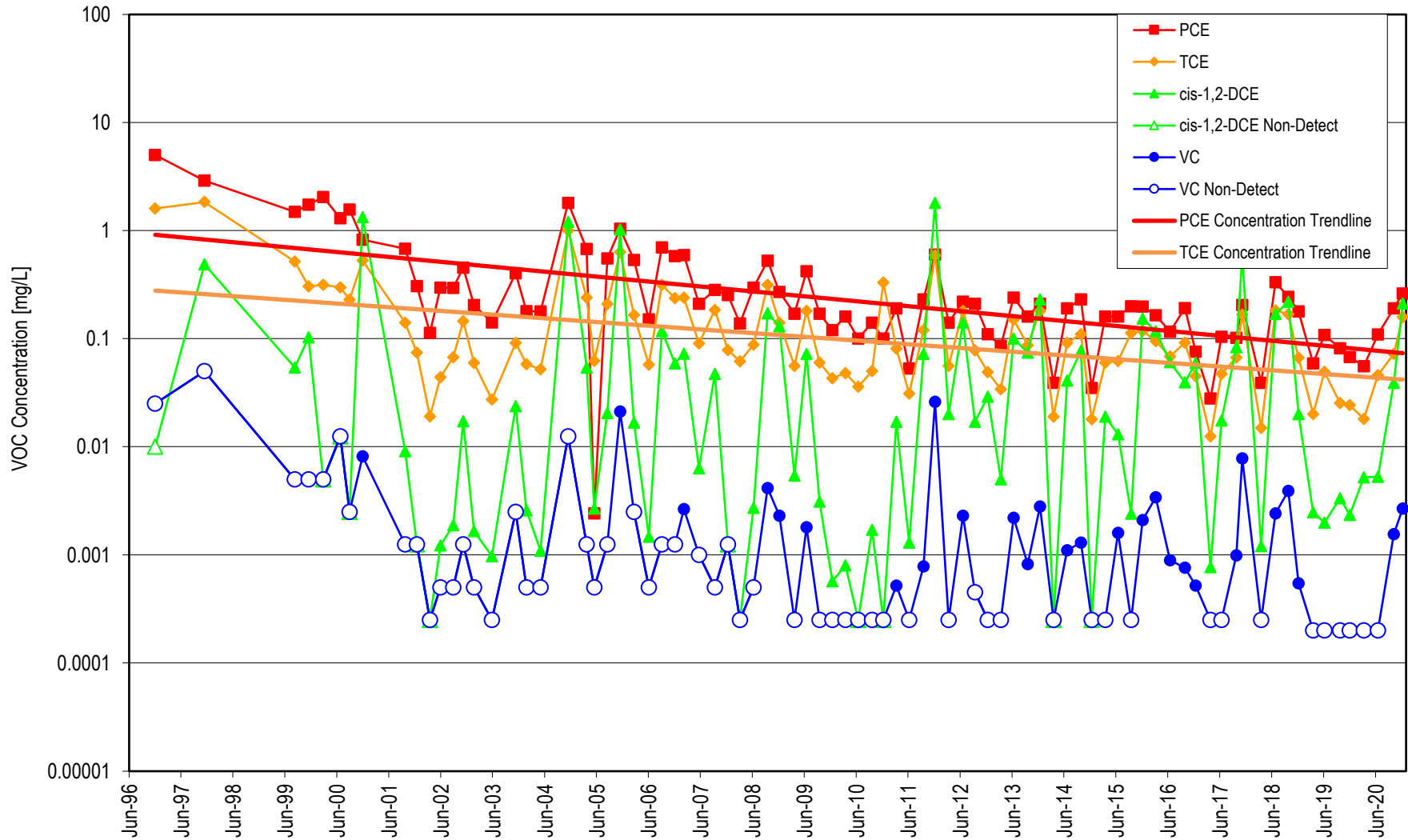
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-8



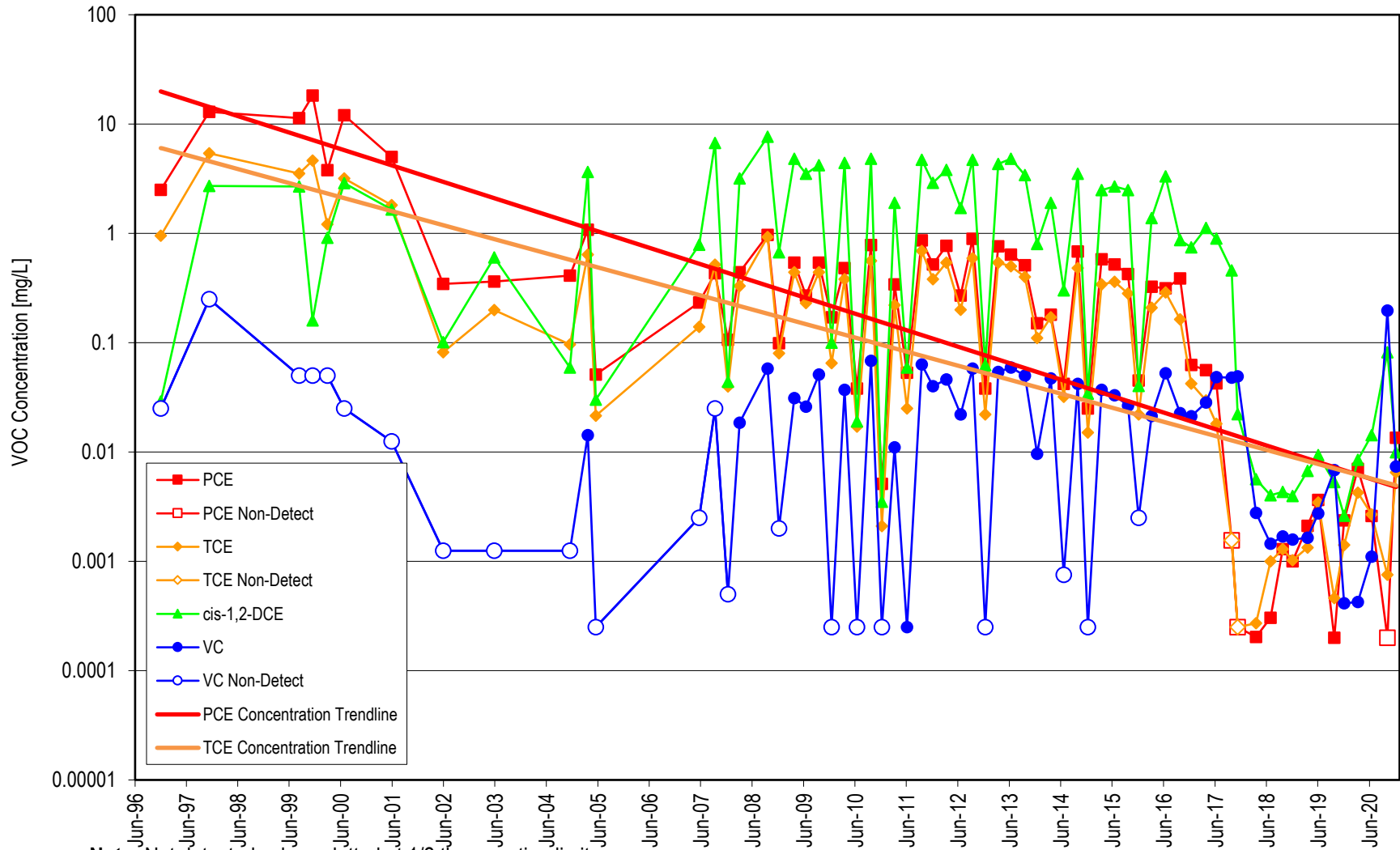
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-9



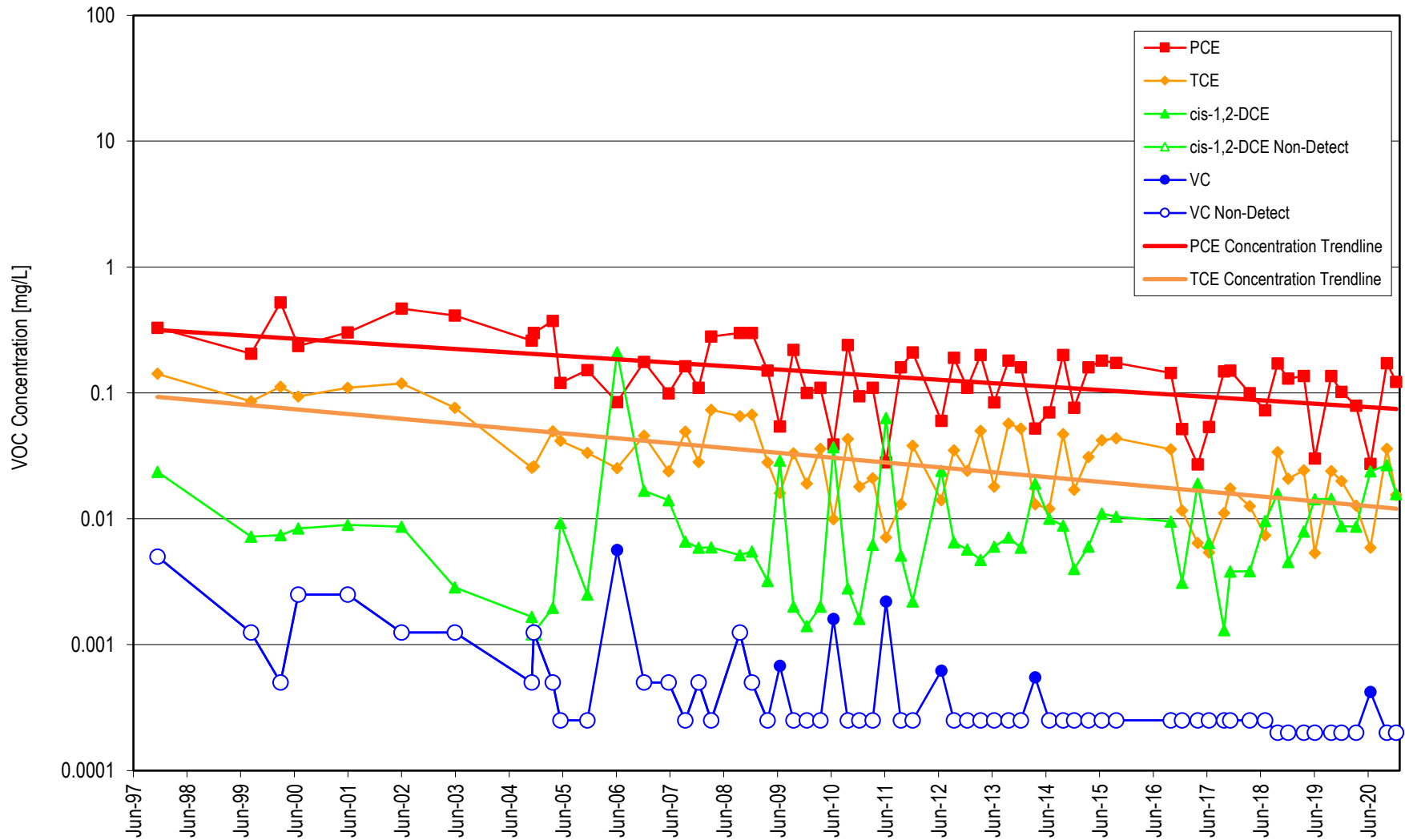
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-12



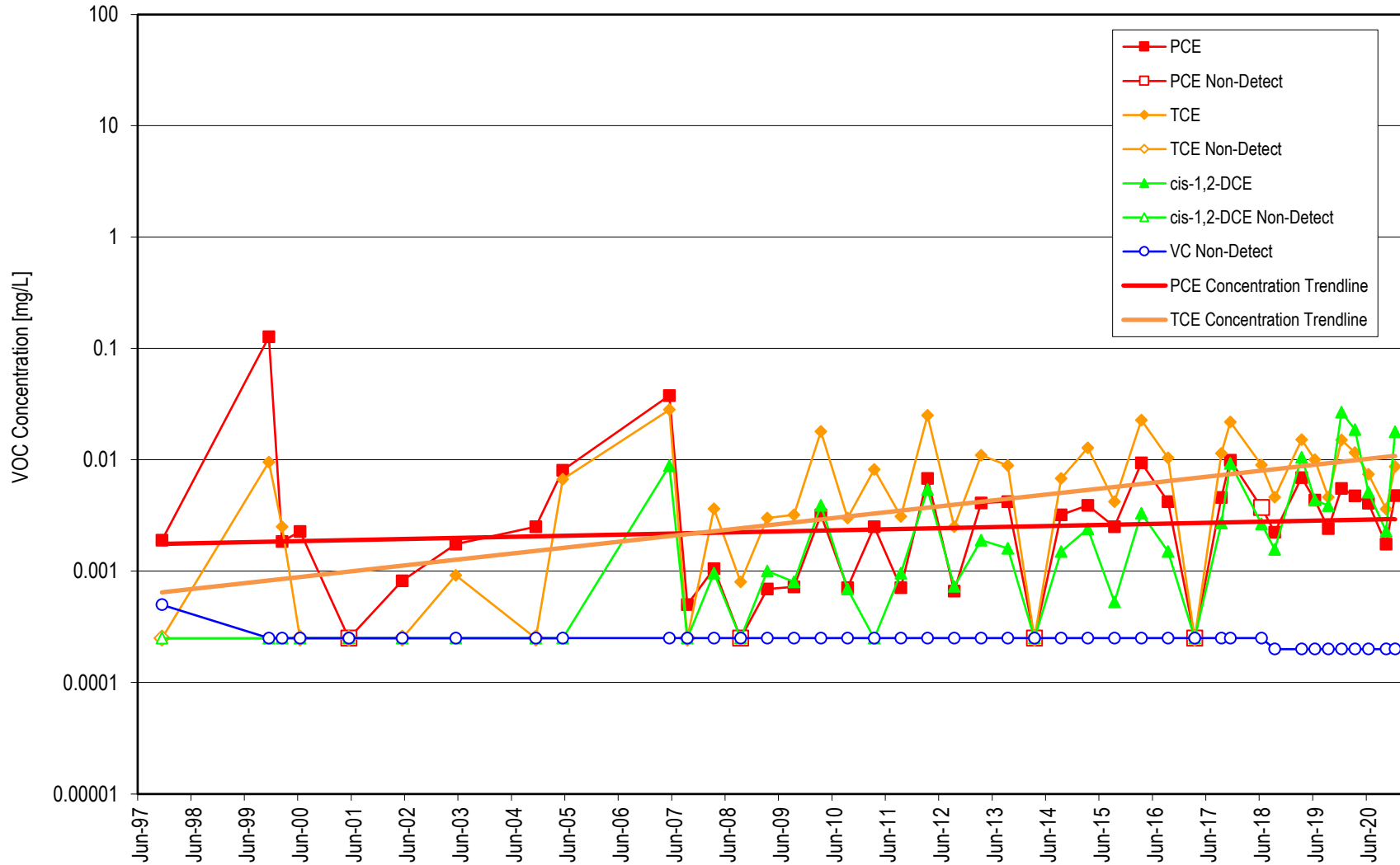
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-16



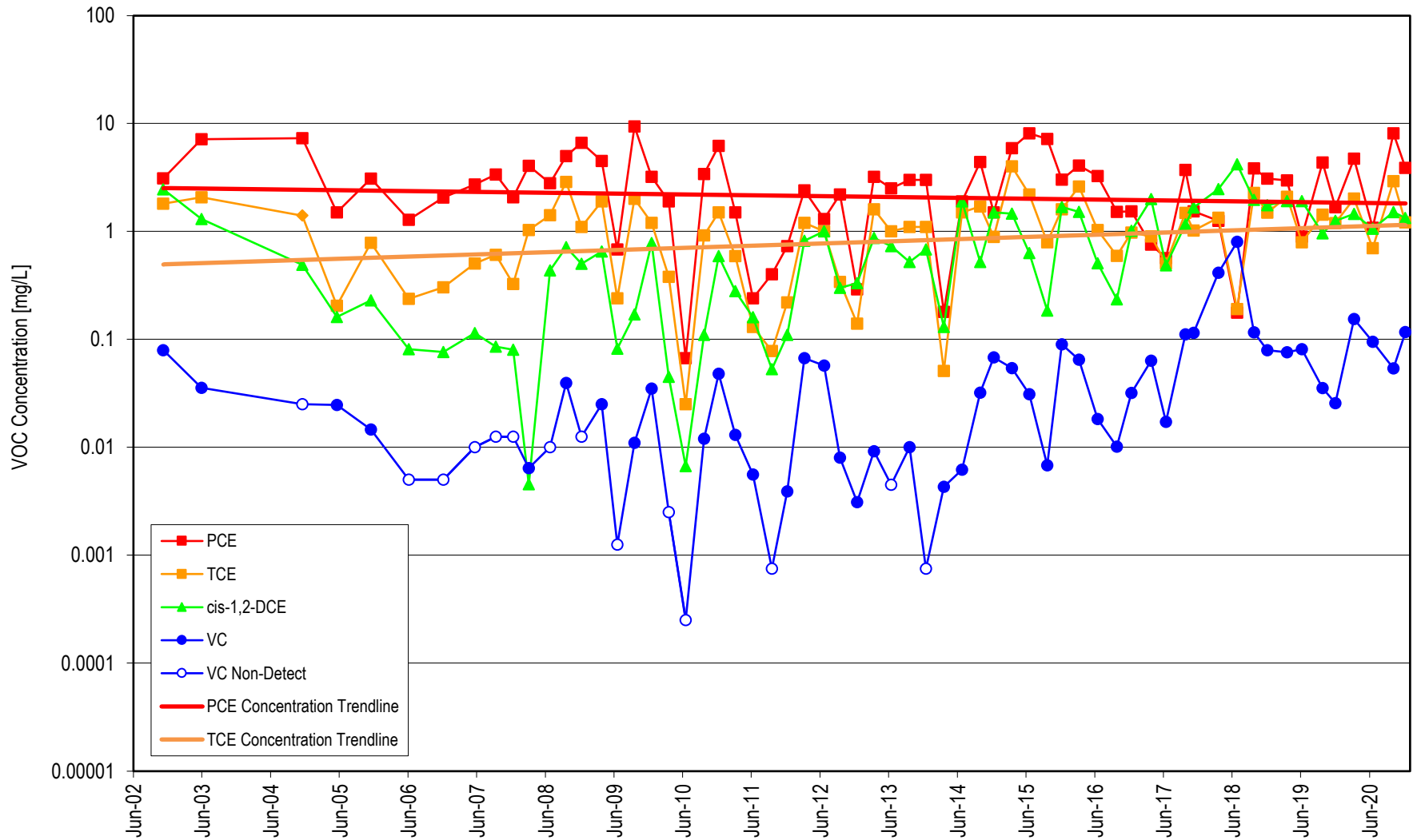
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-17



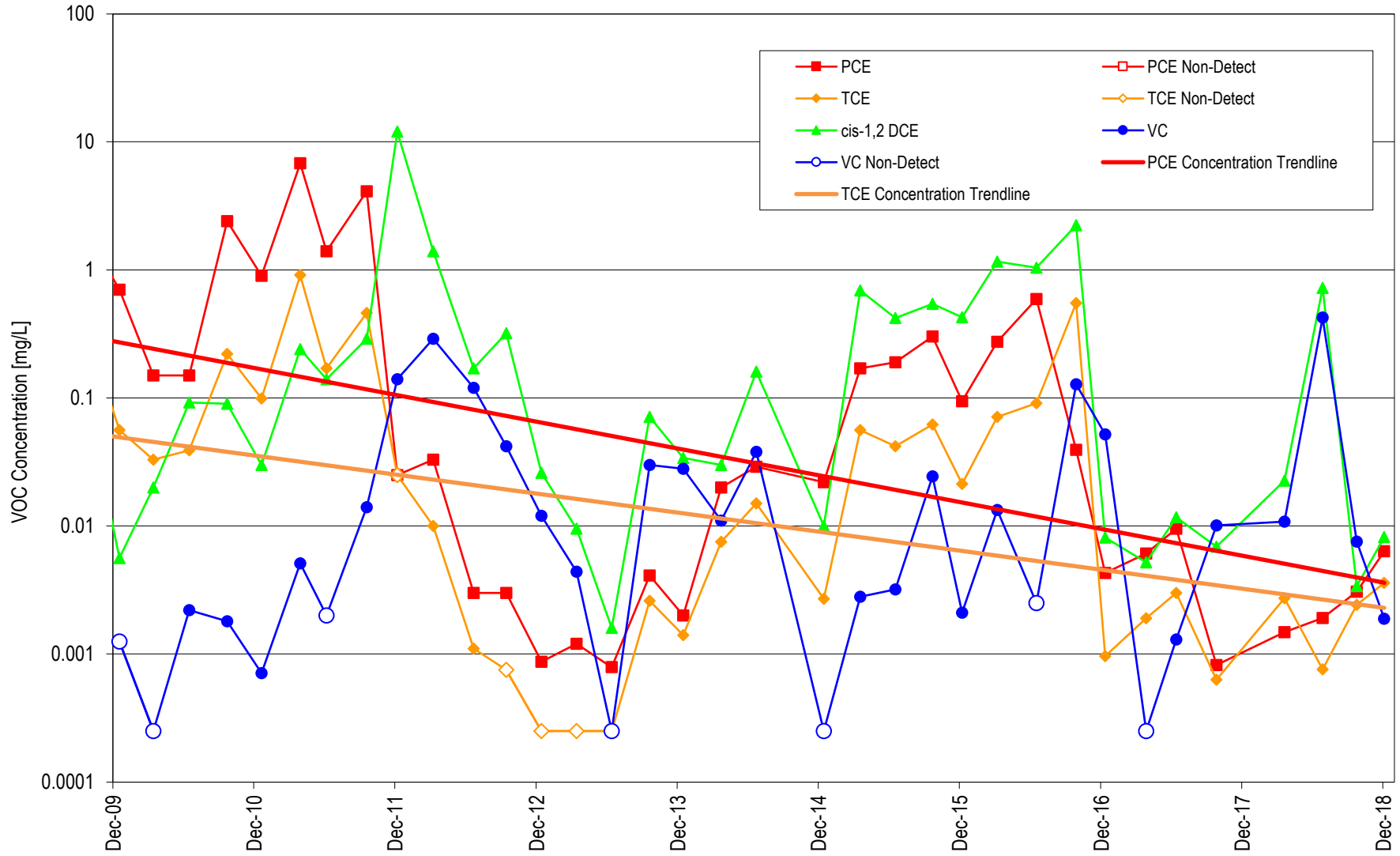
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-19



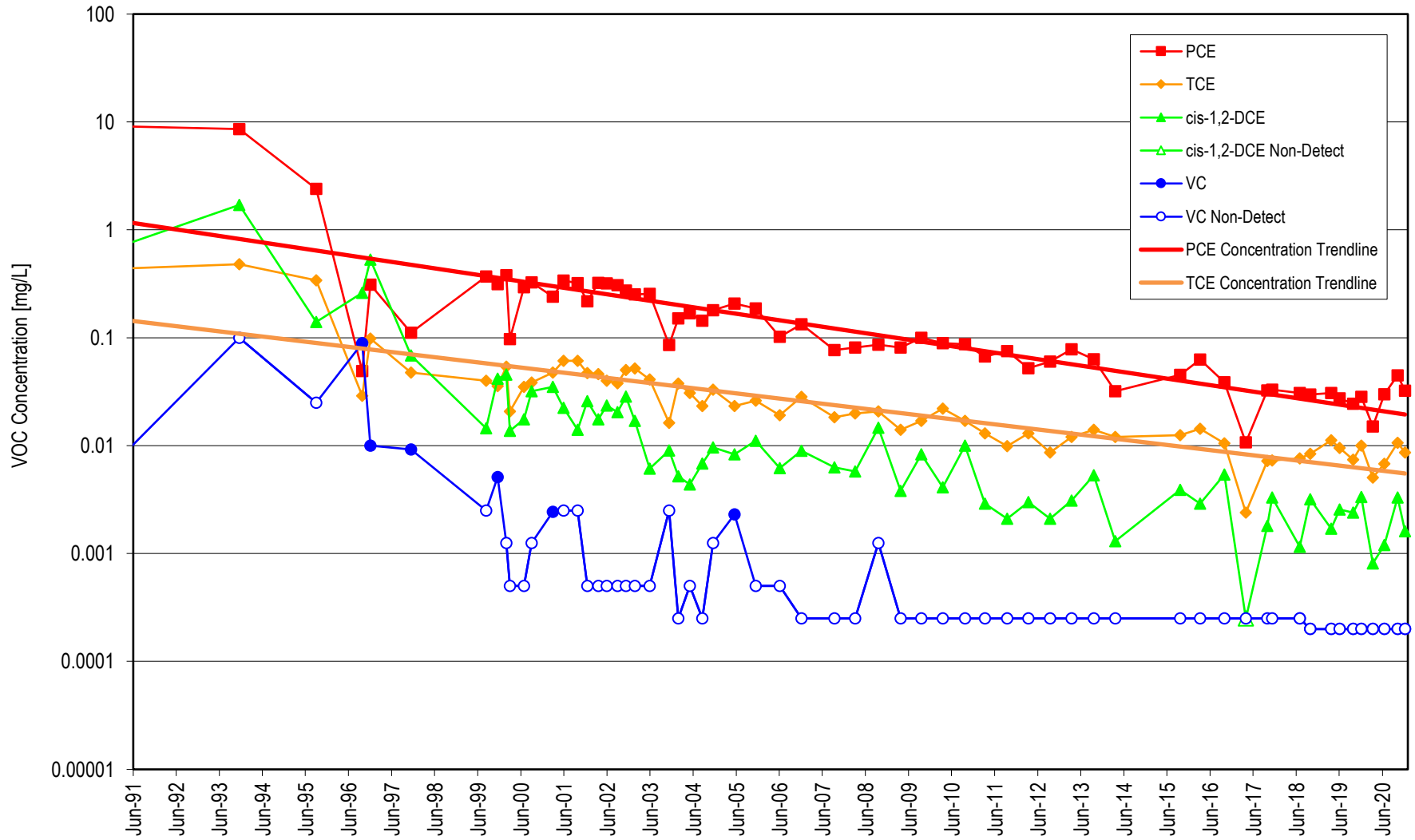
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in EX

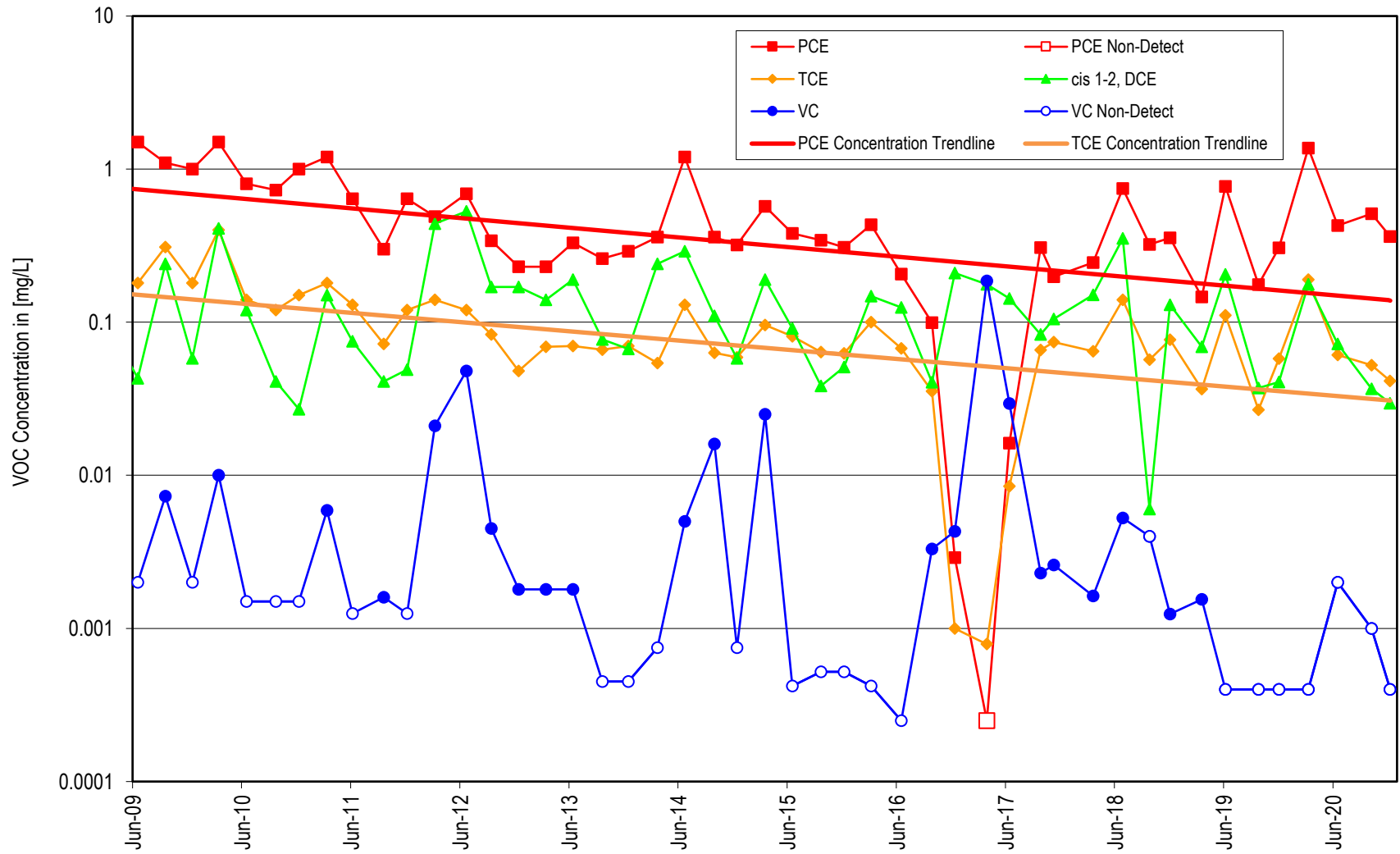


Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in EW-1

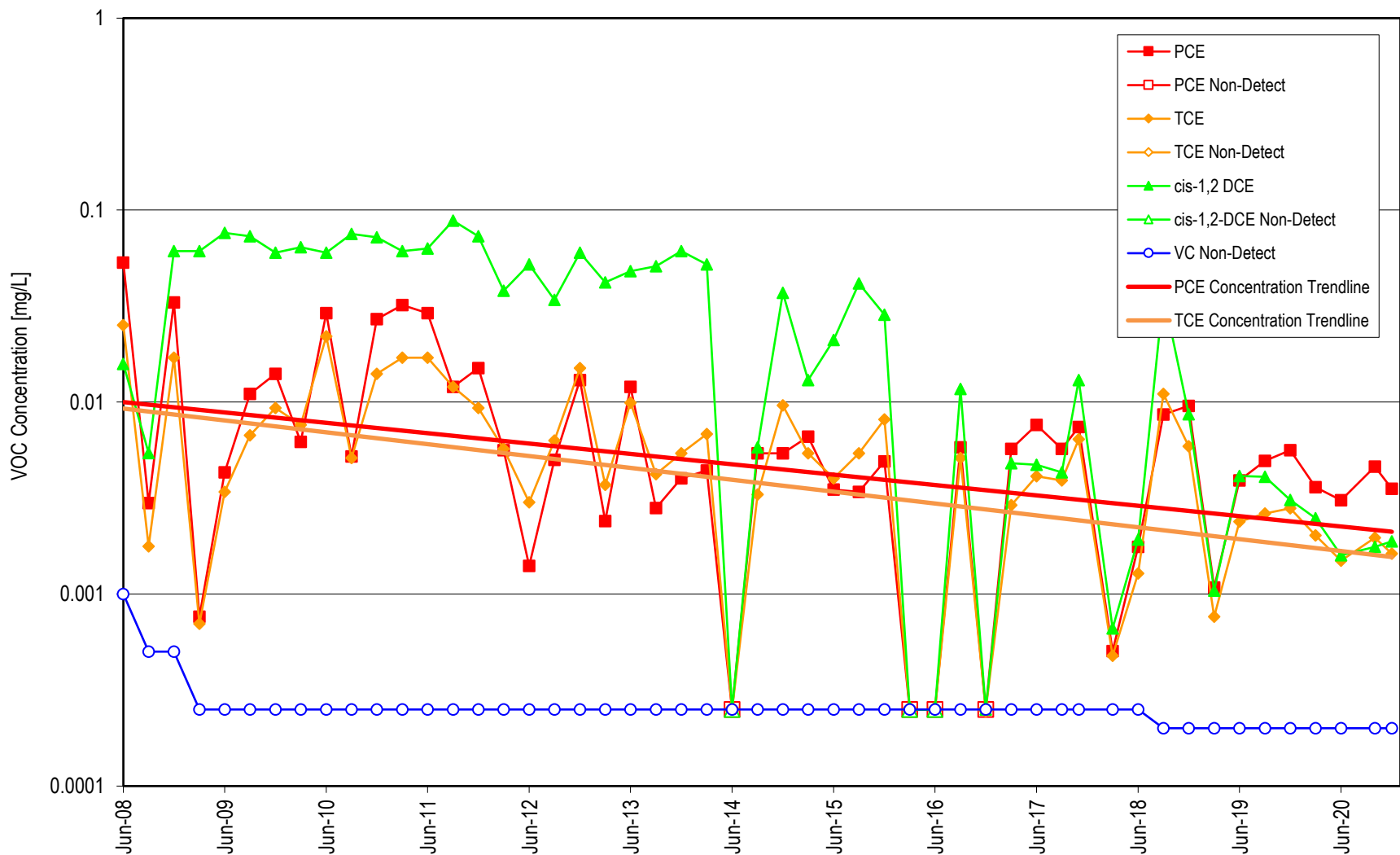


VOC Concentrations in MP-1



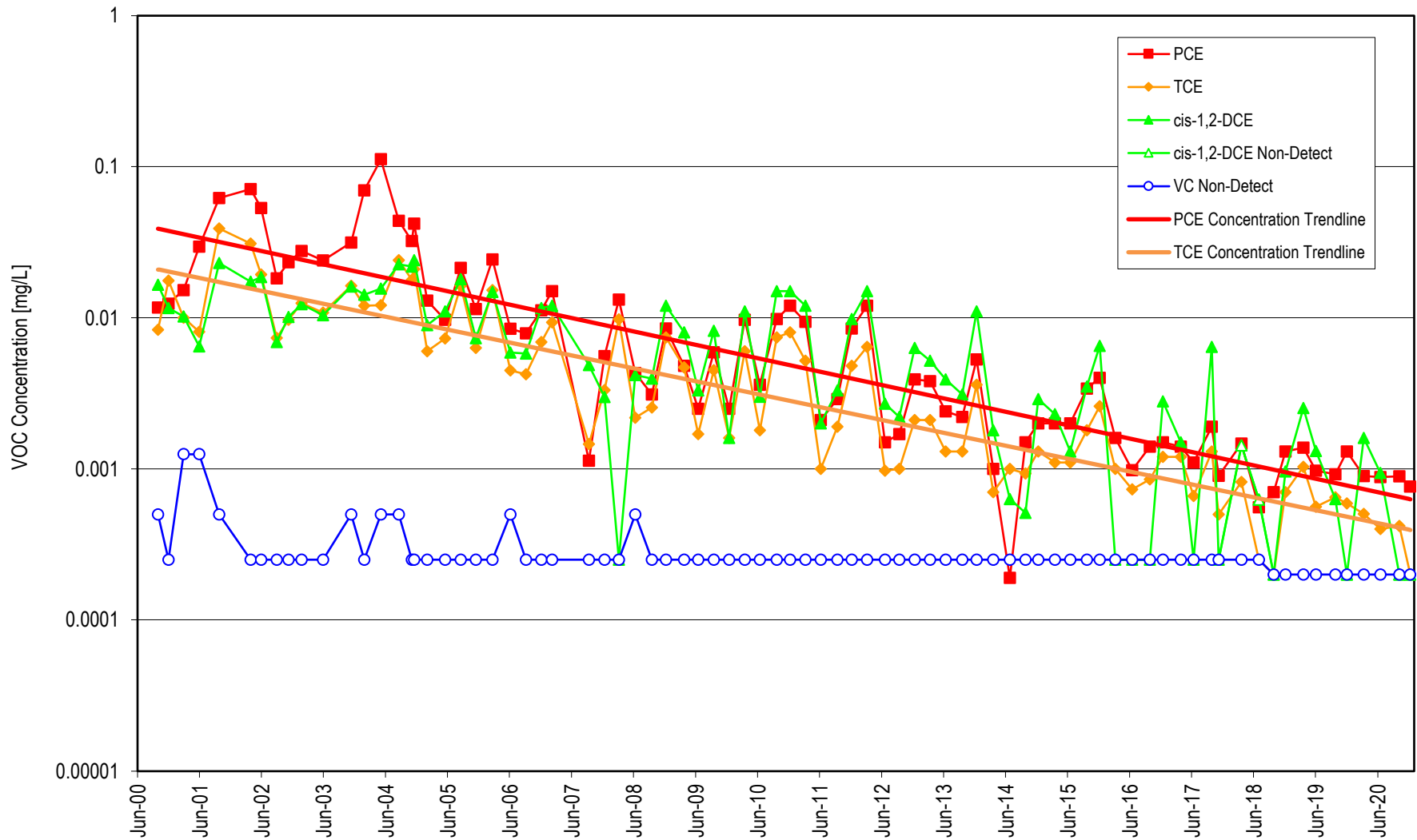
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-21i-105



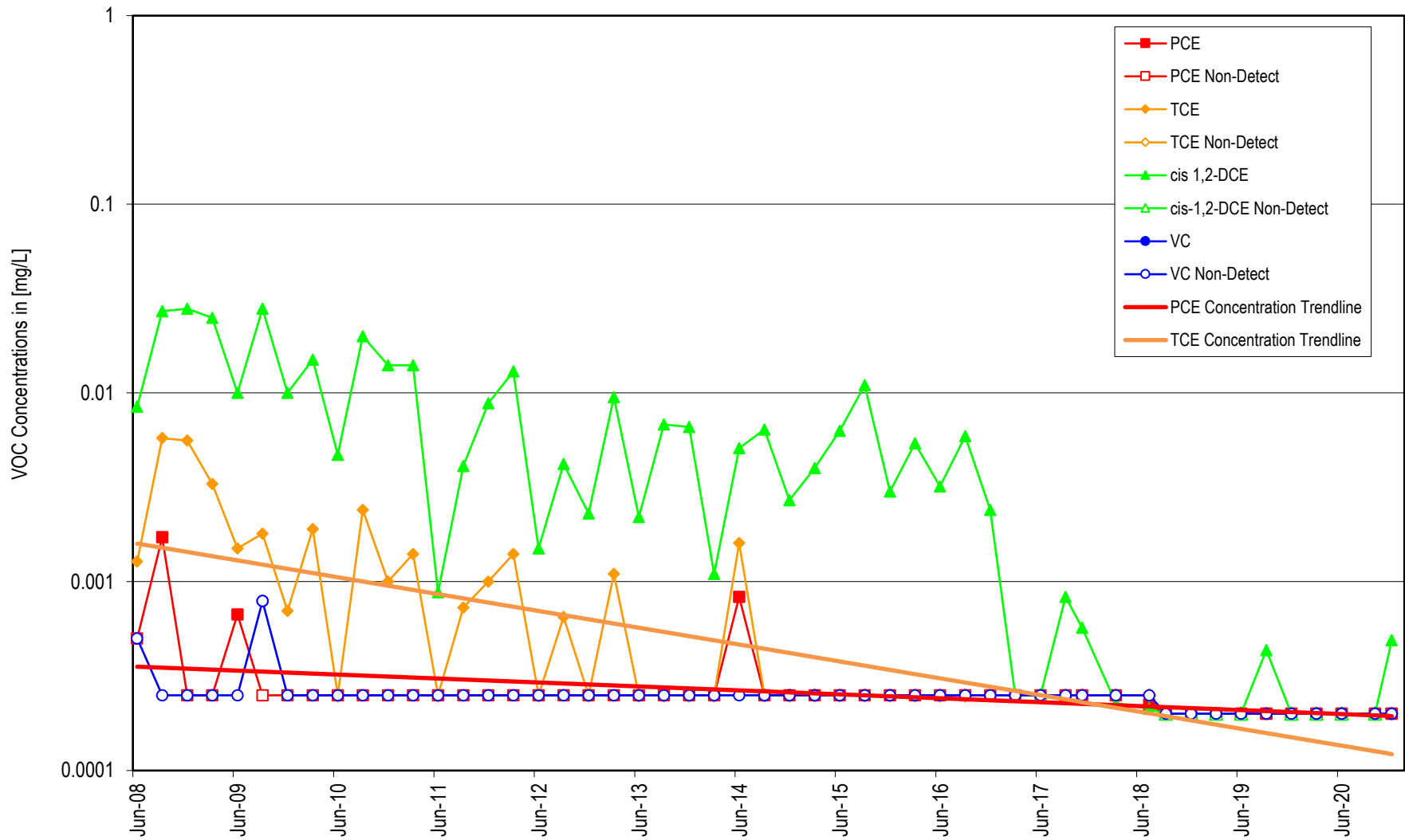
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-18i



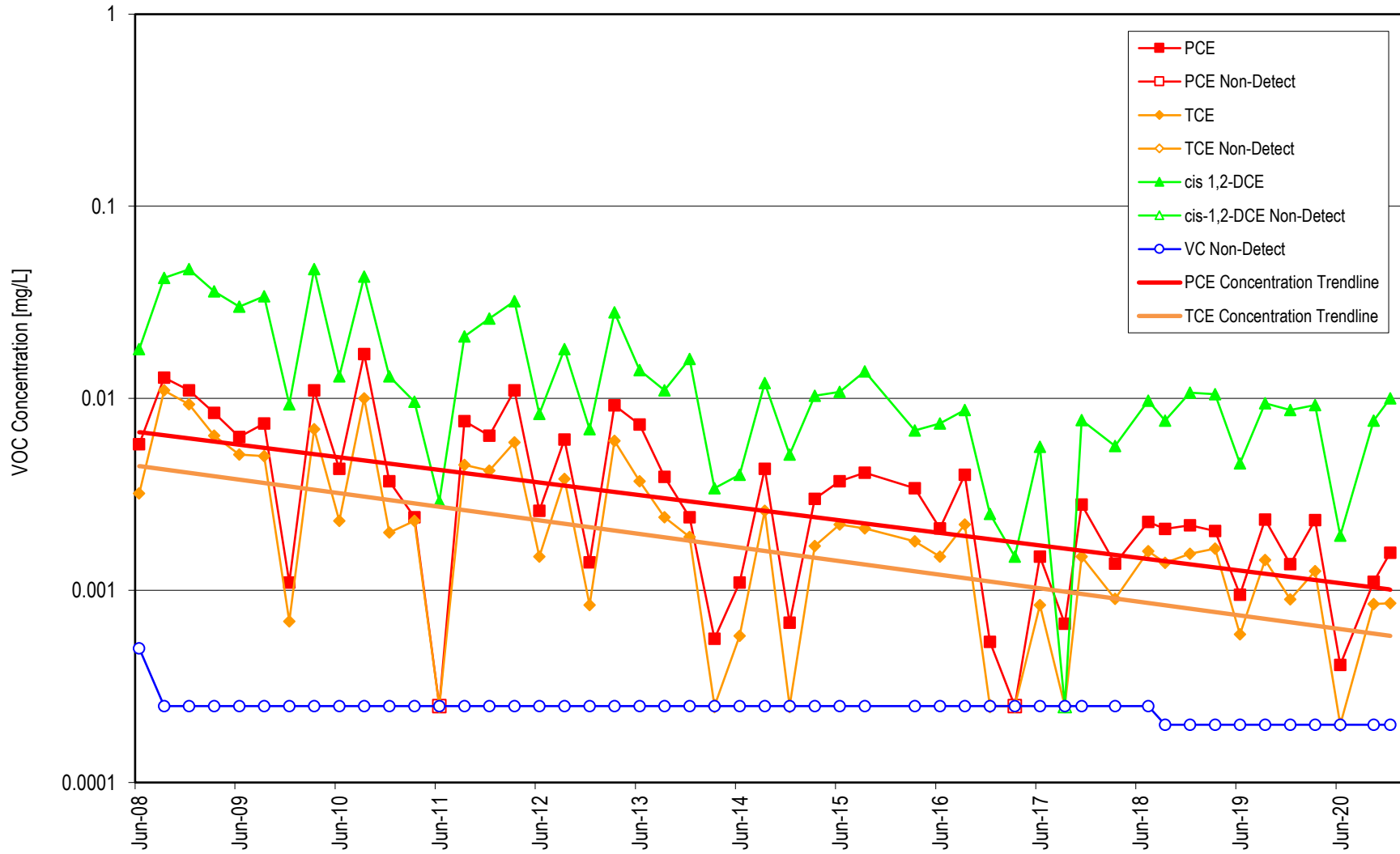
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-19i



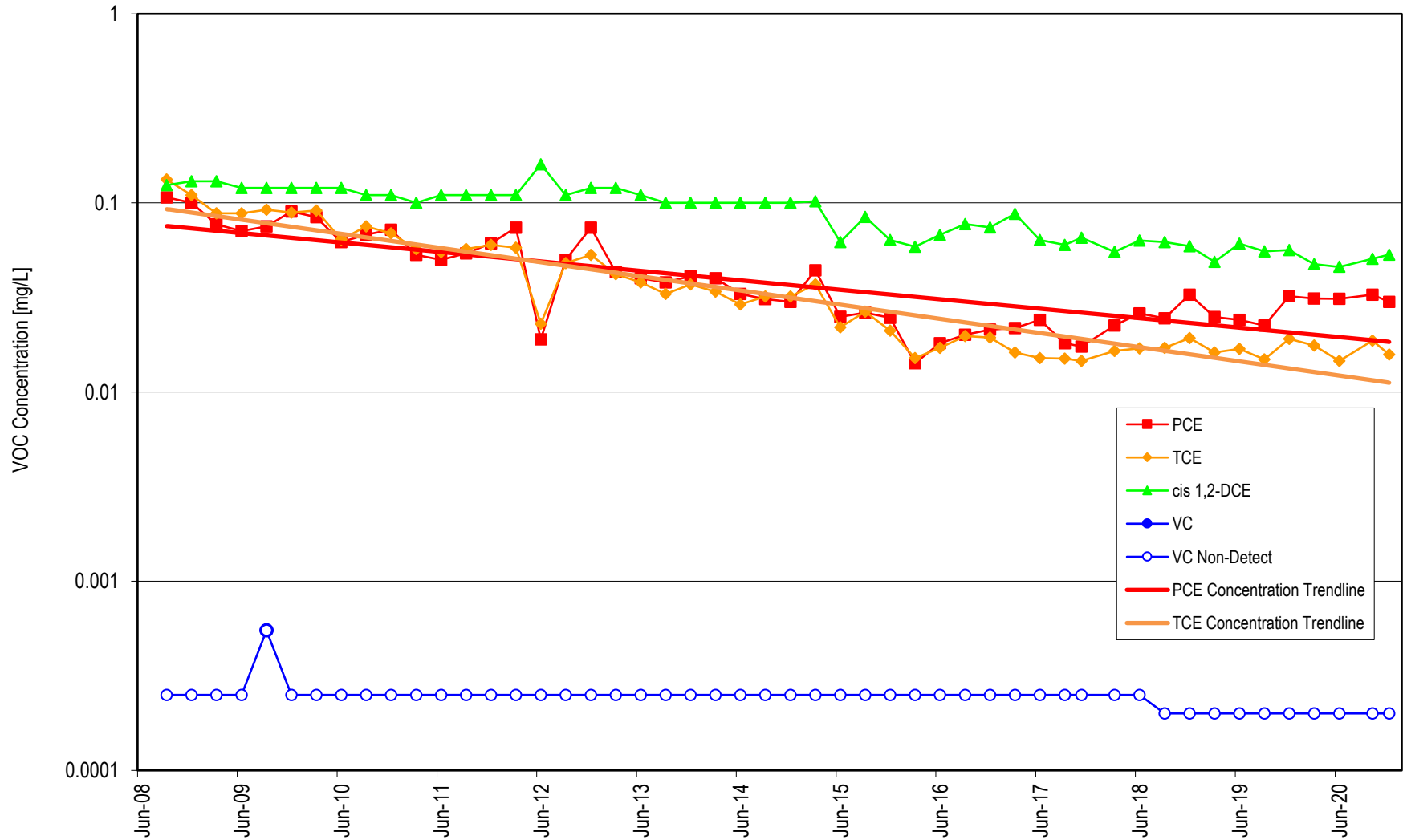
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-20i



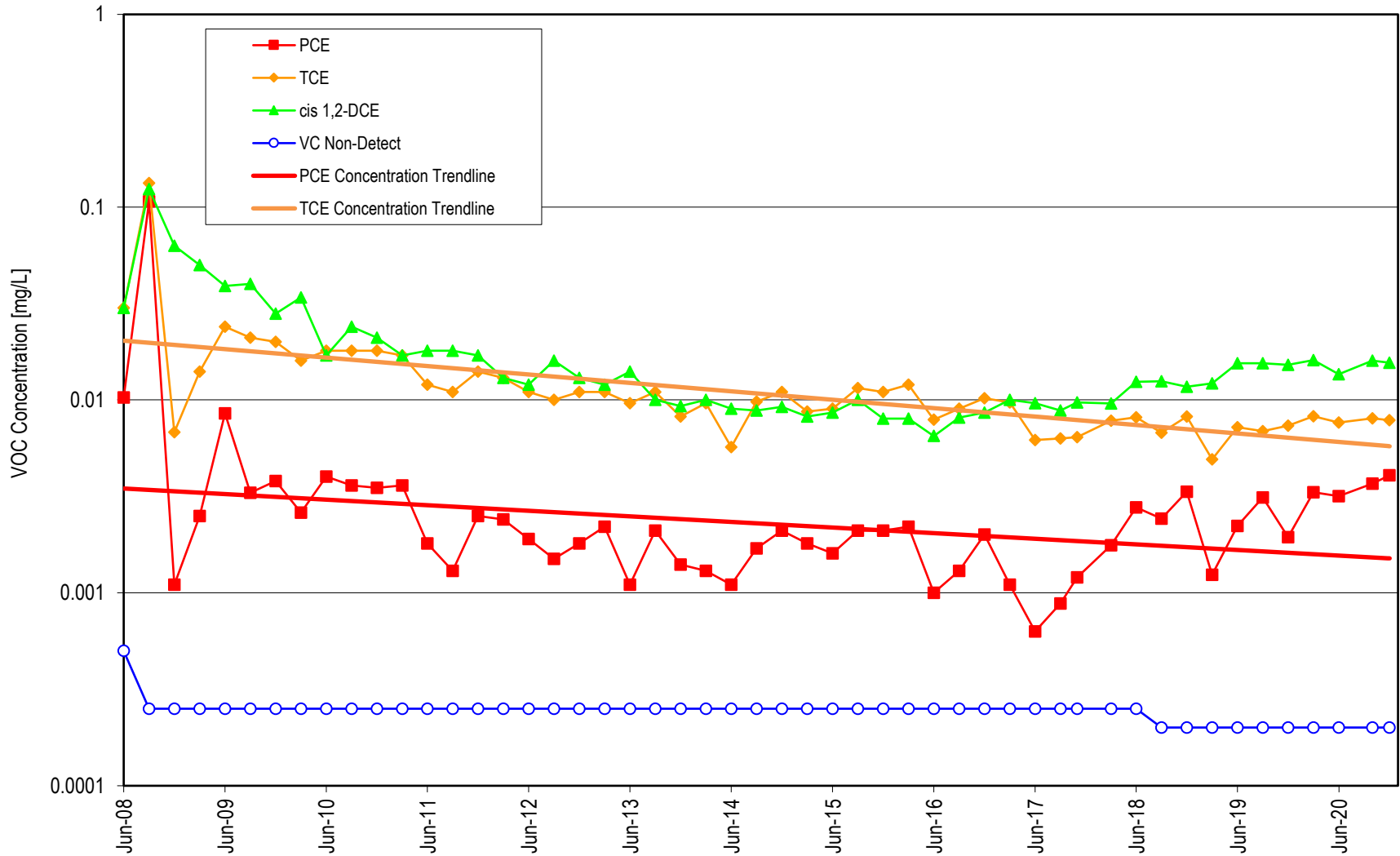
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-21i-40



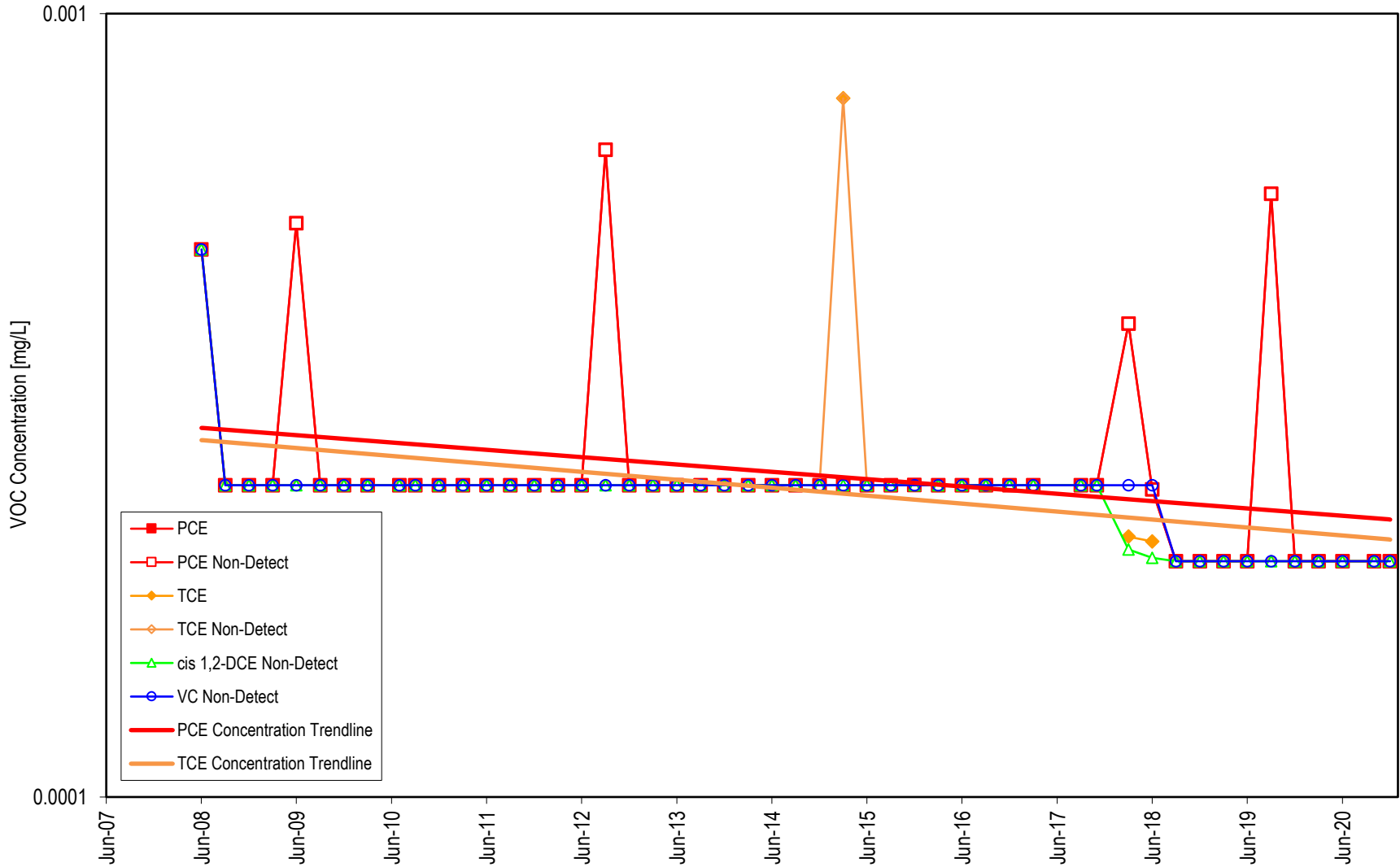
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-22i



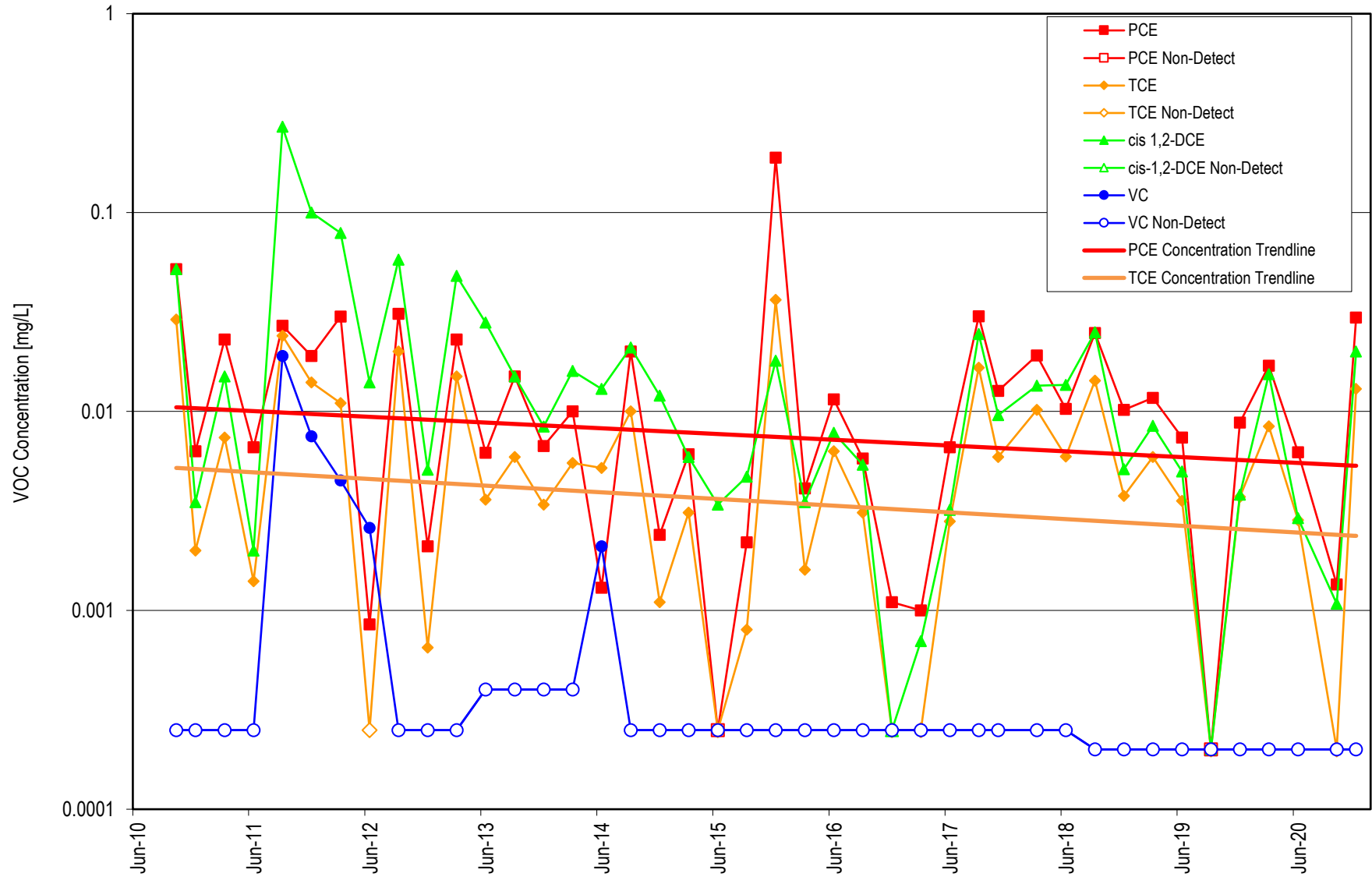
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-23i



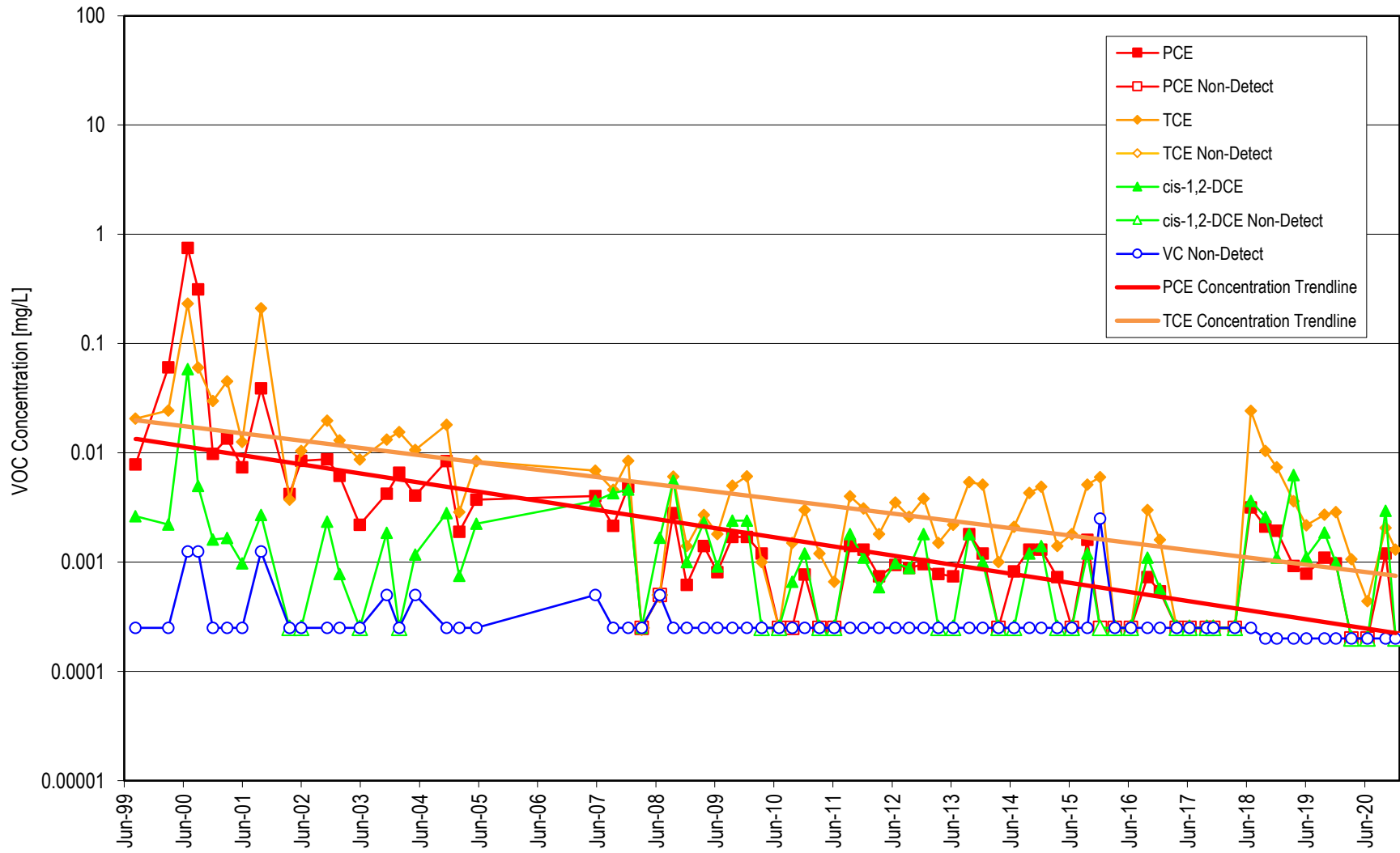
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MW-24i



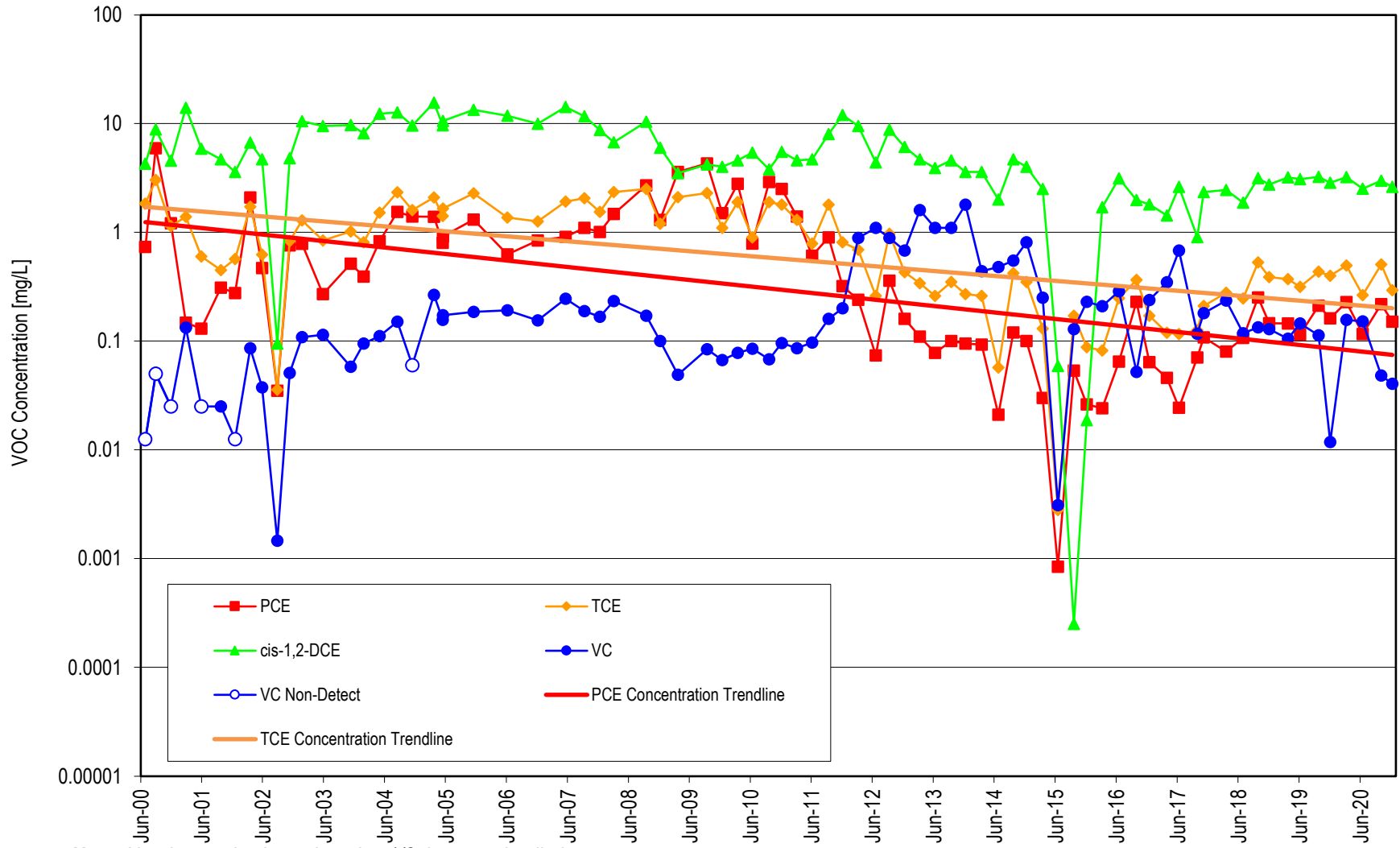
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in S-1



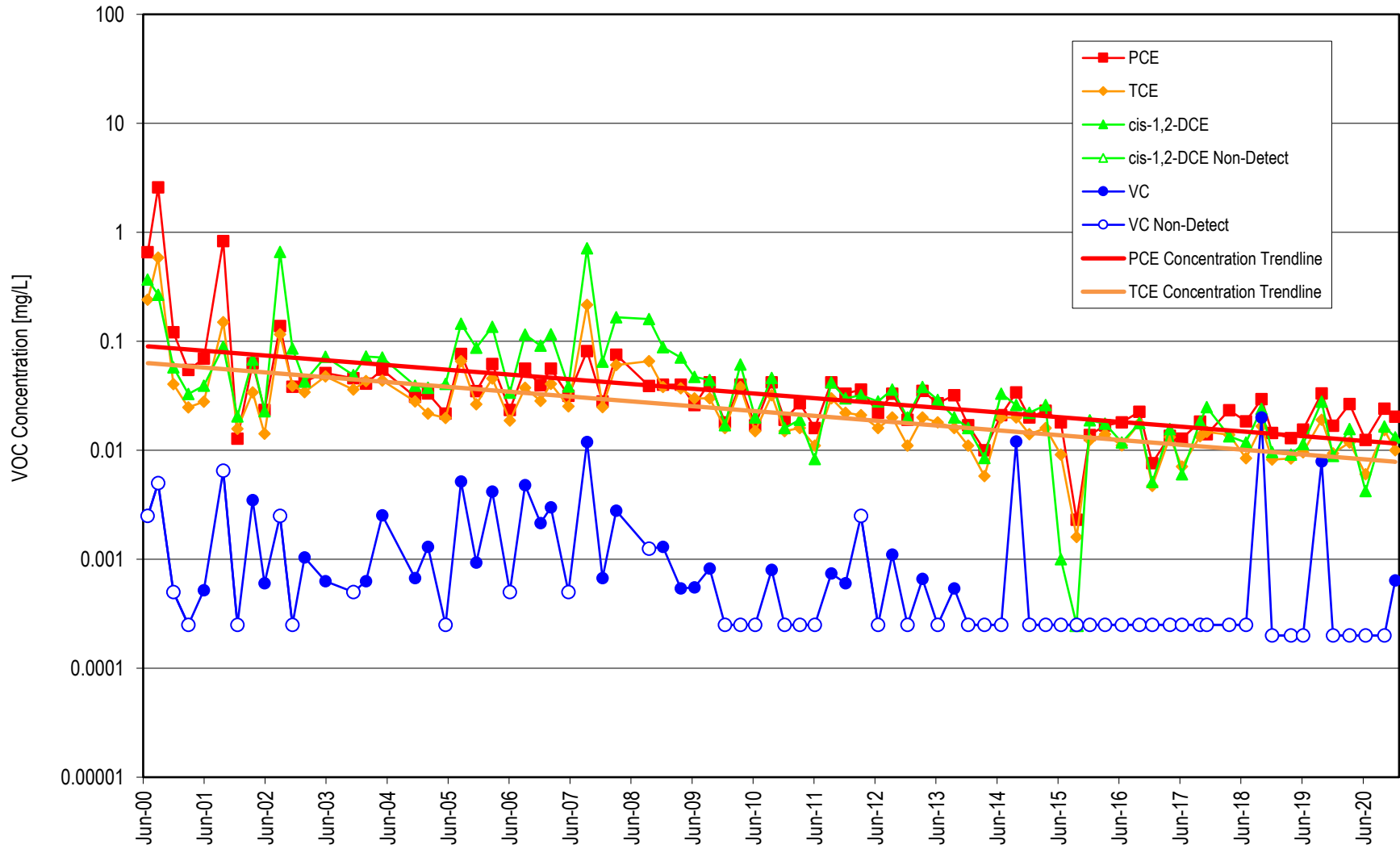
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MGMS1-43



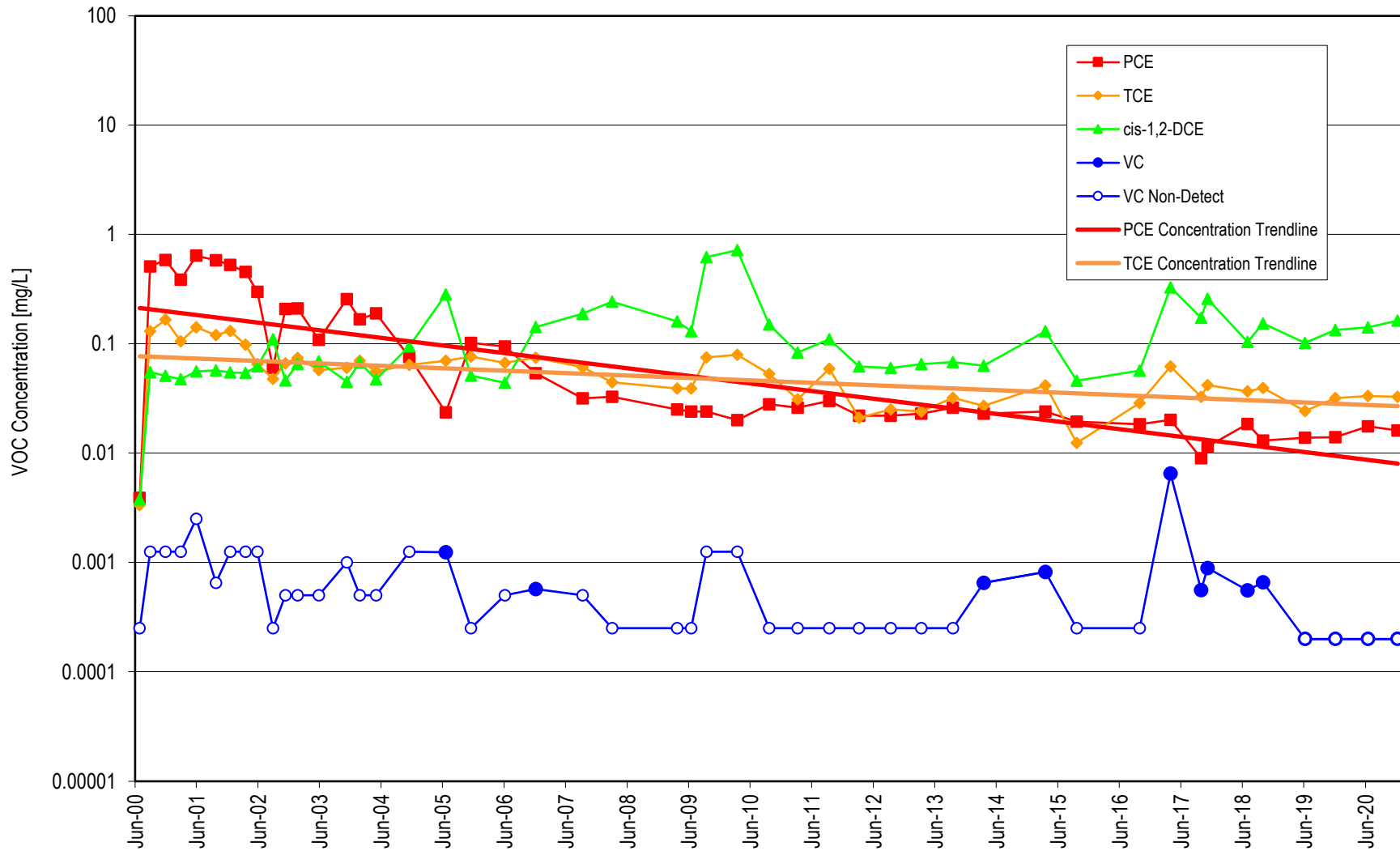
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MGMS1-60



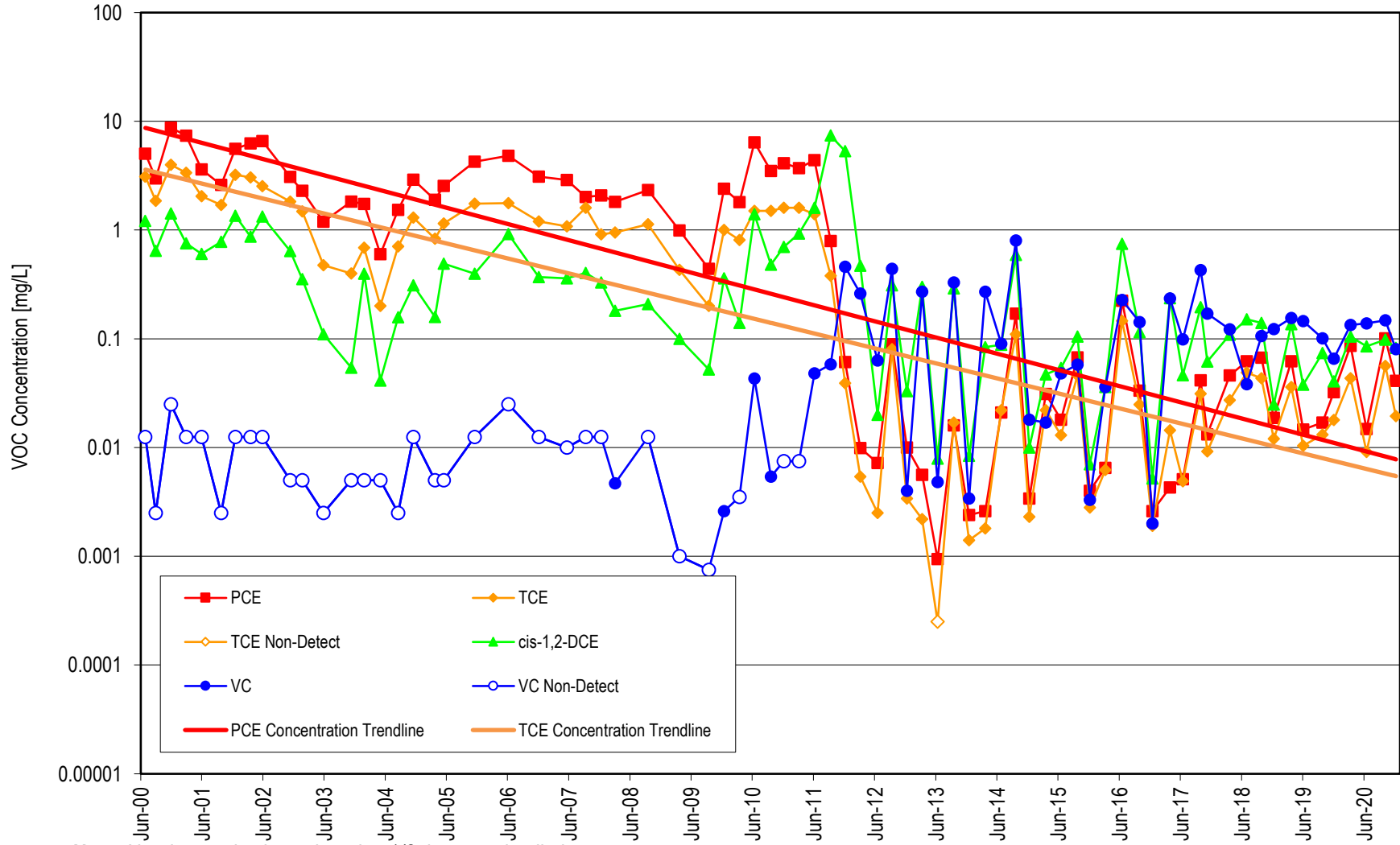
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MGMS1-110



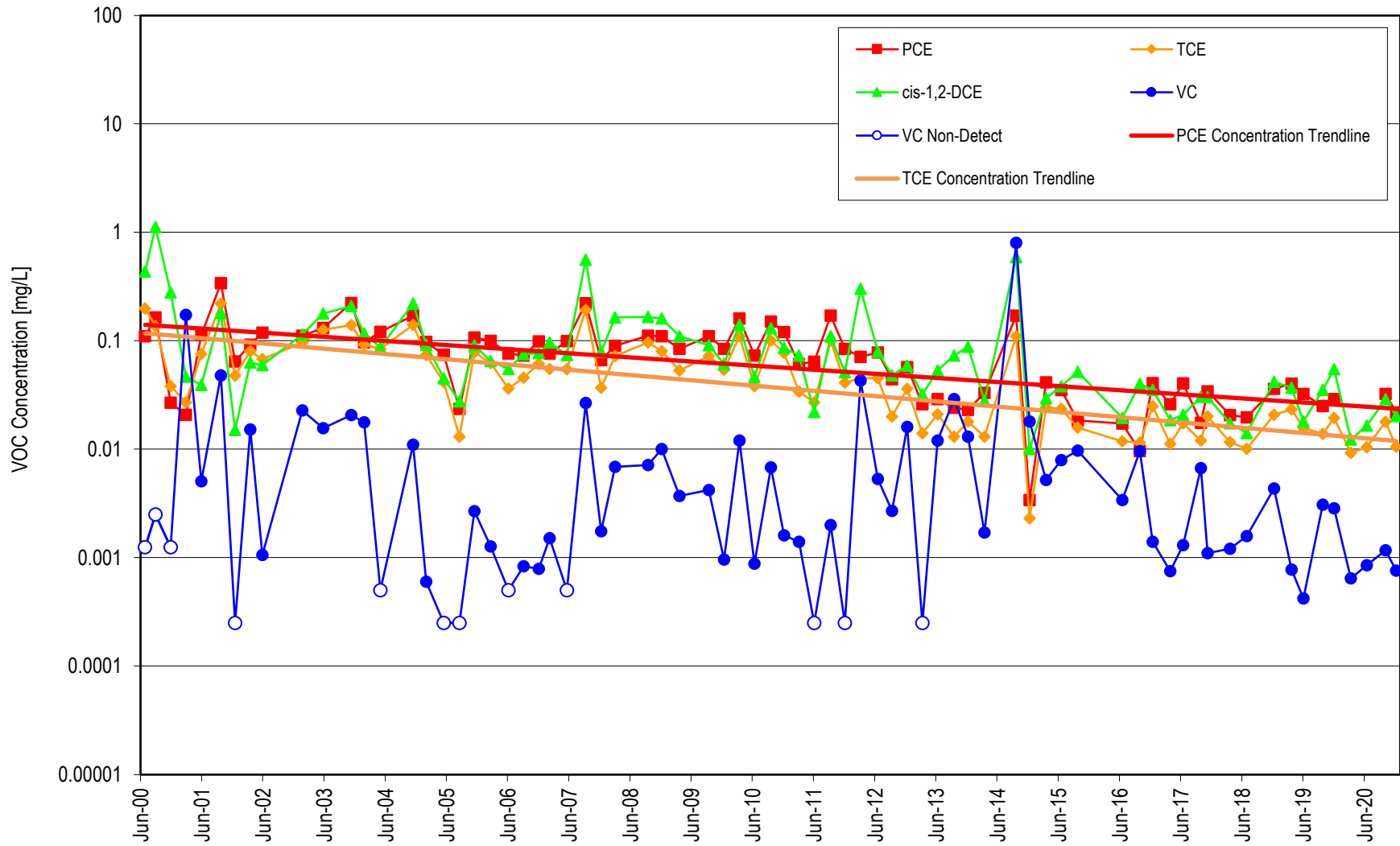
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MGMS2-40



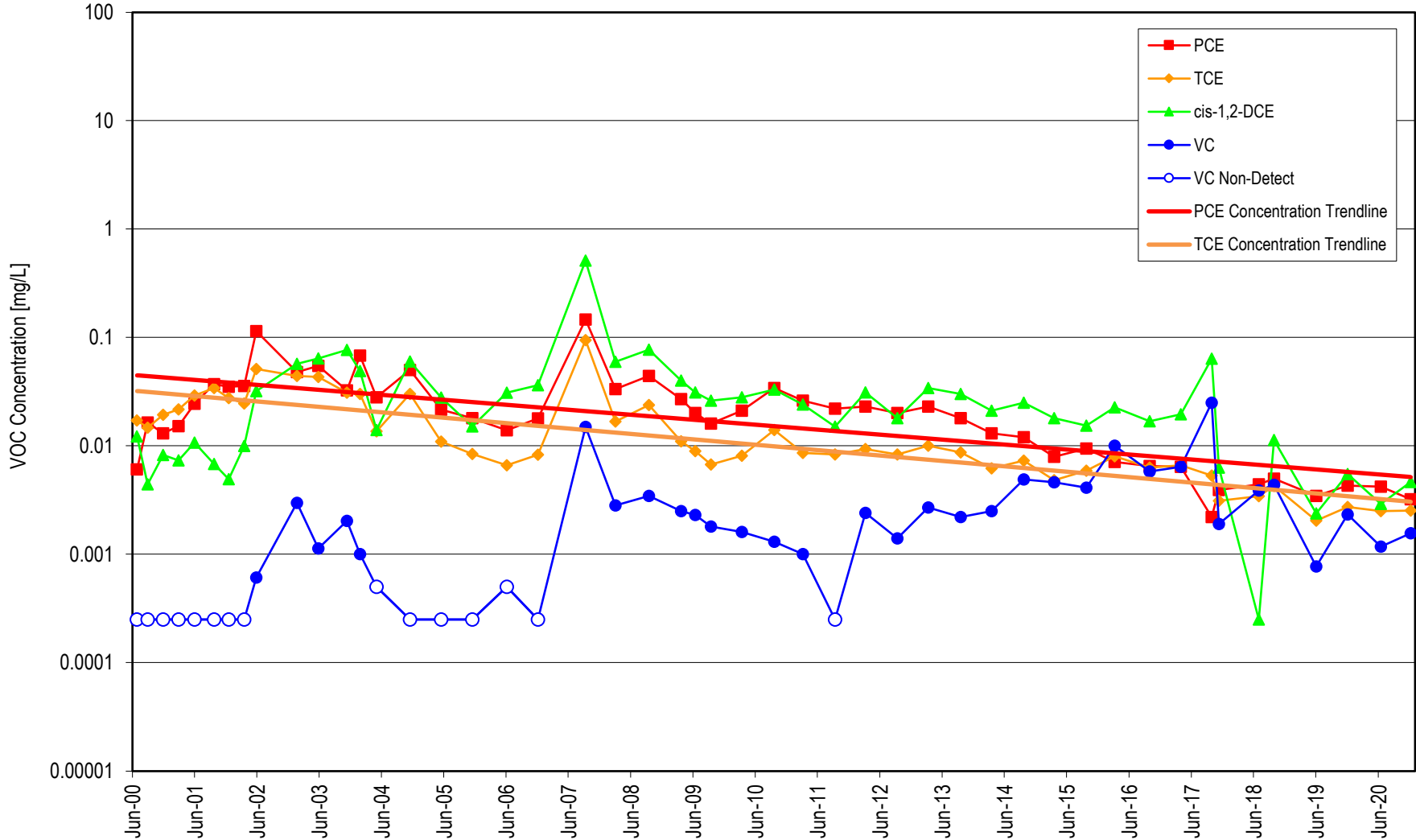
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MGMS2-60



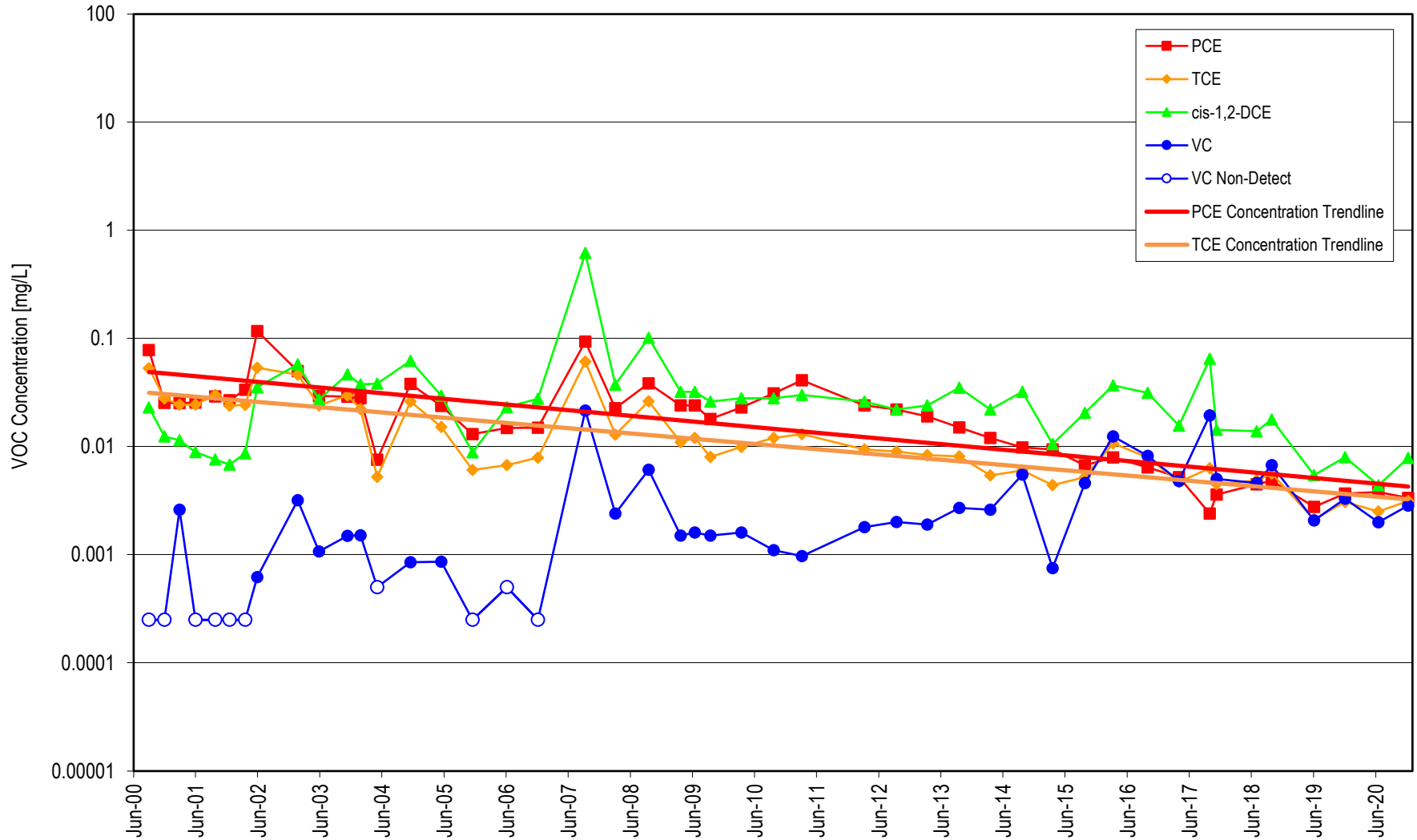
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MGMS2-110



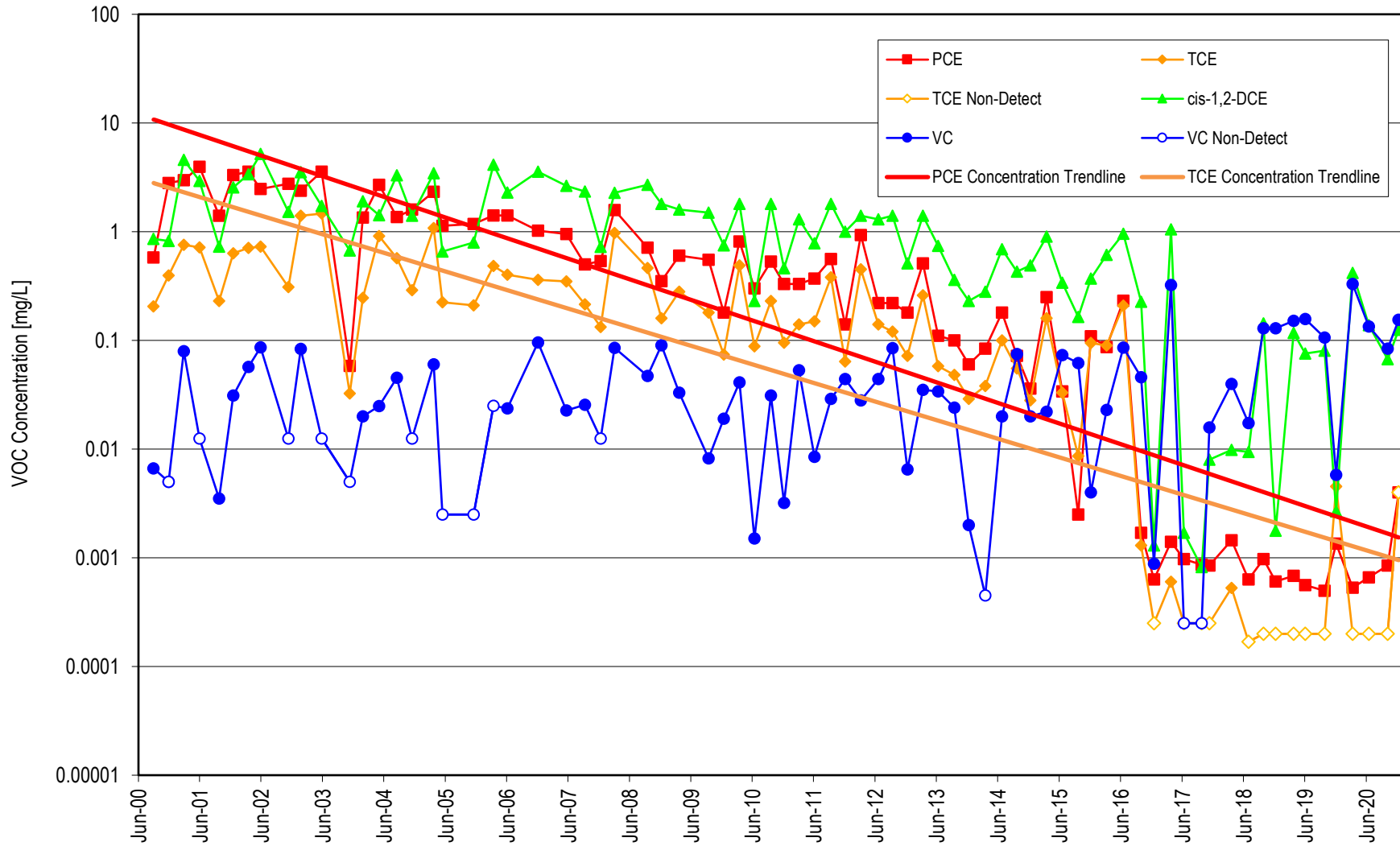
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MGMS2-132



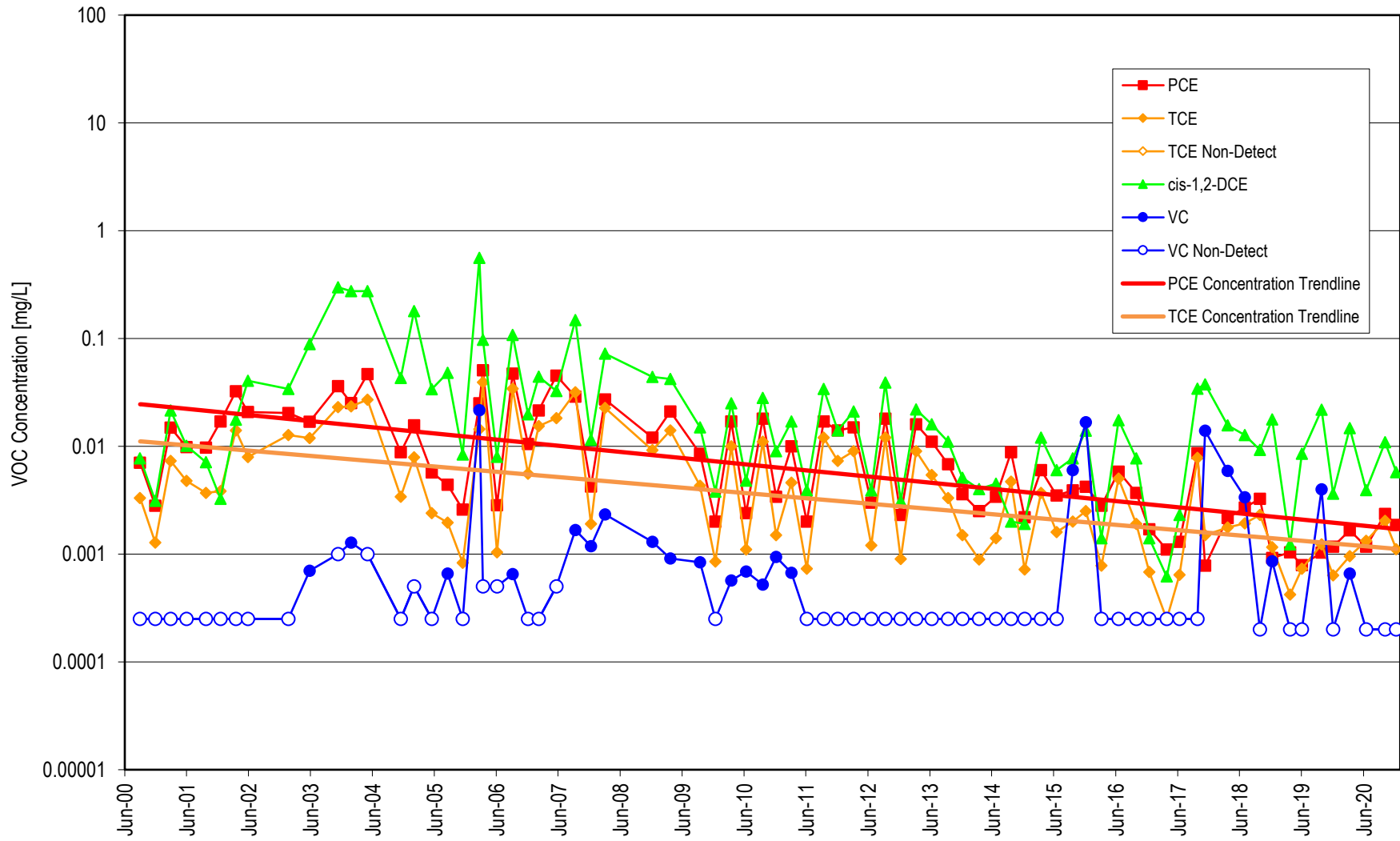
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MGMS3-40



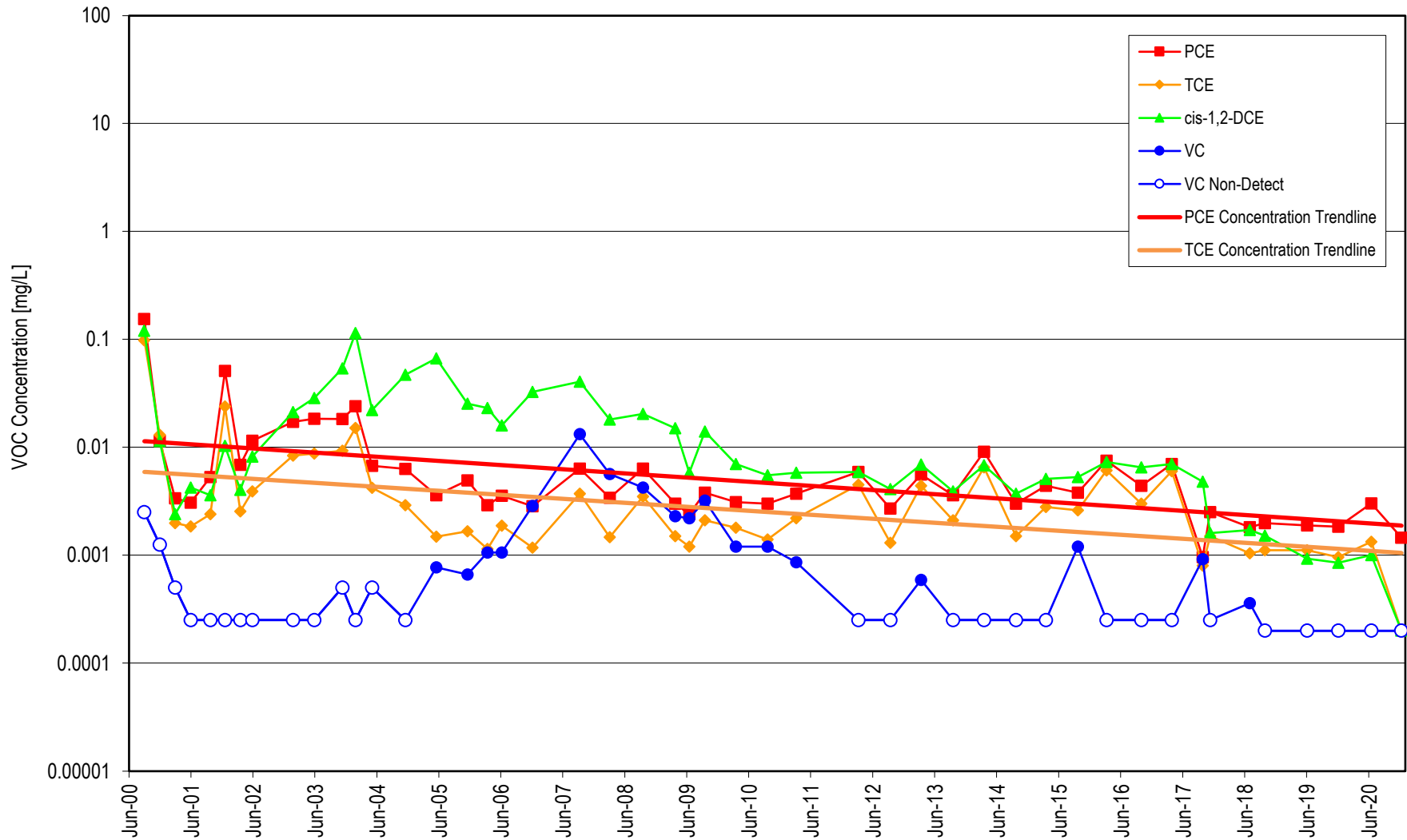
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MGMS3-60



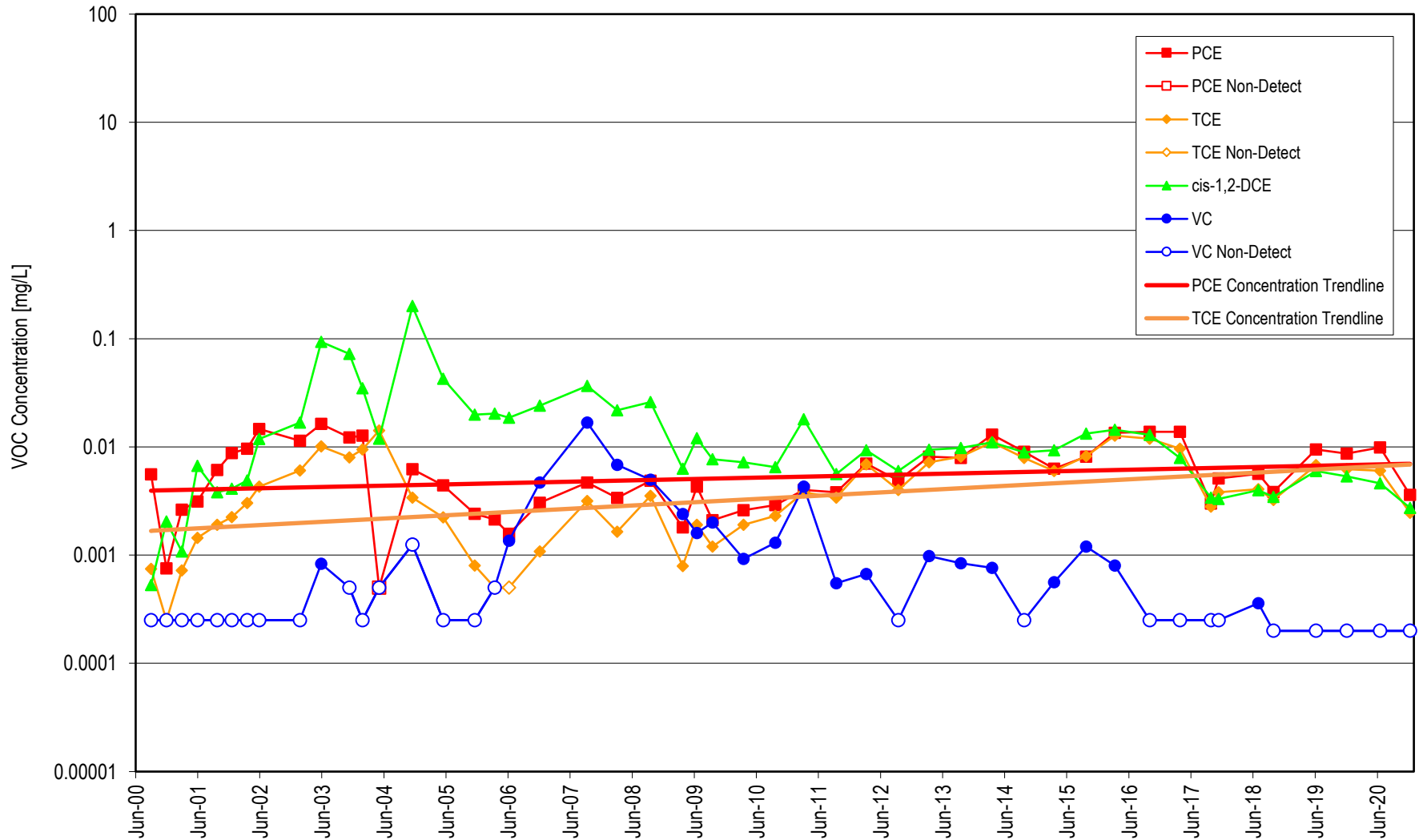
Note: Not detected values plotted at 1/2 the reporting limit.

VOC Concentrations in MGMS3-101



Note: Not detected values plotted at 1/2 the reporting limit.

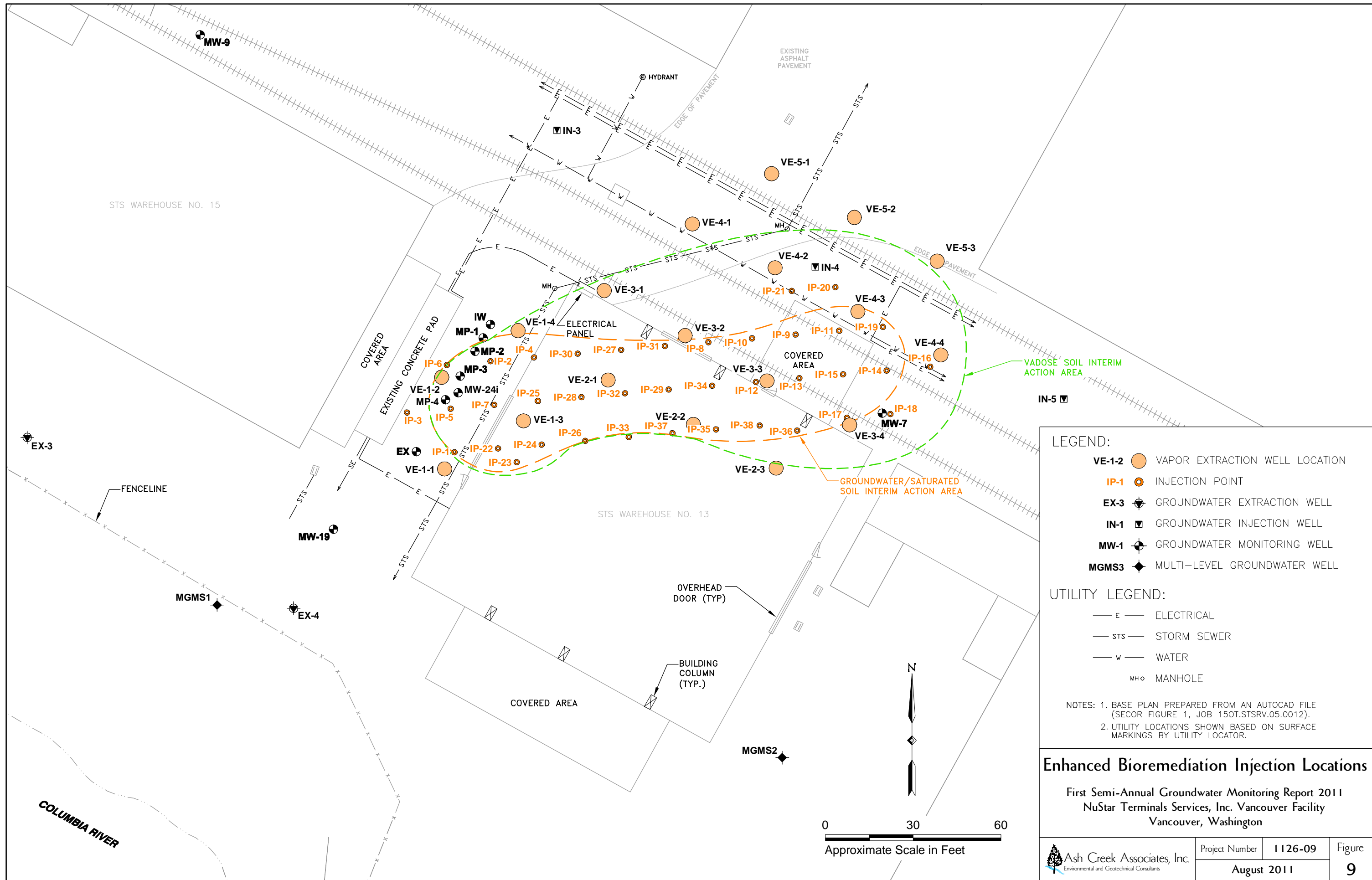
VOC Concentrations in MGMS3-132



Note: Not detected values plotted at 1/2 the reporting limit.

APPENDIX E

2008—SVE AND BIOREMEDIATION INJECTION LAYOUT AND
MASS REMOVAL CHART



LEGEND:

- VE-1-2** ○ VAPOR EXTRACTION WELL LOCATION
- IP-1** ○ INJECTION POINT
- EX-3** ⊕ GROUNDWATER EXTRACTION WELL
- IN-1** ▽ GROUNDWATER INJECTION WELL
- MW-1** ⊕ GROUNDWATER MONITORING WELL
- MGMS3** ◆ MULTI-LEVEL GROUNDWATER WELL

UTILITY LEGEND:

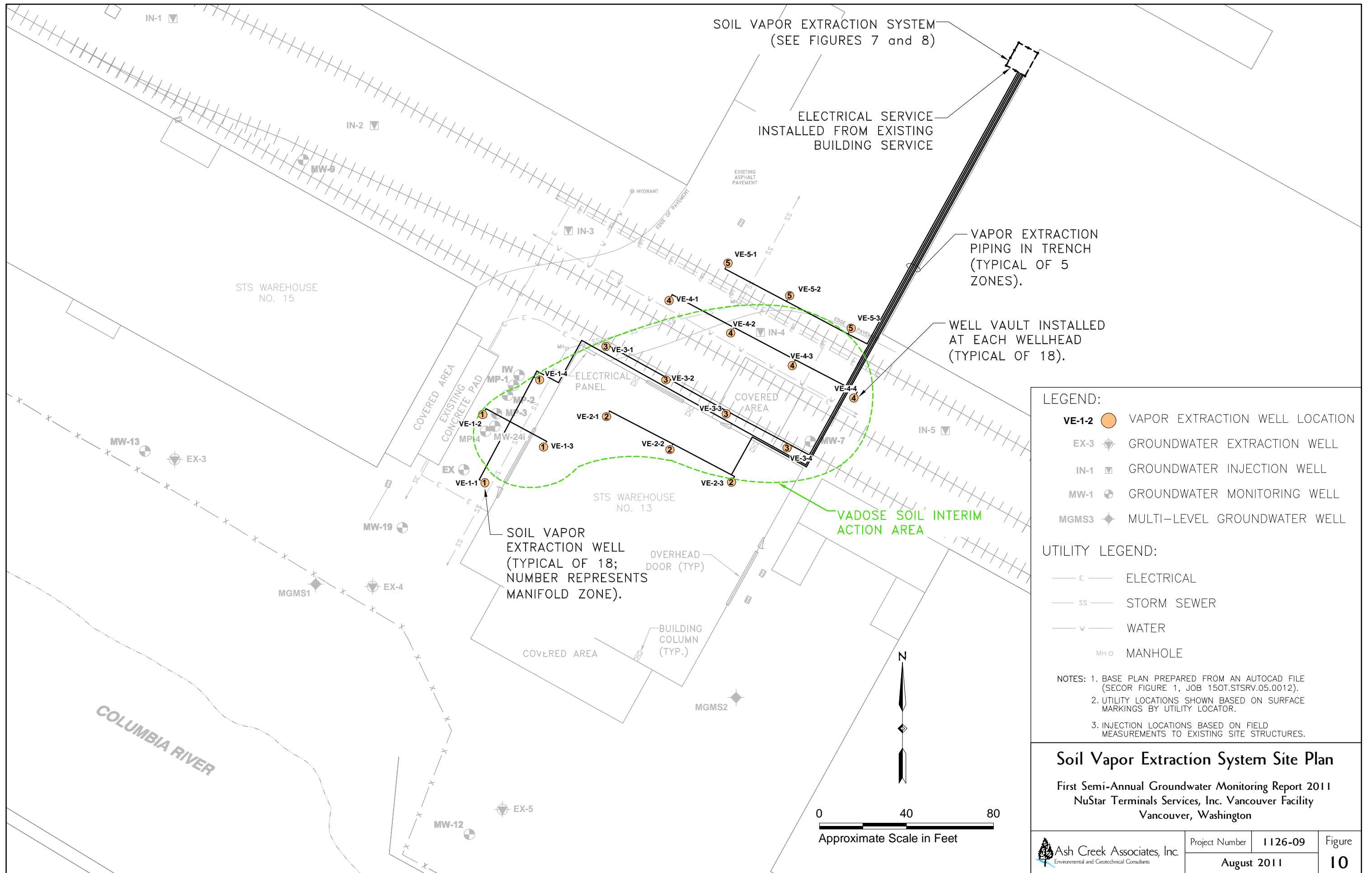
- E — ELECTRICAL
- STS — STORM SEWER
- W — WATER
- MH ⊕ MANHOLE

NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 150T.STSRV.05.0012).
2. UTILITY LOCATIONS SHOWN BASED ON SURFACE MARKINGS BY UTILITY LOCATOR.

Enhanced Bioremediation Injection Locations

First Semi-Annual Groundwater Monitoring Report 2011
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington



LEGEND:

- VE-1-2** ○ VAPOR EXTRACTION WELL LOCATION
- EX-3** ⊕ GROUNDWATER EXTRACTION WELL
- IN-1** ▽ GROUNDWATER INJECTION WELL
- MW-1** ⊕ GROUNDWATER MONITORING WELL
- MGMS3** ◆ MULTI-LEVEL GROUNDWATER WELL

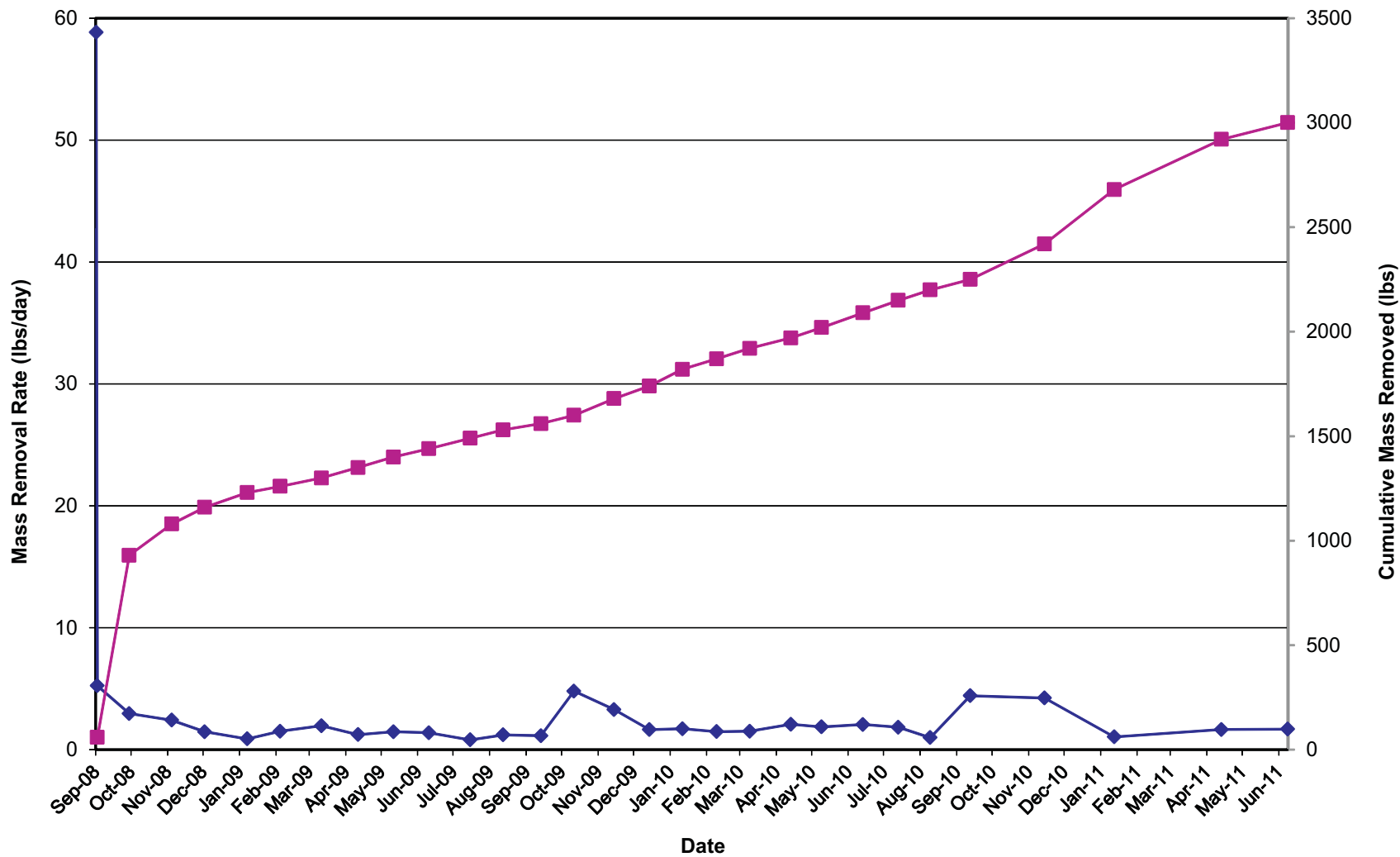
UTILITY LEGEND:

- E — ELECTRICAL
- SS — STORM SEWER
- W — WATER
- MH ○ MANHOLE

NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 150T.STSRV.05.0012).
2. UTILITY LOCATIONS SHOWN BASED ON SURFACE MARKINGS BY UTILITY LOCATOR.
3. INJECTION LOCATIONS BASED ON FIELD MEASUREMENTS TO EXISTING SITE STRUCTURES.

Soil Vapor Extraction System Site Plan
 First Semi-Annual Groundwater Monitoring Report 2011
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington



Legend:

- ◆ Removal Rate (lbs/day)
- Cumulative Mass Removal

2008 SVE System - VOC Mass Removal

Second Semi-Annual Groundwater Monitoring Report 2011
 NuStar Terminals Services, Inc. Vancouver Facility
 Vancouver, Washington



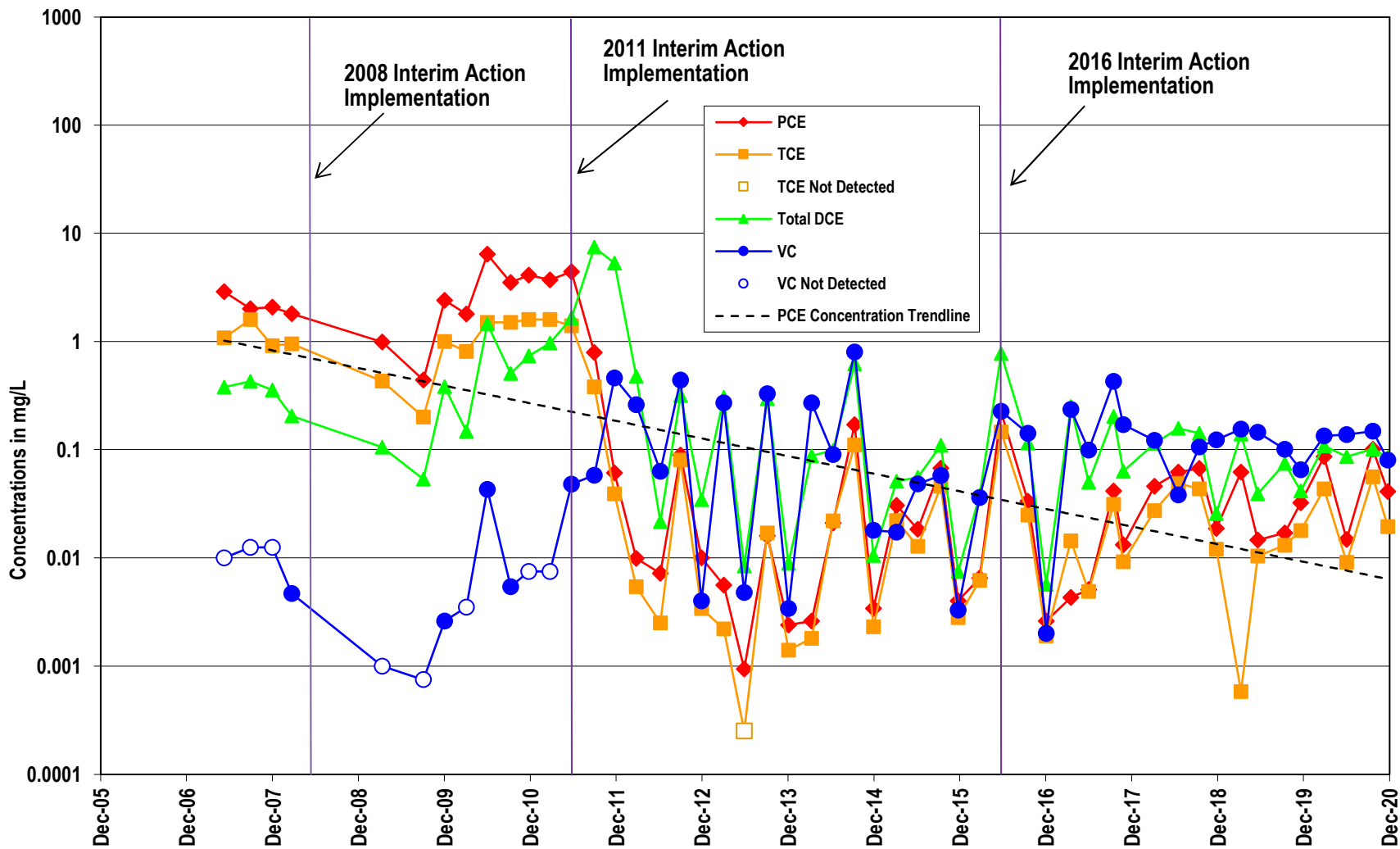
Project Number	1126-09	Figure 11
January 2012		

APPENDIX F

MOLAR CONCENTRATION TREND

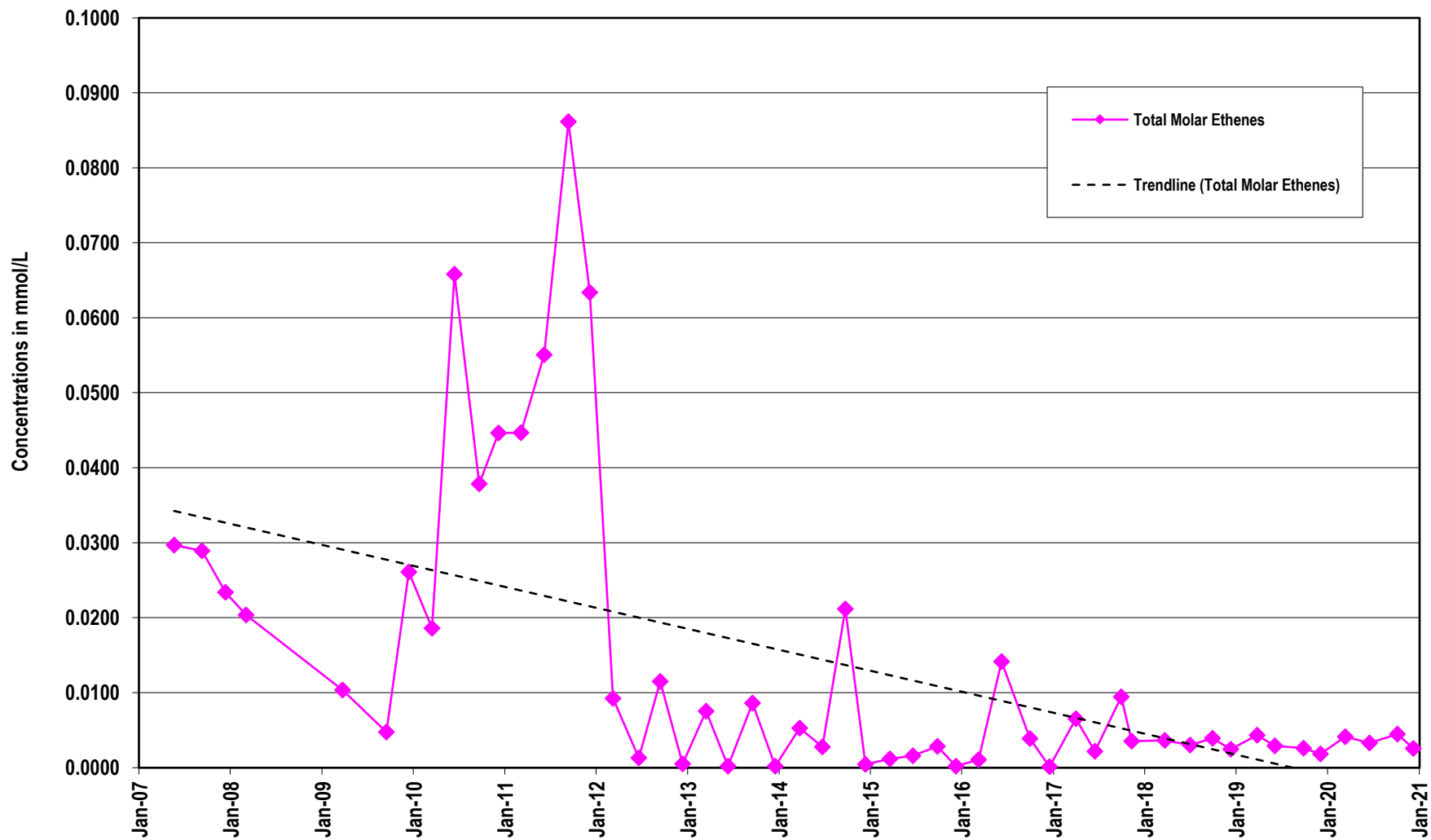
PLOTS—INTERIM ACTION WELLS

Interim Action Area - VOC Trends: MGMS2-40

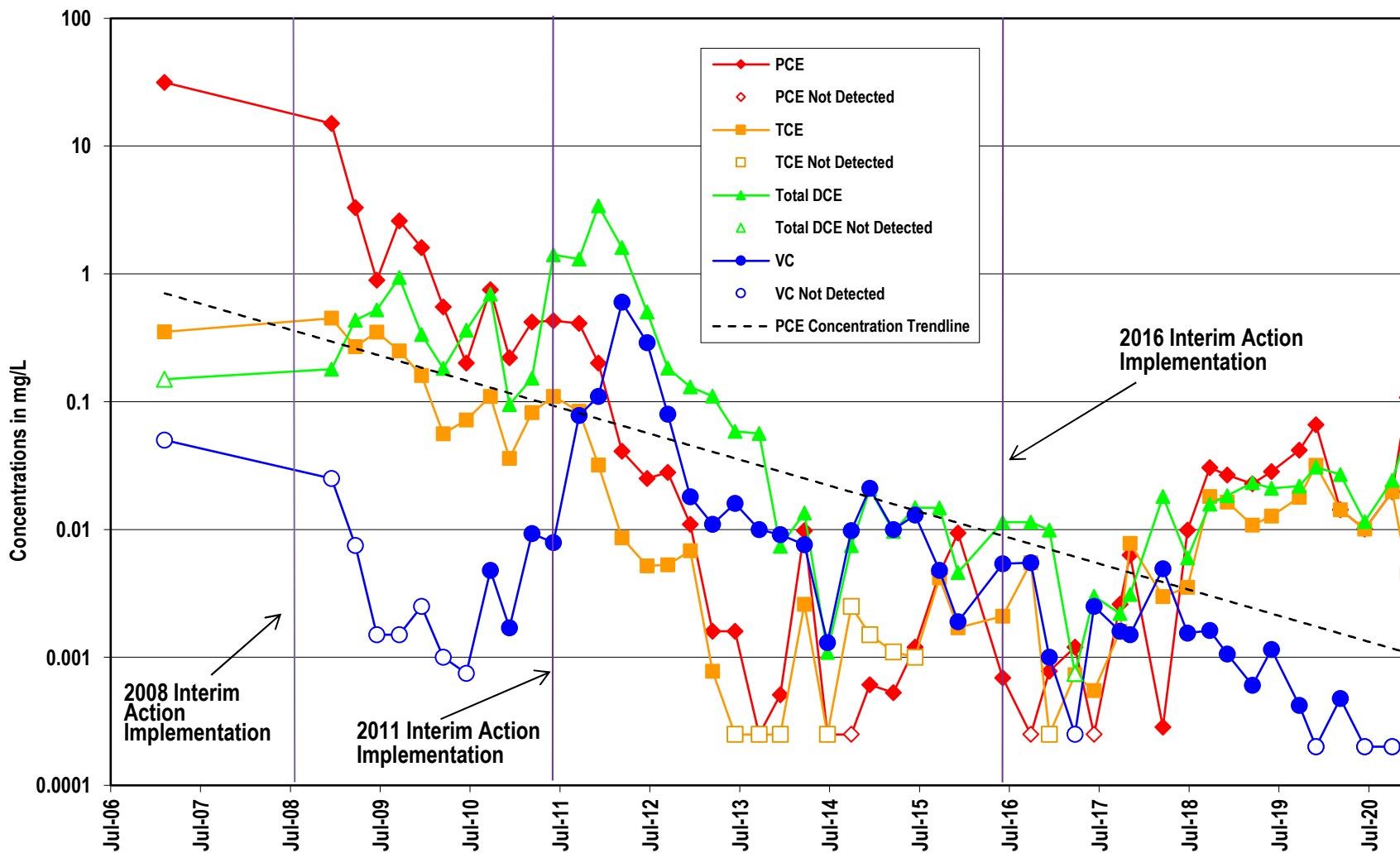


Note: Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MGMS2-40

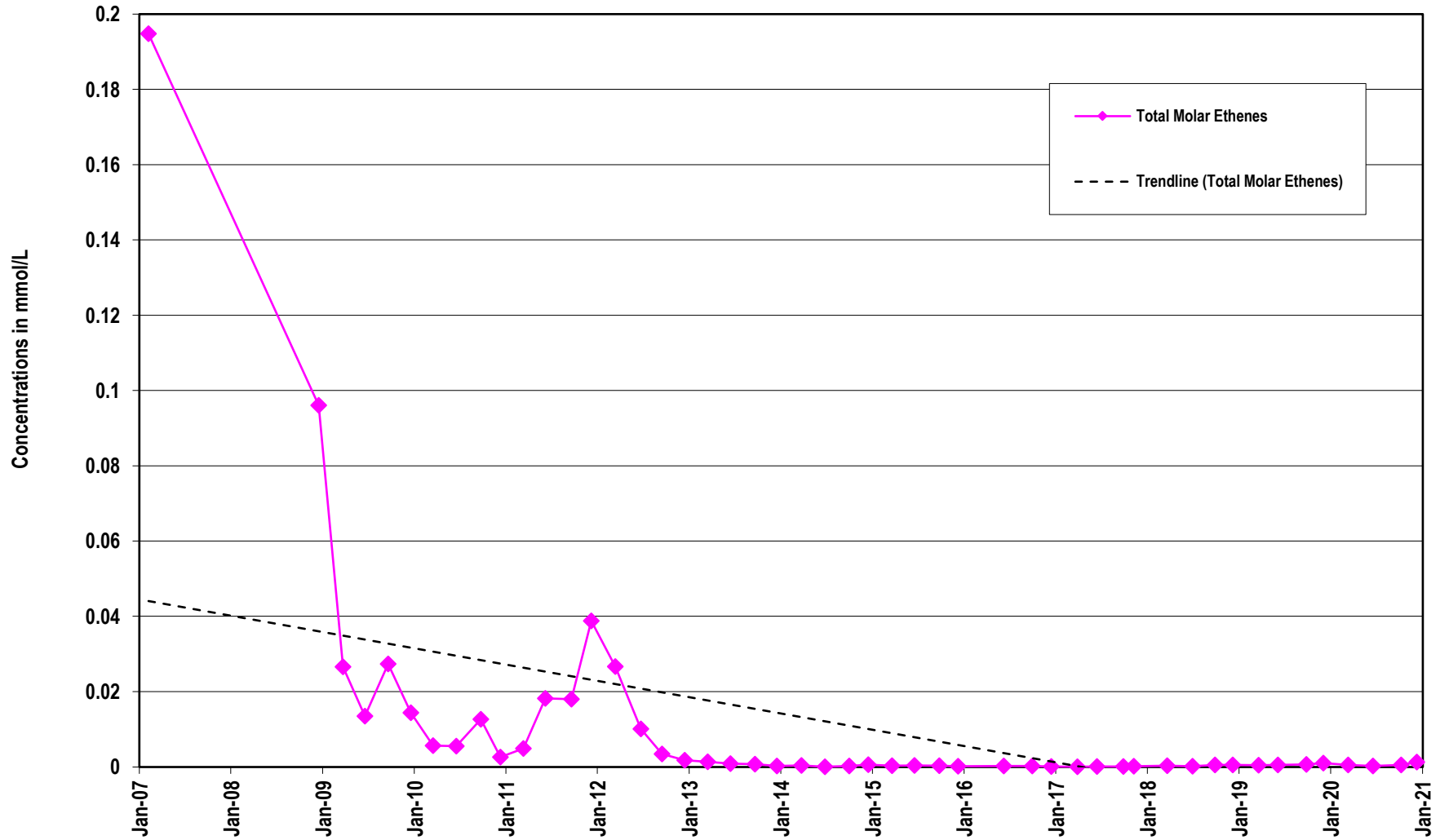


Interim Action Area - VOC Trends: MW-7

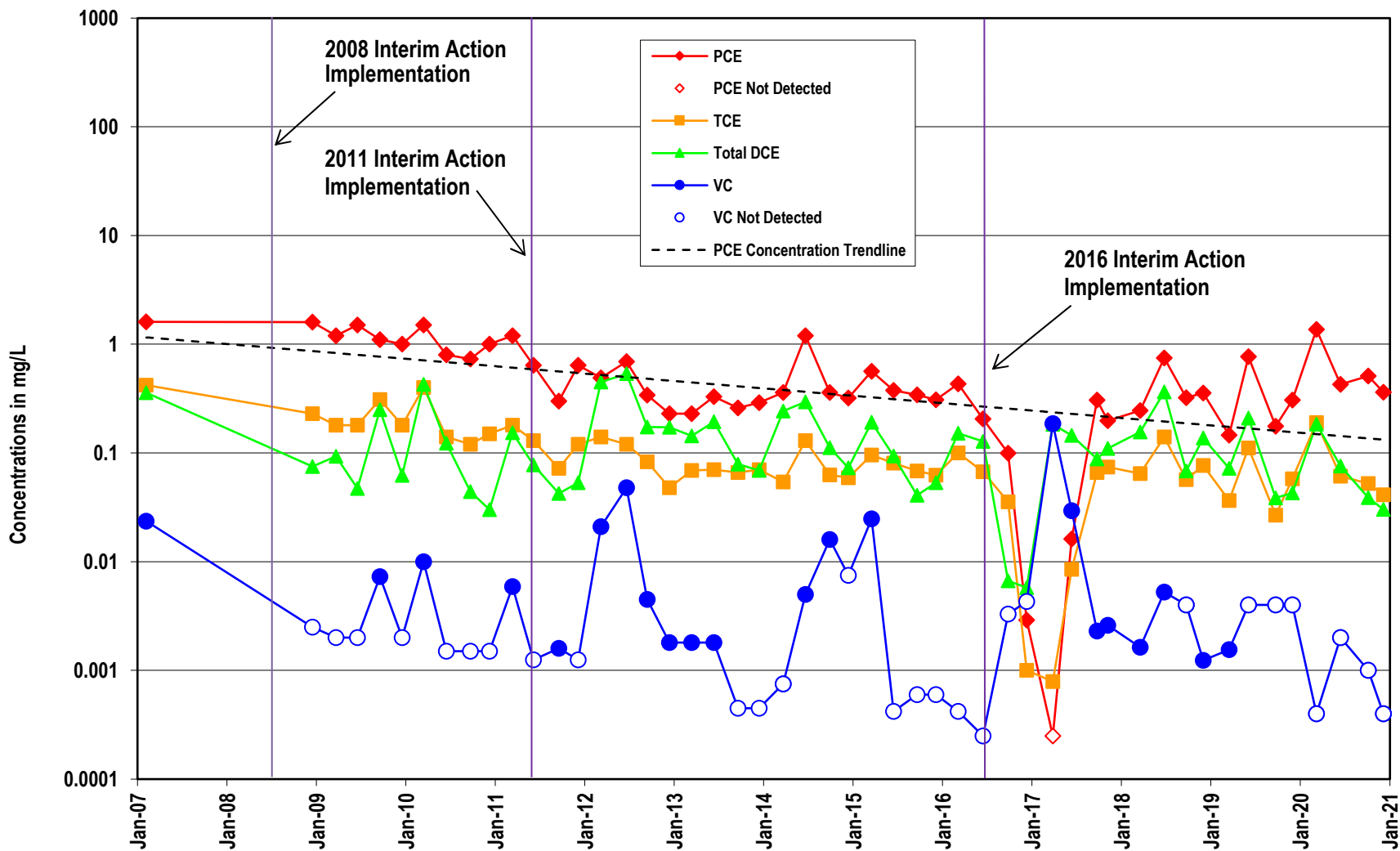


Notes: Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MW-7

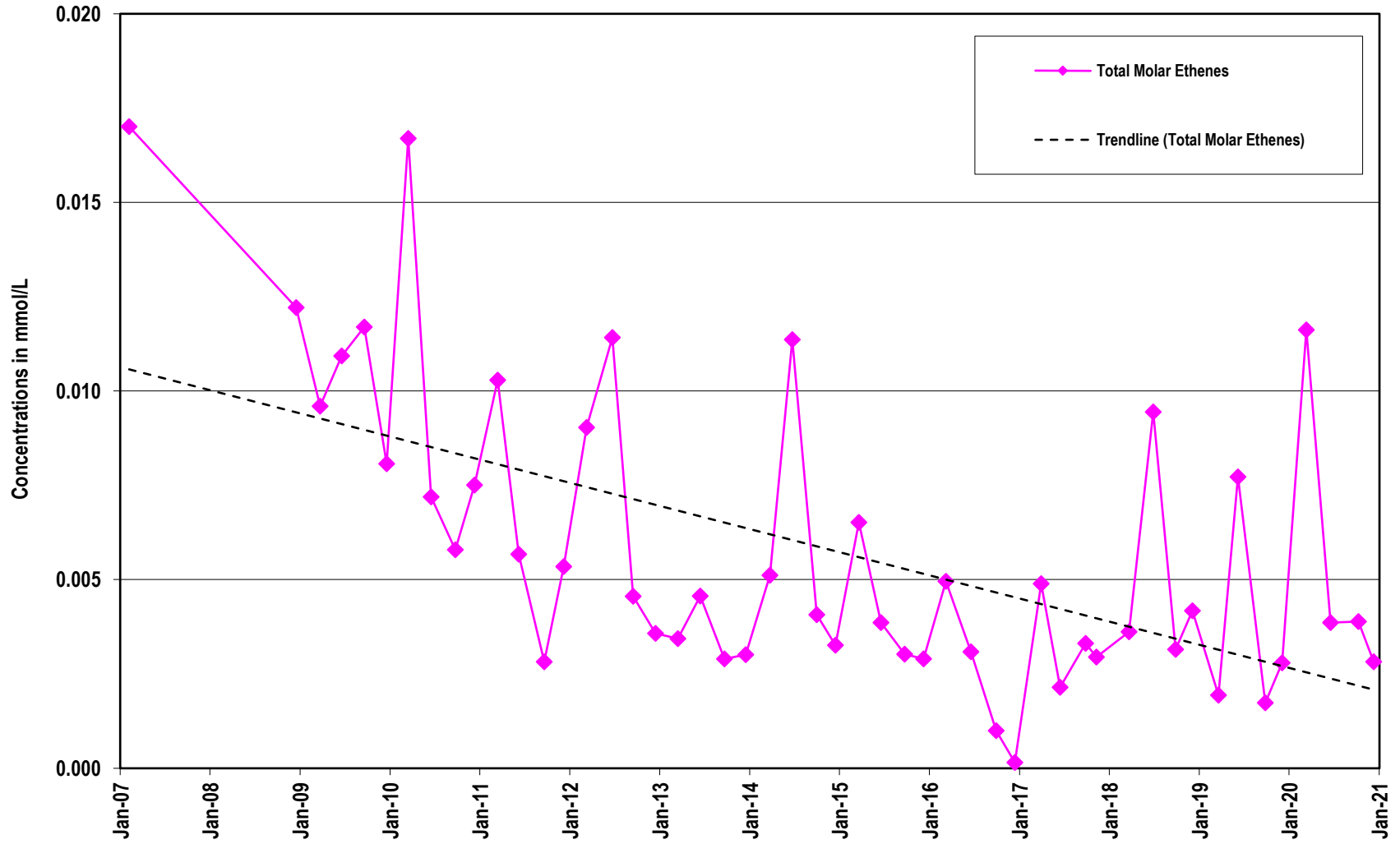


Interim Action Area - VOC Trends: MP-1

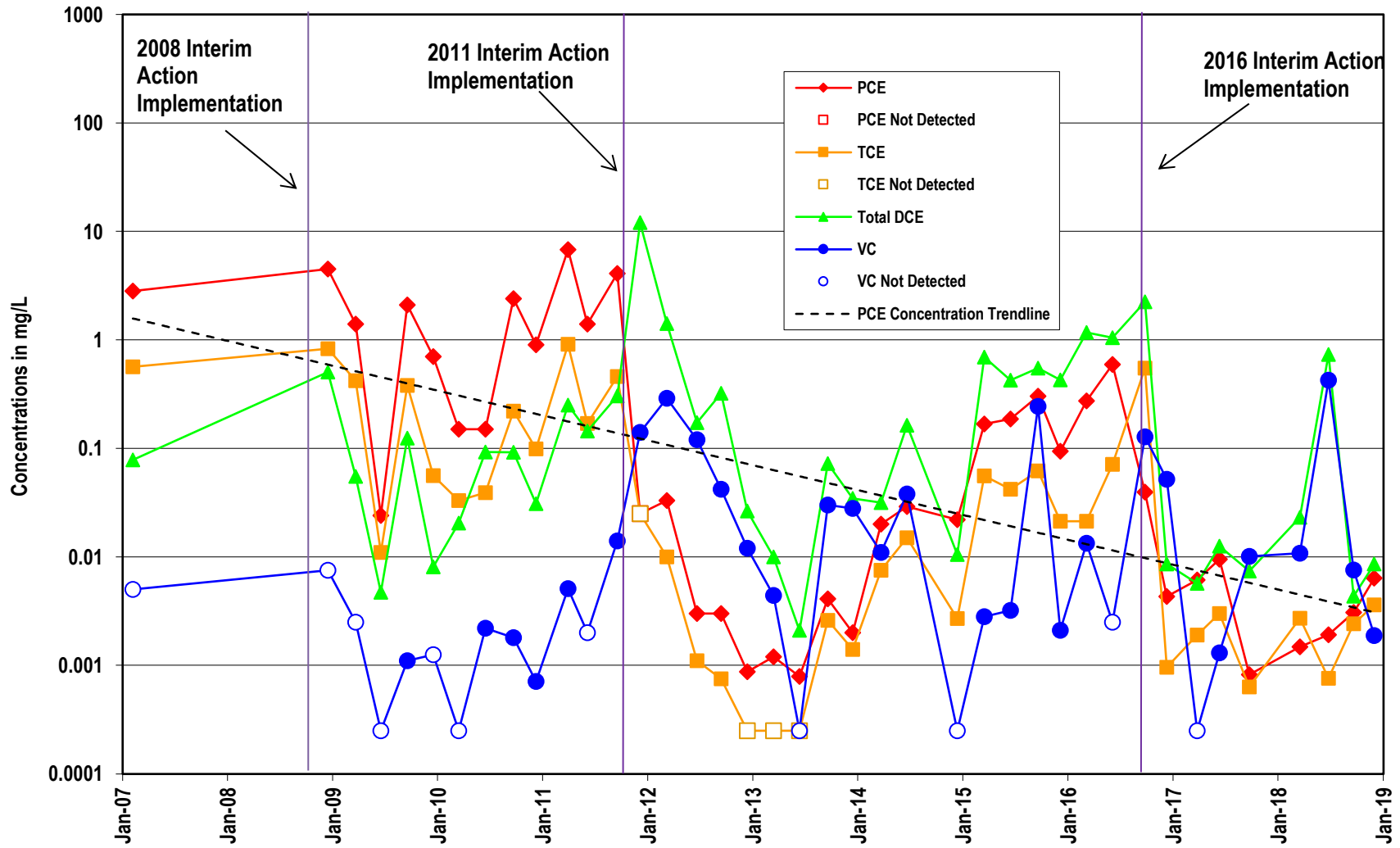


Note: Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MP-1

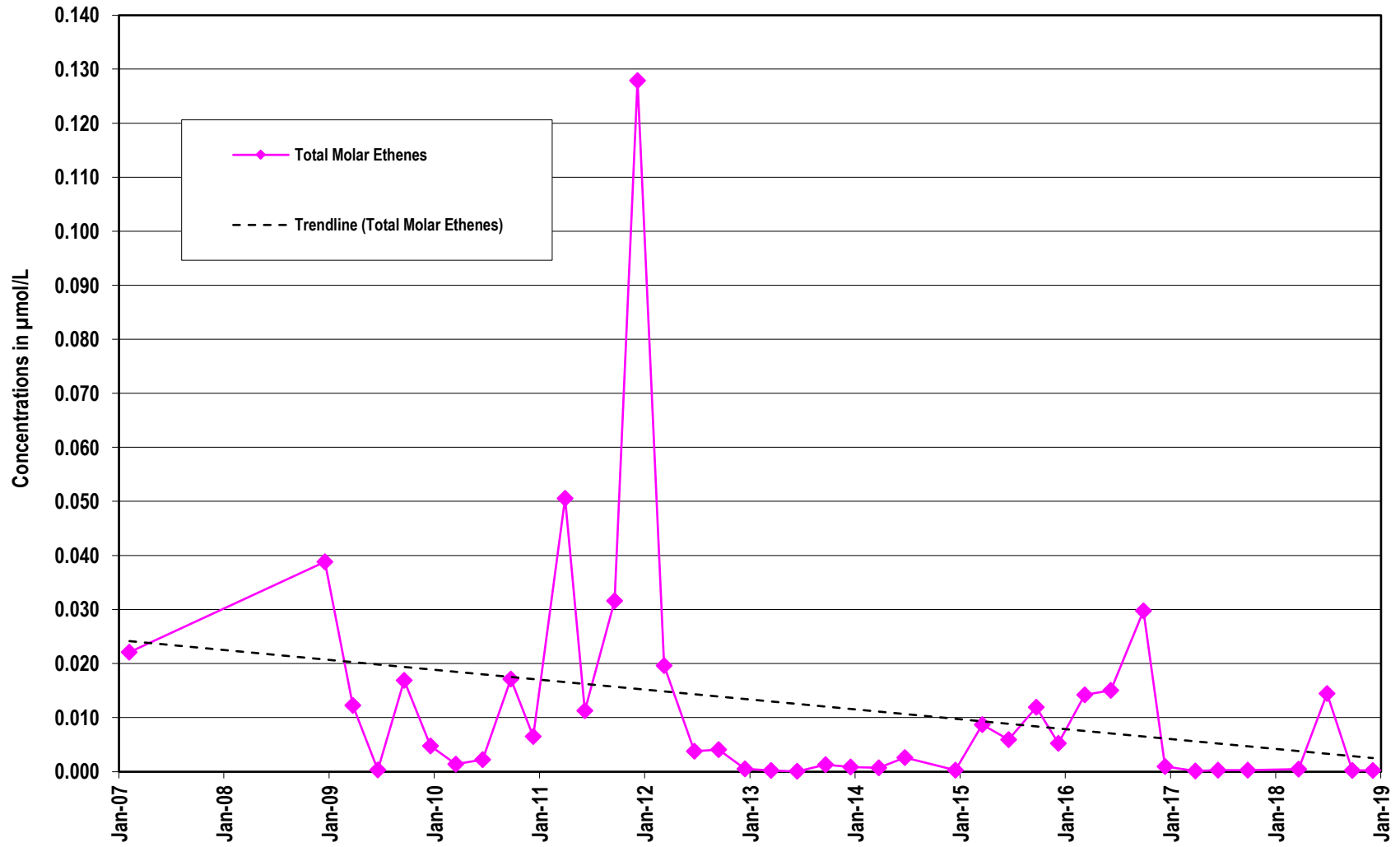


Interim Action Area - VOC Trends: EX

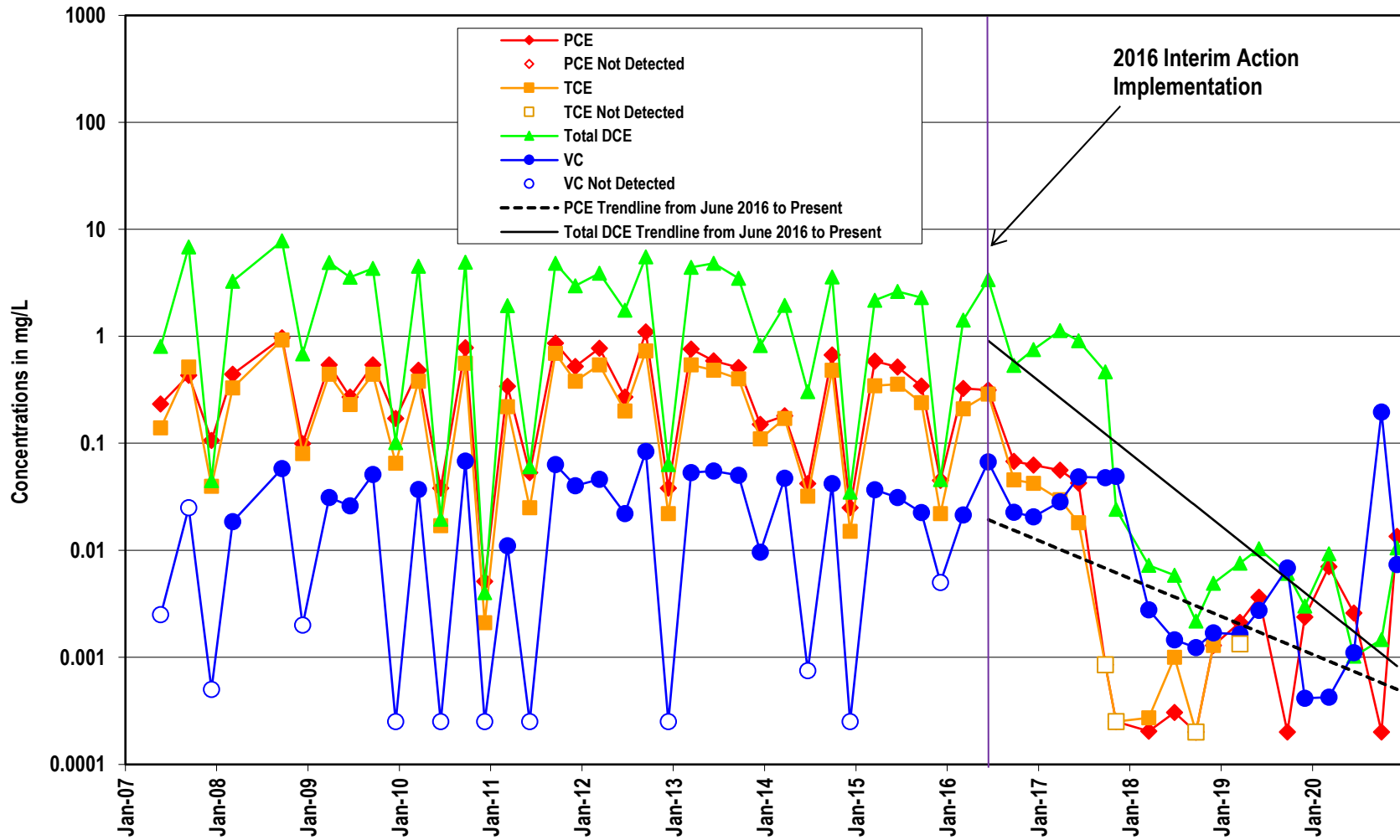


Note: Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in EX

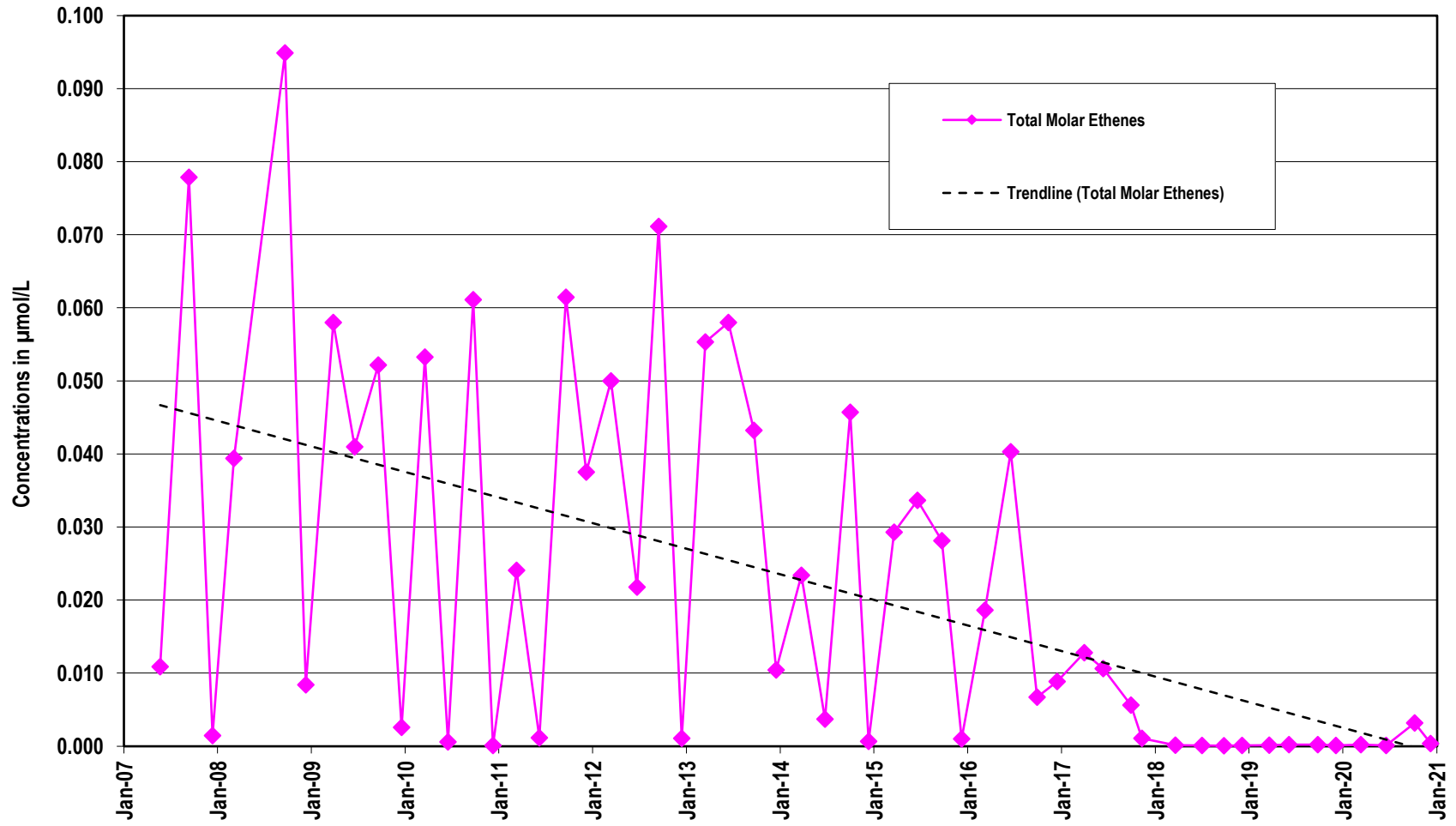


Interim Action Area - VOC Trends: MW-12

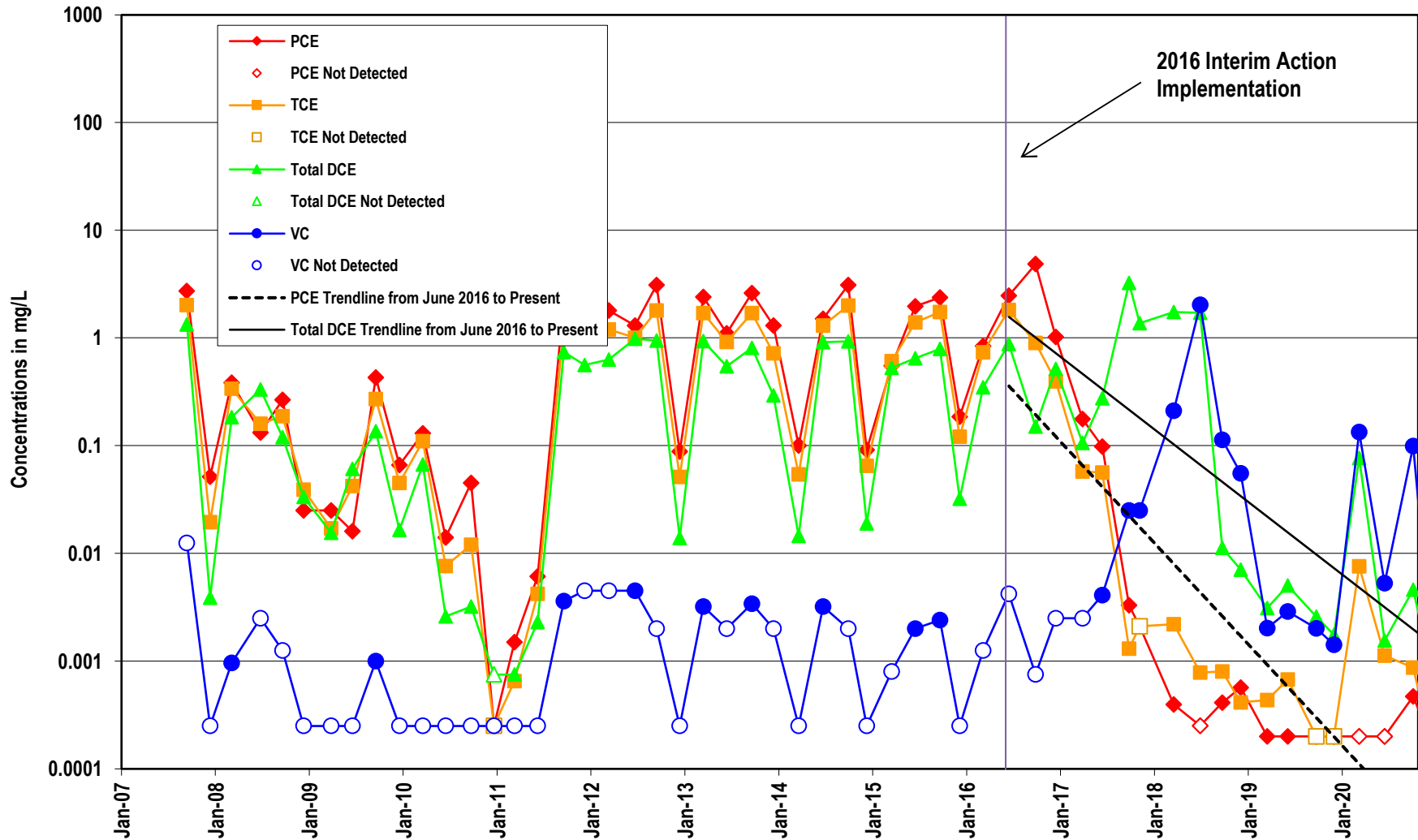


Note: Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MW-12

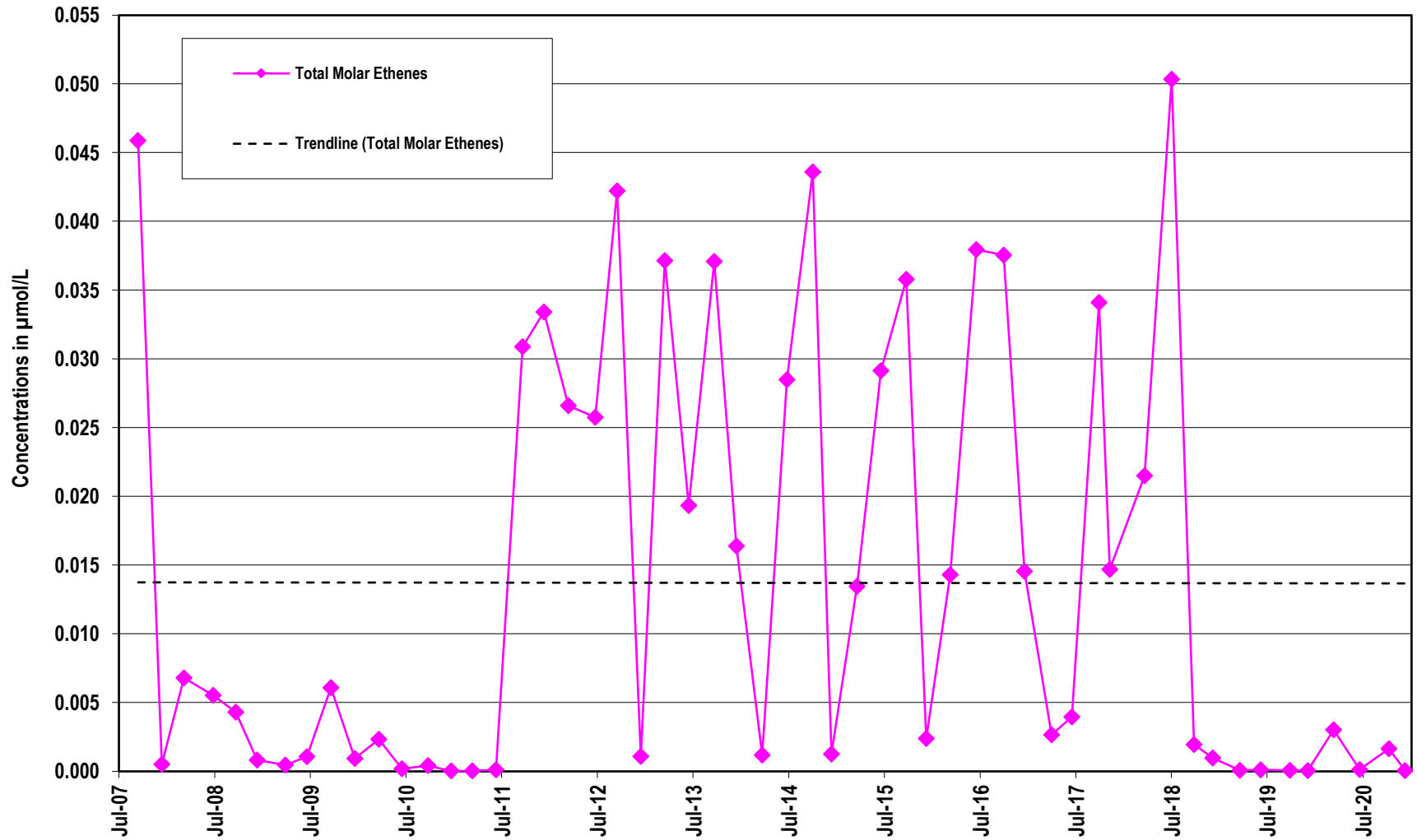


Interim Action Area - VOC Trends: MW-13

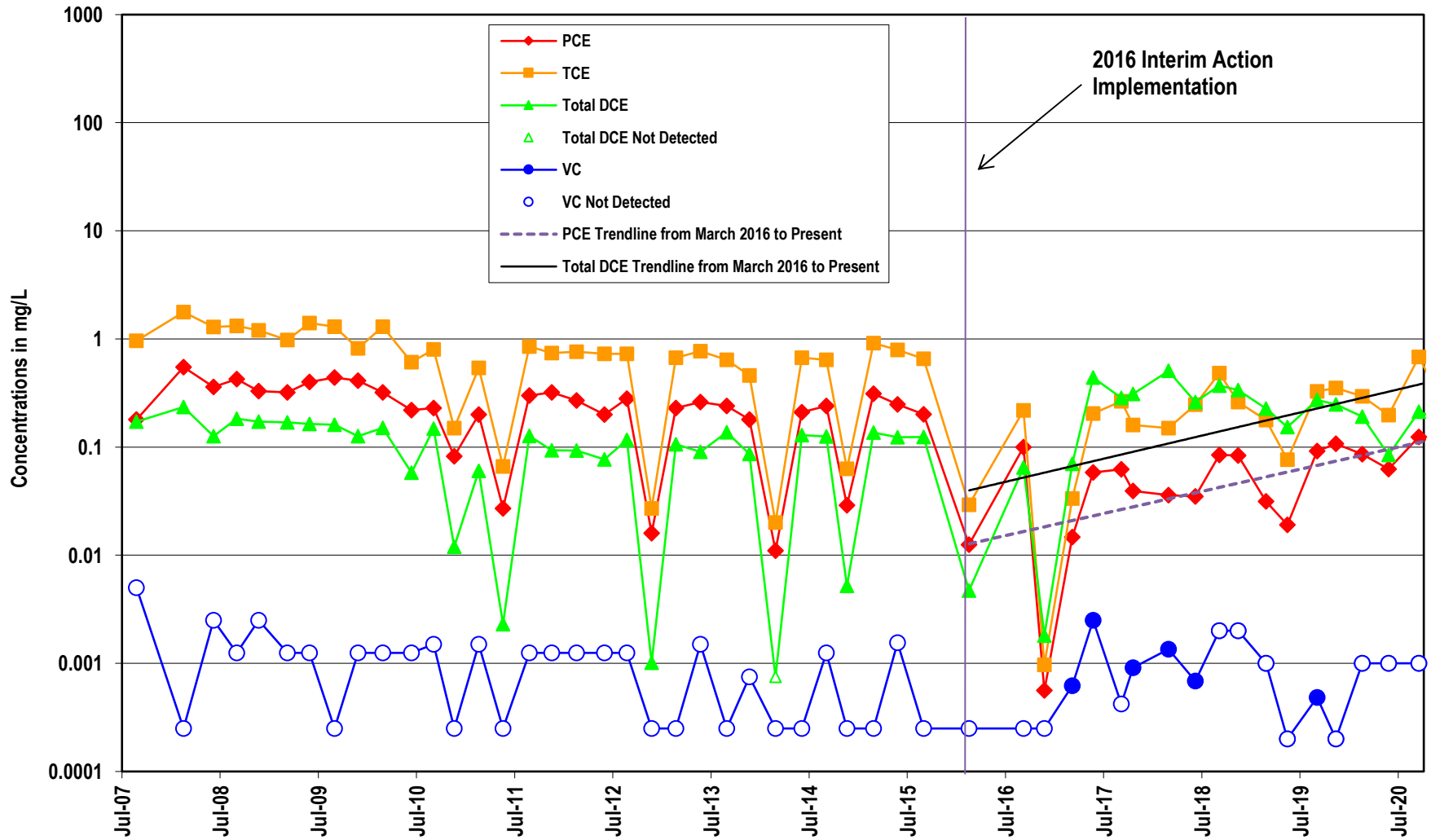


Note: Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MW-13

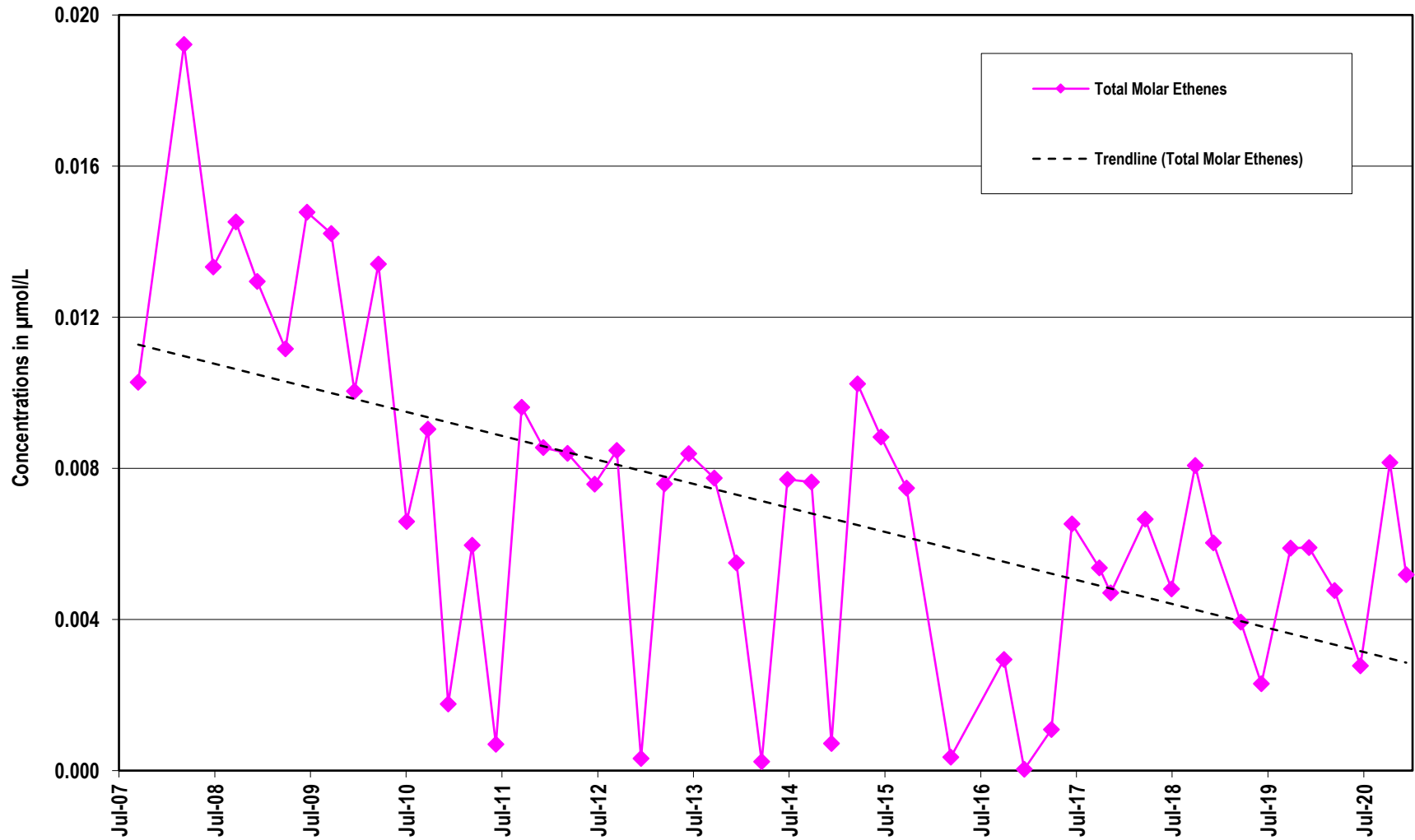


Interim Action Area - VOC Trends: MW-14

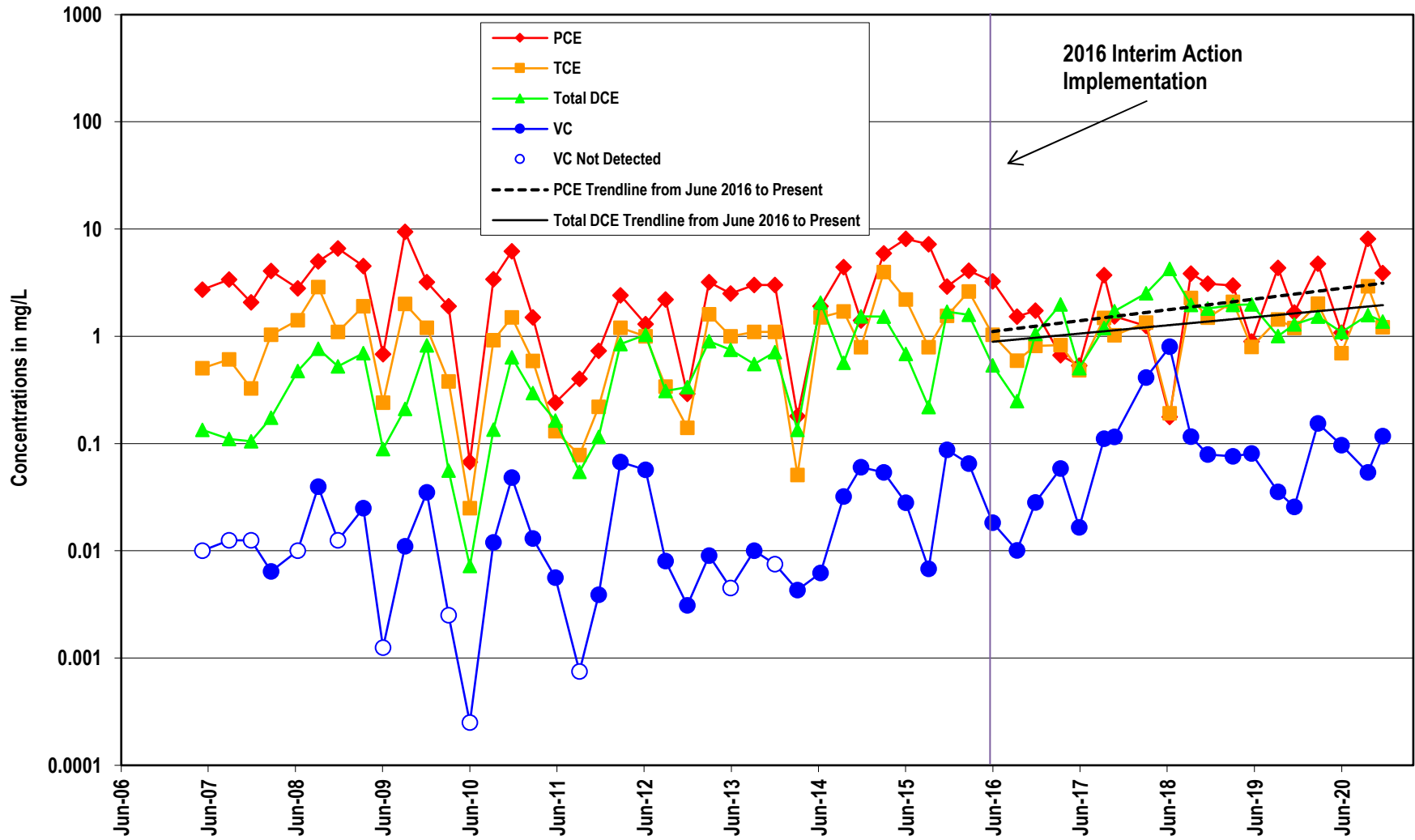


Note: Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MW-14

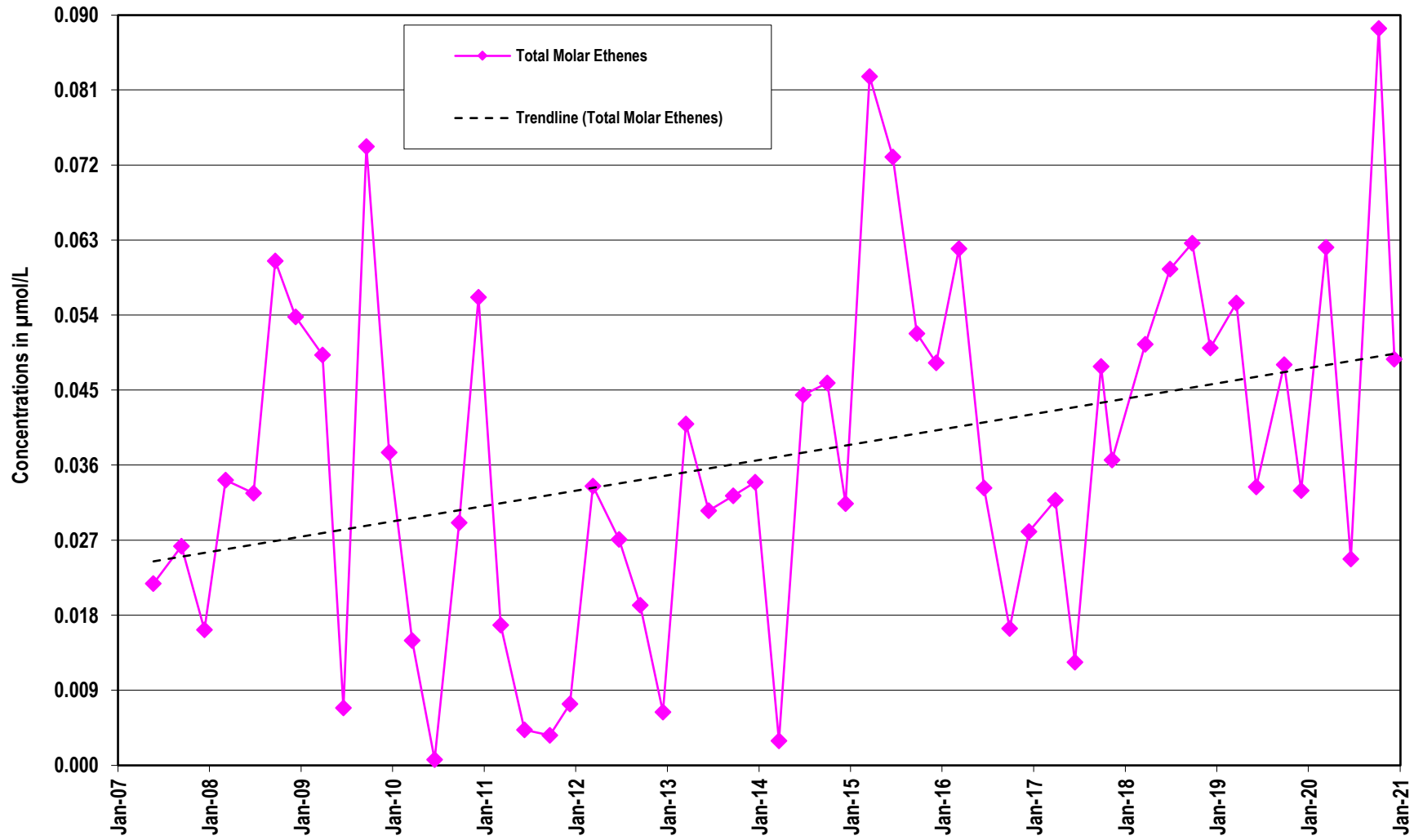


Interim Action Area - VOC Trends: MW-19

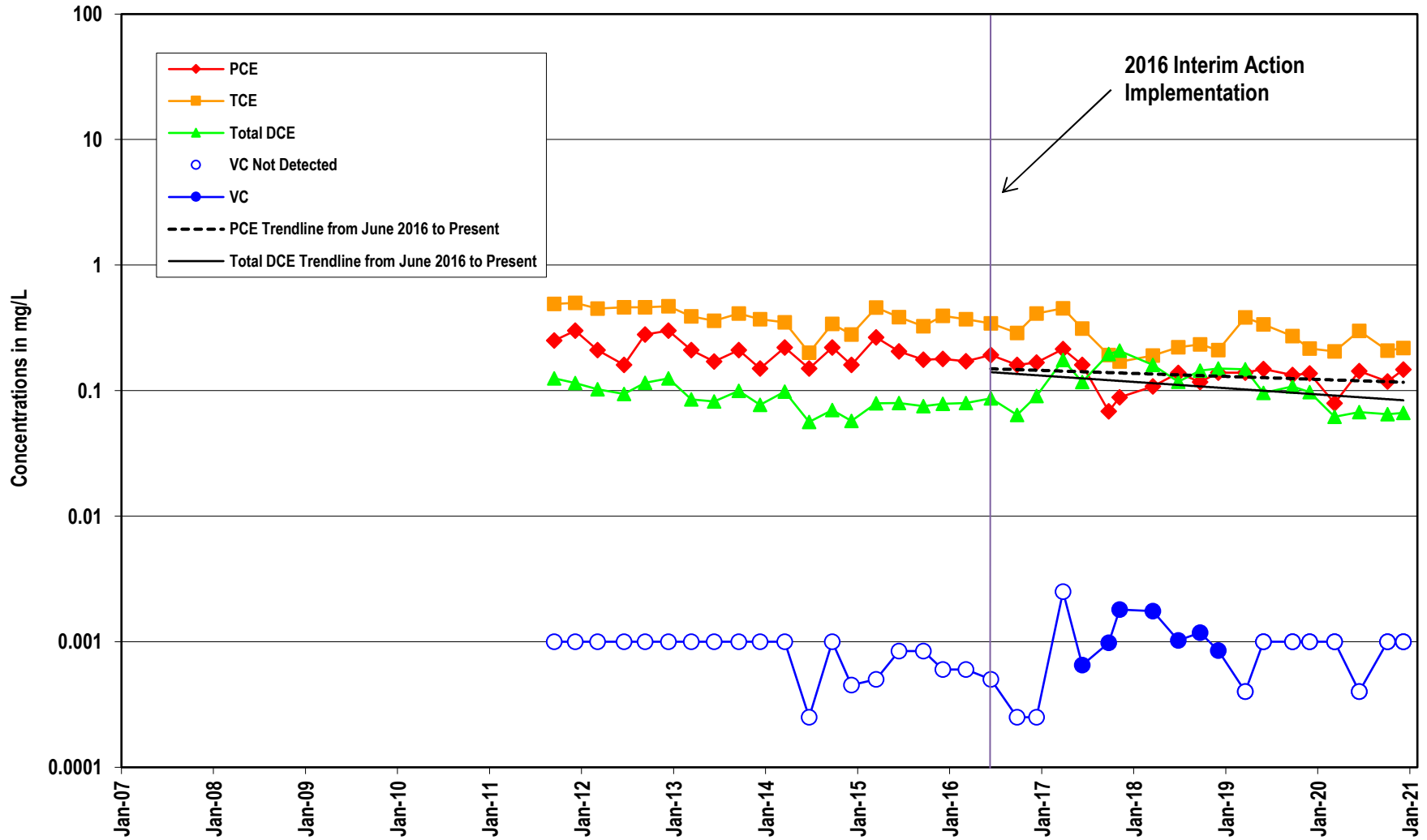


Note: Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MW-19

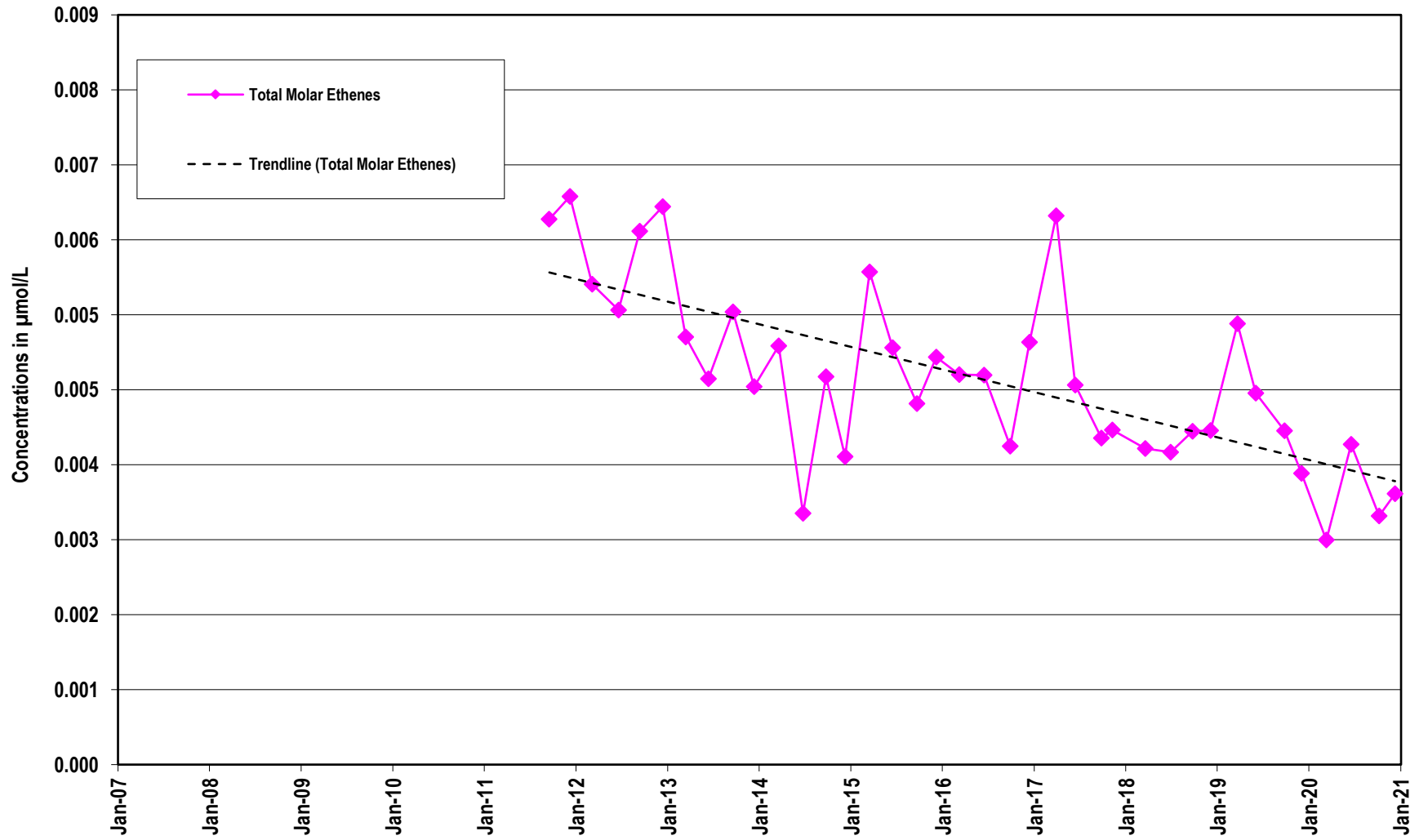


Interim Action Area - VOC Trends: MW-26

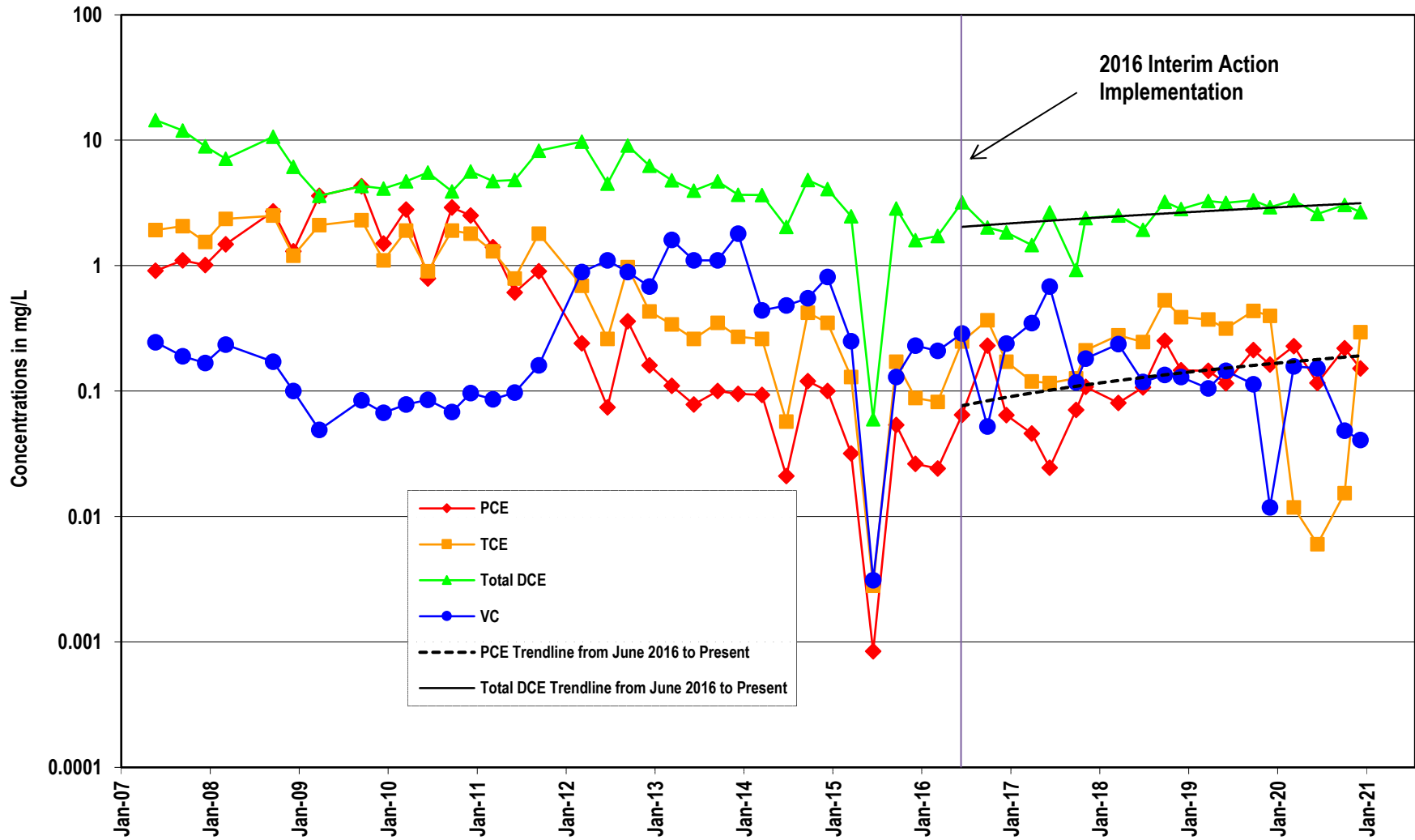


Note: Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MW-26

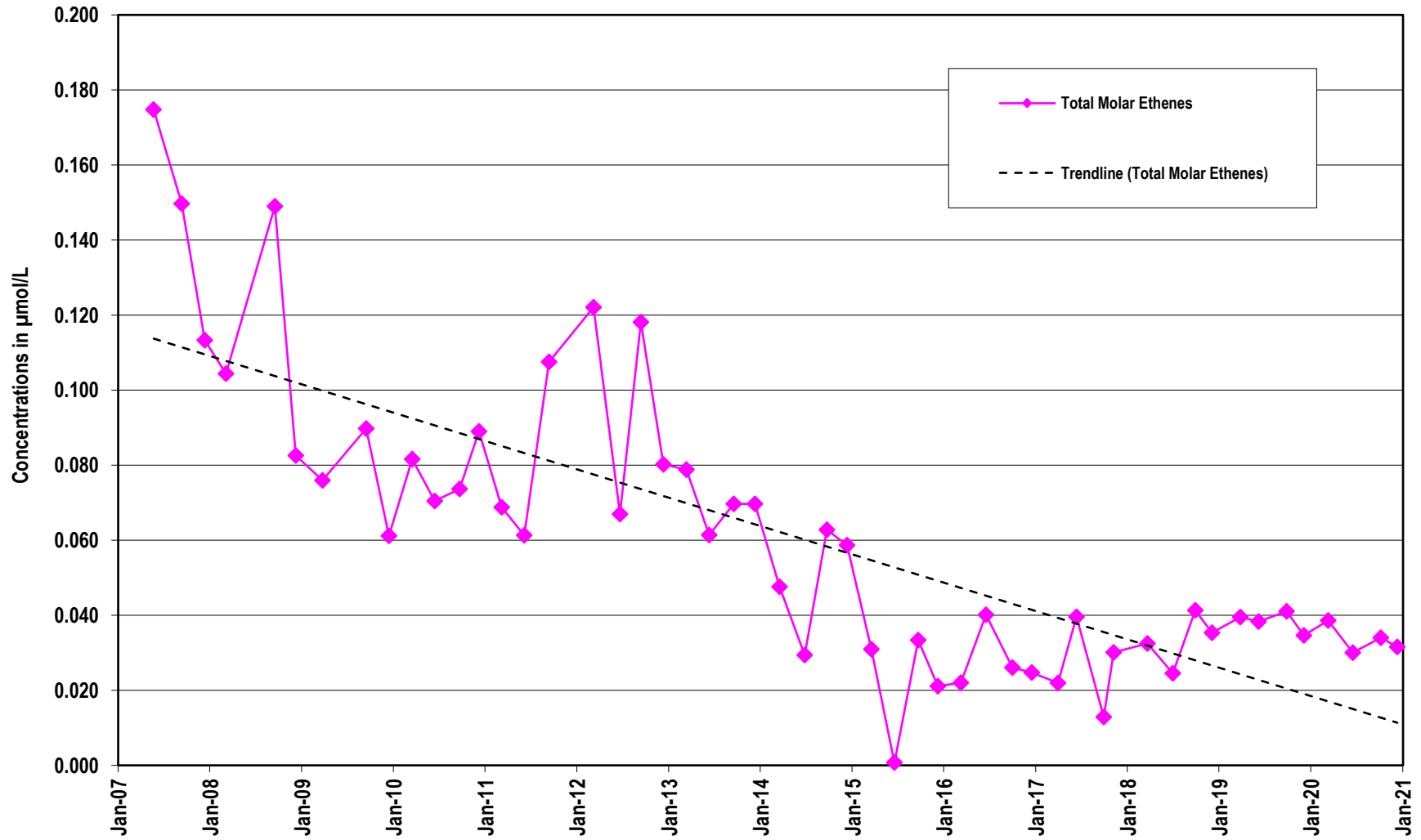


Interim Action Area - VOC Trends: MGMS1-43

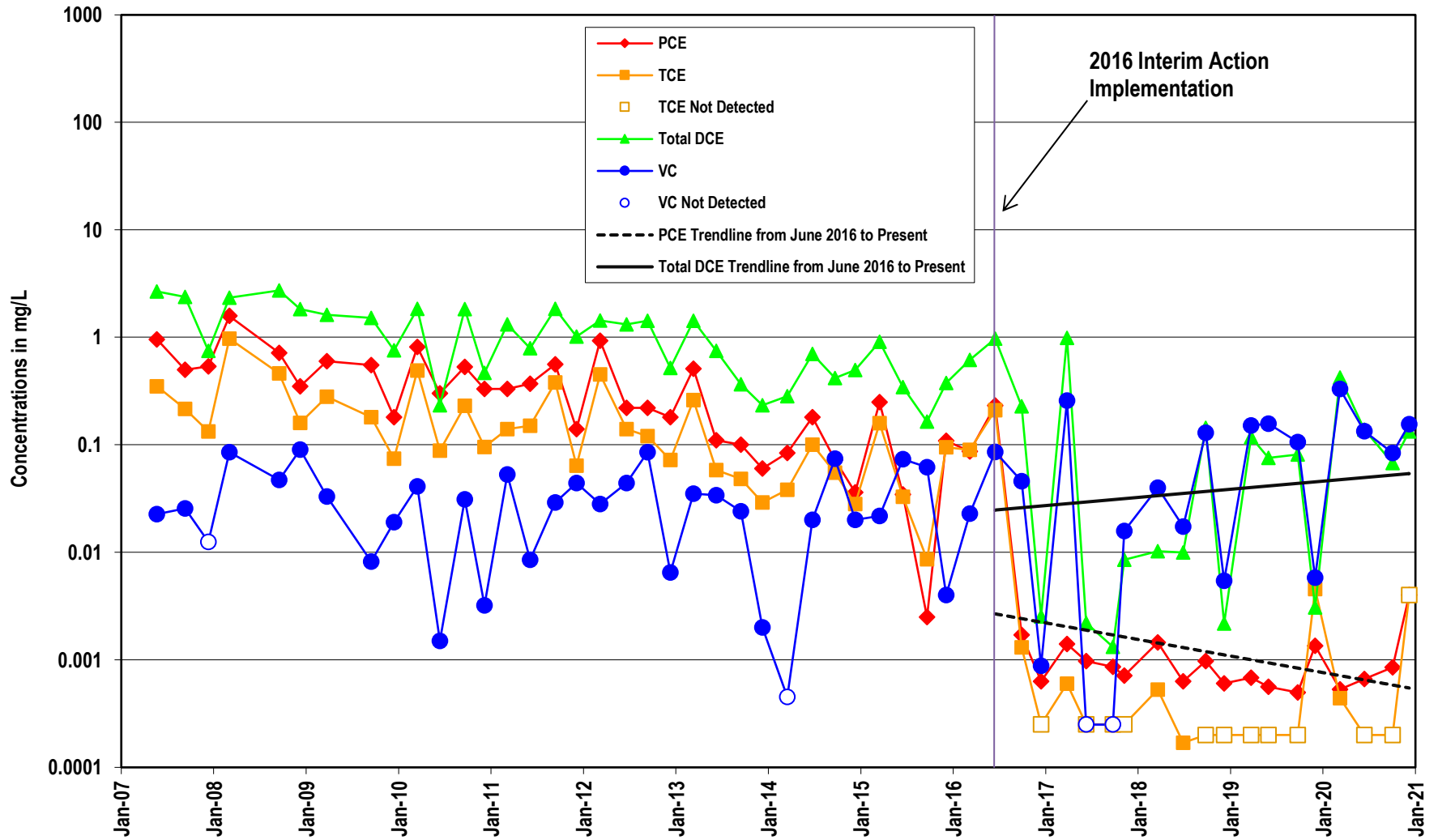


Note: Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MGMTS1-43

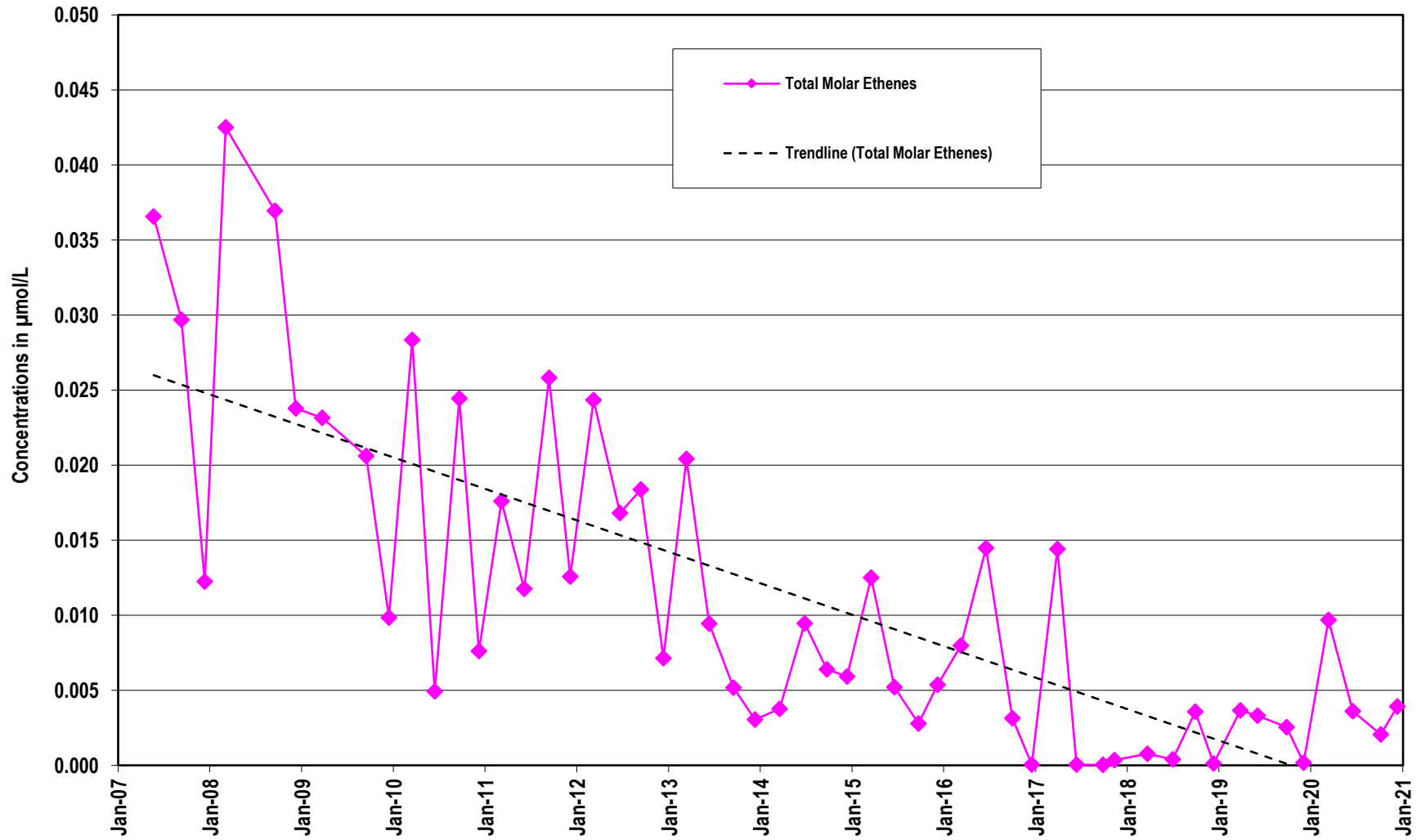


Interim Action Area - VOC Trends: MGMS3-40



Note: Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MGMT3-40





Cascadia
Associates, LLC