

August 12, 2021

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

**Subject: Submittal Semi-Annual Groundwater Monitoring Report  
January through June 2021  
NuStar Vancouver Facility  
Vancouver, Washington  
0060-002-012**

Dear Mr. Rankine:

Enclosed please find the *Semi-Annual Groundwater Monitoring Report: January through June 2021*. The report was prepared on behalf of NuStar Terminals Services, Inc. (NuStar) by Cascadia Associates, LLC (Cascadia) and presents data collected from January through June 2021.

If you have any questions or would like to discuss this further, please contact me at 503-807-3835.

Sincerely,



Stephanie Bosze Salisbury, L.G.  
Associate Geologist

## ENCLOSURE

Semi-Annual Groundwater Monitoring Report January through June 2021 (2 hard copies)

**cc:** Ms. Renee Robinson, NuStar (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  
January through June 2021  
NuStar Vancouver Facility  
2565 NW Harborside Drive, Port of Vancouver  
Vancouver, Washington**

*Prepared for:*

**NuStar Terminals Services, Inc.**

*Prepared by:*

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**Project No. 0060-002-012**

**August 2021**

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January through June 2021  
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2565 NW Harborside Drive, Port of Vancouver  
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*Prepared by:*



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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 first and second quarters of 2021. 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 first and second quarters of 2021 is summarized in Table 1. Deviations from the Table 1 program include the following:

- Monitoring well EX<sup>1</sup> was not sampled in the first quarter 2021; due to damage to the well, the well was decommissioned during the third quarter 2019. The replacement well EX was installed on April 15, 2021, as described in further detail in Section 6.2.
- Monitoring well MW-24d was not sampled in the second quarter 2021 sampling event due to an inability of the sampling equipment to be advanced to the correct sampling depth. Troubleshooting will occur to allow for sampling in future events.
- Monitoring well MGMS3-132 was inadvertently omitted from the sampling program during the second quarter 2021; this well will be sampled according to the monitoring program in future events.
- The three multi-port (MGMS) wells were not gauged during the second quarter 2021 event. Gauging of those wells requires the rental of a narrow diameter tape capable of fitting in the

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<sup>1</sup> Monitoring well EX has historically been referred to as EX-1 or EX. It will be referred to as EX from this date forward.

narrow sampling ports; due to unusually high demand, the rental equipment was not available during the gauging event. The narrow tape was procured in time for MGMS well sampling activities.

Two monitoring events were conducted during this period: the first quarter 2021 groundwater monitoring event was conducted from March 1 through 5, 2021, and the second quarter 2021 event was conducted from June 14 through June 17, 2021.

## 2.1 WATER LEVEL MEASUREMENTS

First quarter 2021 groundwater levels were measured on March 1, 2021, and second quarter 2021 groundwater levels were measured on June 17, 2021. The depth to groundwater was measured at Facility monitoring wells, multi-level groundwater monitoring (MGMS) wells (first quarter only), and selected off-site wells (MW-14, MW-17, MW-23i, MW-25i, MW-26, MW-E, MW-F, 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 first and second quarter 2021 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 first and second quarter 2021 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 first and second quarter 2021 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 first quarter 2021 are shown on Figures 3 and 4, respectively. Groundwater elevations and estimated elevation contours for the Shallow and Intermediate Zone wells for the second quarter 2021 are shown on Figures 5 and 6, respectively.

### 3.1 FIRST QUARTER 2021

**Shallow Zone.** On March 1, 2021, 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 23.97 to 31.47 feet below the top of casing (BTOC), and the corresponding groundwater elevations in these wells ranged from 4.84 to 8.59 feet above mean sea level (MSL; Table 2).

During the first quarter 2021 monitoring event, gauging of the Shallow Zone wells was completed between 9:08 AM and 12:57 PM. During that time interval, the water level in the adjacent Columbia River decreased by 1.09 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 1.9 feet higher in March 2021 than during the previous monitoring event in December 2020. During the first quarter 2021 gauging event, and consistent with previous gauging data, there was a northwest to southeast groundwater divide between wells MW-10 located in the northwest and well MW-6 located in the southeast. 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 March 1, 2021, 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 7:58 AM and 11:16 AM on March 1, 2021. During the time interval in which Intermediate Zone wells were gauged, water levels in the adjacent Columbia River decreased by 0.98 feet.

During the March 1, 2021 water level measurements, the observed depths to groundwater in the Intermediate Zone wells ranged from 25.45 to 28.00 feet BTOC, with groundwater elevations ranging from 4.59 to 7.31 feet above MSL (Table 2). As shown in Table 2, groundwater elevations in

the Intermediate Zone were approximately 1.8 feet higher in March 2021 than during the previous monitoring event in December 2020. During the March 2021 gauging event, the Intermediate Zone groundwater gradient beneath the Facility was relatively flat, with a slight gradient toward the river (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 26.61 feet BTOC, corresponding to an elevation of 7.30 feet above MSL. A groundwater potentiometric map was not prepared for Deep Zone groundwater.

### 3.2 SECOND QUARTER 2021

**Shallow Zone.** On June 17, 2021, 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 23.92 to 31.76 feet BTOC, with groundwater elevations ranging from 7.11 to 7.90 feet above MSL (Table 2).

During the second quarter 2021 monitoring event, gauging of the Shallow Zone wells was completed between 8:45 AM and 11:14 AM. During the gauging activities, the water level in the adjacent Columbia River increased by 0.45 foot. As shown in Table 2, groundwater elevations on average were around 0.2 foot higher in June 2021 than the previous gauging event in March 2021.

A northwest to southeast trending groundwater divide was observed in the western and central portion of the property between wells MW-8 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 June 17, 2021 gauging event, depth to groundwater was measured in Intermediate Zone wells between 8:43 AM and 9:55 AM. During this time period, water levels in the adjacent Columbia River increased by 0.33 foot. The observed depths to groundwater in Intermediate Zone wells ranged from 24.17 to 29.68 feet BTOC, and groundwater elevations in these wells ranged from 4.6 to 7.50 feet above MSL (Table 2). As shown in Table 2, groundwater elevations on average were around 1 foot higher in June 2021 than the previous monitoring event in March 2021. During the June 17, 2021 gauging event, groundwater flow beneath the Facility was flat, with no discernable gradient (Figure 6).

**Deep Zone.** Depth to water in Deep Zone well MW-24d was 26.69 feet BTOC, corresponding to an elevation of 7.22 feet above MSL (Table 2).

## 4.0 GROUNDWATER SAMPLE ANALYTICAL RESULTS

Complete copies of the laboratory reports for the first and second quarter 2021 groundwater monitoring events, including the quality assurance evaluation report and chain-of-custody documentation, are included in Appendix C.

## 4.1 FIRST QUARTER 2021

The March 2021 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 first quarter 2021 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 SECOND QUARTER 2021

The June 2021 monitoring program included the collection of groundwater samples from the wells as shown in Table 1. 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 second quarter 2021 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 March and June 2021 are generally similar to or less than historical results. A Supplemental Remedial Investigation (SRI) was initiated in the first semi-annual 2021 reporting period to further assess the nature and extent of ammonia, nitrates, and nitrites in groundwater at the Facility. The results of the SRI groundwater investigation will be provided to Ecology in a memorandum during third quarter 2021.

## 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 an SVE system 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 first and second quarter 2021 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 first and second quarter 2021 monitoring events. Table 5 shows the results of interim action groundwater monitoring from the February 2007 baseline event through the second quarter 2021 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 second quarter 2021. 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 June 2021.

A discussion of reductive dechlorination of HVOCs in groundwater from prior to the 2008 interim action through the second quarter 2021 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 2011<sup>2</sup>; 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, 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, 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 June 2021. The concentrations of PCE and TCE have decreased in each well. The concentrations of PCE and TCE in wells MW-7 and MGMS2-40 have been reduced by more than 88 percent since the interim measures were initiated. The concentrations of PCE and TCE in well MP-1 have decreased by approximately 81 percent and 88 percent, respectively, between the February 2007 baseline event and the June 2021 monitoring event. The concentration of PCE and TCE in well EX decreased by more than 99 percent between the February 2007 baseline event and the December 2018 monitoring event. As described in Section 2.0, monitoring well EX was identified as damaged during the first quarter of 2019 and was decommissioned during the third quarter 2019. In April 2021, a replacement monitoring well was installed adjacent to the abandoned well location. During the first sampling event of the new well in June 2021, the PCE, TCE, and cis-DCE concentrations were elevated above the concentrations measured during the last monitoring event in December 2018. This well will continue to be monitored to determine if concentrations trends are consistent with historical results from the abandoned well.

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

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<sup>2</sup> 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.

heavy PCE to the progressively lighter TCE, DCE, and VC. Molar concentration trend plots for wells MW-7, EX, MP-1, and MGMS2-40 are provided in Appendix F. Between the February 2007 baseline event and the June 2021 monitoring event, total molar concentrations in wells MP-1, MW-7 and MGMS2-40 decreased between 82 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 decreased over 99 percent. Given the large time gap between the sampling of well EX in December 2018 and the sampling of the replacement well EX in June 2021, trends will continue to be evaluated after a few quarters of data are collected from the new well.

**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 93 percent in groundwater from wells 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 June 2021, PCE and TCE were detected at 1.01 and 2.56 µg/L, respectively. DCE concentrations have also decreased. The DCE concentrations in wells MW-12, MW-13, and MGMS3-40 have all been reduced by greater than 75 percent since the 2016 enhanced bioremediation injections; concentrations of DCE in well MGMS1-43 have decreased by approximately 81 percent since 2007 and 14 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 first and second quarter 2021 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 first semi-annual 2021 monitoring period, ethene was detected in five of the eleven 2016 interim action area monitoring wells sampled (MW-12, MW-13, MW-19, MGMS1-43, 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. 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 June 2021). 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, 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 during the December 2018 or June 2021 monitoring events. As described in Section 2.0, well EX was not sampled between December 2018 and June 2021; due to damage to the well, the well was decommissioned in September 2019 and a replacement well was installed adjacent to the former well on April 15, 2021.

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 was detected during subsequent monitoring event samples through December 2020, at concentrations ranging from 1.4 to 78 µg/L. Ethene was not detected (<1.0 µg/L) during the March and June 2021 monitoring events. The presence of ethene in several interim action area wells, along with decreasing PCE and TCE concentrations, indicates that reductive dechlorination has been ongoing near this well.

**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), and June 2021 (14.0 µg/L).
- PCE and TCE concentrations in MW-13 have decreased significantly between September 2016 and June 2021 (from 5,090 µg/L and 951 µg/L, respectively, to 1.01 µg/L and 2.56 µg/L, respectively), but it was not until November 2017 that ethene was detected in the well. Beginning in November 2017, concentrations of ethene rose to a maximum concentration of 500 µg/L in July 2018 and then decreased to 7.1 µg/L by December 2018. Since December 2018, the concentrations of ethene in MW-13 have been variable ranging from below the reporting limit of 1.0 µg/L (multiple events) to 120 µg/L in October 2020 (120 µg/L). The ethene concentrations in MW-13 during March and June 2021 were 16.0 µg/L and 1.00 µg/L, respectively.
- Ethene was first detected in well MW-19 during the September 2017 monitoring event and was detected consistently until December 2019, 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 through June 2021 sampling periods, with the exception of detections during the first and second quarter 2020 and second quarter 2021 sampling events (7.5, 5.0, and 1.3 µg/L, respectively). 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 June 2021, 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 June 2021 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 June 2021. At well EX, 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 until the well was decommissioned at concentrations ranging between 11 and 44 mg/L. When the replacement well was sampled for the first time in June 2021, the TOC concentration had decreased to 5 mg/L. 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 June 2021.
- 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 June 2021 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 during the March 2018 through June 2018 events. TOC concentrations decreased from June to September 2018, where they remained relatively

stable (between 5.38 and 19.7 µg/L) through June 2021. The only exception being in June 2020, when the TOC concentration was 40.1 µg/L.

- 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 June 2021.
- At well MGMS1-43, the TOC concentration in groundwater has remained relatively low and steady from September 2016 through June 2021 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 mg/L in December 2019 before decreasing to 4.22 mg/L in June 2020 and remained low and stable through the June 2021 sampling event.

**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 NW 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 first and second quarter 2021 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 June 2021 monitoring events in many 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 June 2021, 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 NW 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 June 2021, 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 SVE system monitoring events were conducted on February 23, April 9, and June 17, 2021.

North SVE System operational 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 operational 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 4,584 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 8,036 pounds.

## 6.0 INFRASTRUCTURE MAINTENANCE

The following sections describe maintenance and upgrades to the site SVE system and monitoring well network.

## 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 system blower, wells, and piping has been continuously assessed to identify the source of the blue water.

During the January 10, 2020 SVE system 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. While attempting to turn the SVE system back on after the repair, it was discovered that the blower had seized up and was not operational. On December 7, 2020, representatives from Telluric repaired the blower and restarted the system.

During an investigation to determine the source of the blue water in the knockout drum in the Fall of 2019, 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.

During the February 23, 2021 SVE system monitoring event, approximately 11 gallons of blue water were observed in the knockout drum and were subsequently removed. This was the first SVE monitoring event since the blower was repaired and the corroded knockout drum and pipe valves were replaced. No blue water was observed in the knockout drum during the subsequent April 9, 2021 or June 17, 2021 SVE system monitoring events. Troubleshooting will continue to determine the source of the blue water. Typically, the blue water is only observed from late autumn through early summer and is correlated with local precipitation. Continued monitoring will help determine if the system repairs will be sufficient to stop the water/blue water from entering the system, or if additional troubleshooting and source tracing is warranted.

## 6.2 GROUNDWATER MONITORING WELLS

During the first semi-annual 2021 monitoring period, one monitoring well was installed and the well monuments for 16 monitoring wells were upgraded. Details are provided in the paragraphs below.

### 6.2.1 Installation of Replacement Well EX

On April 15, 2021, a licensed well driller from Cascade Drilling installed replacement well EX at the Facility. The well was installed in accordance with 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). Because the original well EX was abandoned by grouting in place, the replacement well was offset from the original well by about 3 to 4 feet to the south in order to avoid the original well and well pack and to avoid other wells, utilities, and remediation infrastructure to the north and east. The replacement well was installed to a depth of 44 feet bgs with a well screen from 29 to 44 feet bgs—the same depth and screened interval as the original well. The only modification from the original well construction was that with Ecology approval, the original 4-inch diameter well was replaced with a 2-inch diameter well. The original well was used for groundwater extraction purposes and for groundwater monitoring purposes; a 2-inch diameter well was not only sufficient but also consistent with most of the other wells at the Facility. A well log for the replacement well EX is provided in Appendix G.

### 6.2.2 Well Monument Upgrades

In addition to the well replacement, the flush monuments for wells (MW-3, MW-7, MW-8, MW-10, MW-16, MW-17, MW-20i, MW-21i-40, MW-23i, MW-24i, S-1, S-2, EW-1, and EX) were upgraded to heavy duty manhole style monuments in accordance with a Work Plan email submitted to Ecology on March 17, 2021 and approved by the agency on March 18, 2021. The well monument upgrades were completed by Telluric with oversight from a field geologist from Cascadia. The new monument installation involved the saw-cutting of pavement and removal of the old flush moment and concrete pad. Approximately 20 inches were excavated below grade around the polyvinyl chloride (PVC) casing to accommodate the new 32-inch by 44-inch concrete manhole riser and top. Approximately 4 to 6 inches of 1-¼" minus crushed rock were placed and compacted in the excavation to provide bedding for the manhole risers and tops. The PVC casing, manhole riser, and top were encased in a minimum of 6 inches of quick-setting non-shrink concrete and the manholes were set to approximately ½ inch above the surrounding grade. Gasket material was also installed between the base of the cement monument and the cement riser. Once the riser and top were installed, a lid was placed on the manhole top and was bolted down with three bolts. Armor Seal A-100 was used to seal the surface contacts between the asphalt and concrete. Except for well MW-0 and well MP-1, the PVC casing was not modified during the monument upgrade work. For wells MW-10 and MP-1 the casing was cut and/or couplers were added, affecting the top-of-casing elevation of the well. Both wells were resurveyed as described in Section 6.2.3.

Project debris was placed in a drop box and disposed of offsite at a subtitle D landfill. Any soil removed was profiled and disposed of as non-hazardous investigation-derived waste.

### 6.2.2 Monitoring Well Survey

As discussed in the section above, the PVC casing for wells MW-10 and MP-1 were modified during well monument upgrade activities and required a new top-of-casing elevation survey. In addition, seven additional wells were surveyed either to check the existing survey (for reference) or to confirm the elevation based on concerns associated with routine anomalous water elevation results relative to surrounding wells. The following wells were surveyed by a licensed surveyor with MacKay Sposito on June 2, 2021: MW-10, MW-14, MW-15, MW-F, EW-1, S-1, S-2, MP-1, and EX. A copy of the well survey is provided in Appendix H.

## 7.0 FUTURE ACTIVITIES AND SUPPLEMENTAL REMEDIAL INVESTIGATION

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).

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

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. 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 stormwater, soil, groundwater, and sediment investigation to evaluate the nature and extent of metals and fertilizer constituents in site media. The Work Plan also included additional delineation of VOCs in groundwater to the west of well MW-26 and of VOCs in site sediment. 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 was completed from March through May 2021; a series of media-specific memoranda will be submitted to Ecology detailing the work performed, the results of the investigation, and potential recommendations for additional investigation. It is anticipated that the stormwater, upland soil and groundwater investigation, and sediment investigation memoranda will be submitted to Ecology during the third quarter of 2021.

## 8.0 REFERENCES

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## **TABLES**

**Table 1**  
**Groundwater Monitoring Plan: First and Second Quarters 2021**  
**NuStar Vancouver Facility**  
**Vancouver, Washington**

Monitoring Program	Well ID	Included Monitoring Wells		Notes
		First Quarter	Second 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: First and Second Quarters 2021**  
**NuStar Vancouver Facility**  
**Vancouver, Washington**

Monitoring Program	Well ID	Included Monitoring Wells		Notes
		First Quarter	Second 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 checked="" type="checkbox"/>	<input checked="" 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 - 2021**  
**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)	10/5/2020	28.05	4.55
	12/7/2020	27.76	4.84
	3/1/2021	25.52	7.08
	6/14/2021	25.36	7.24
MW-2 (34.04)	10/5/2020	29.65	4.39
	12/7/2020	29.16	4.88
	3/1/2021	26.91	7.13
	6/14/2021	26.88	7.16
MW-3 (34.41)	10/5/2020	29.78	4.63
	12/7/2020	27.84	6.57
	3/1/2021	26.32	8.09
	6/14/2021	26.51	7.90
MW-5 (33.86)	10/5/2020	29.14	4.72
	12/7/2020	27.97	5.89
	3/1/2021	25.74	8.12
	6/14/2021	26.34	7.52
MW-6 (32.83)	10/5/2020	27.94	4.89
	12/7/2020	27.24	5.59
	3/1/2021	25.03	7.80
	6/14/2021	25.44	7.39
MW-7 (33.74)	10/5/2020	28.92	4.82
	12/7/2020	28.01	5.73
	3/1/2021	25.74	8.00
	6/14/2021	26.30	7.44
MW-8 (33.97)	10/5/2020	28.29	5.68
	12/7/2020	28.02	5.95
	3/1/2021	25.78	8.19
	6/14/2021	26.33	7.64
MW-9 (33.86)	10/5/2020	28.99	4.87
	12/7/2020	28.12	5.74
	3/1/2021	25.91	7.95
	6/14/2021	26.52	7.34
MW-10 (34.50)	10/5/2020	28.25	6.58
	12/7/2020	28.30	6.53
	3/1/2021	26.24	8.59
	6/14/2021	27.02	7.48

*Please refer to notes at end of table.*

**Table 2**  
**Groundwater Elevation Data: 2020 - 2021**  
**NuStar Vancouver Facility**  
**Vancouver, Washington**

Well Number/ (TOC Elevation)	Date of Measurement	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
MW-12 (31.43)	10/5/2020	26.88	4.55
	12/7/2020	26.72	4.71
	3/1/2021	24.31	7.12
	6/14/2021	24.24	7.19
MW-13 (33.15)	10/5/2020	28.41	4.74
	12/7/2020	27.35	5.80
	3/1/2021	25.68	7.47
	6/14/2021	25.89	7.26
MW-14 (33.79)	10/5/2020	29.02	4.77
	12/7/2020	28.22	5.57
	3/1/2021	26.03	7.76
	6/14/2021	26.56	7.23
MW-15 (39.22)	10/5/2020	33.81	5.41
	12/7/2020	33.38	5.84
	3/1/2021	31.47	7.75
	6/14/2021	31.76	7.46
MW-16 (33.05)	10/5/2020	28.61	4.44
	12/7/2020	28.11	4.94
	3/1/2021	26.15	6.90
	6/14/2021	25.75	7.30
MW-17 (32.65)	10/5/2020	27.98	4.67
	12/7/2020	27.49	5.16
	3/1/2021	25.34	7.31
	6/14/2021	25.00	7.65
MW-18i (33.40)	10/5/2020	29.17	4.23
	12/7/2020	28.28	5.12
	3/1/2021	26.10	7.30
	6/14/2021	26.09	7.31
MW-19 (33.59)	10/5/2020	28.85	4.74
	12/7/2020	28.09	5.50
	3/1/2021	26.63	6.96
	6/14/2021	26.29	7.30
MW-19i (33.62)	10/5/2020	29.48	4.14
	12/7/2020	28.61	5.01
	3/1/2021	26.74	6.88
	6/14/2021	26.35	7.27

*Please refer to notes at end of table.*

**Table 2**  
**Groundwater Elevation Data: 2020 - 2021**  
**NuStar Vancouver Facility**  
**Vancouver, Washington**

Well Number/ (TOC Elevation)	Date of Measurement	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
MW-20i (33.14)	10/5/2020	28.96	4.18
	12/7/2020	28.09	5.05
	3/1/2021	25.87	7.27
	6/14/2021	25.90	7.24
MW21i-40 (34.10)	10/5/2020	29.85	4.25
	12/7/2020	28.99	5.11
	3/1/2021	26.82	7.28
	6/14/2021	26.86	7.24
MW-21i-105 (33.99)	10/5/2020	29.74	4.25
	12/7/2020	28.92	5.07
	3/1/2021	26.69	7.30
	6/14/2021	26.74	7.25
MW-22i (34.39)	10/5/2020	30.13	4.26
	12/7/2020	29.25	5.14
	3/1/2021	27.13	7.26
	6/14/2021	27.09	7.30
MW-23i (33.80)	10/5/2020	29.76	4.04
	12/7/2020	28.53	5.27
	3/1/2021	26.42	7.38
	6/14/2021	26.45	7.35
MW-24i (33.47)	10/5/2020	29.42	4.05
	12/7/2020	28.16	5.31
	3/1/2021	26.16	7.31
	6/14/2021	26.05	7.42
MW-25i (33.58)	10/5/2020	29.32	4.26
	12/7/2020	28.42	5.16
	3/1/2021	26.29	7.29
	6/14/2021	26.30	7.28
MW-26 (33.73)	10/5/2020	28.91	4.82
	12/7/2020	28.04	5.69
	3/1/2021	25.87	7.86
	6/14/2021	26.48	7.25
MW-24d (33.91)	10/5/2020	29.63	4.28
	12/7/2020	28.80	5.11
	3/1/2021	26.61	7.30
	6/14/2021	26.69	7.22

*Please refer to notes at end of table.*

**Table 2**  
**Groundwater Elevation Data: 2020 - 2021**  
**NuStar Vancouver Facility**  
**Vancouver, Washington**

Well Number/ (TOC Elevation)	Date of Measurement	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
EW-1 (31.07)	10/5/2020	26.90	4.17
	12/7/2020	26.18	4.89
	3/1/2021	23.97	7.10
	6/14/2021	23.92	7.15
<i>Secor Interim Action Pilot Study Wells</i>			
S-1 (32.72)	10/5/2020	28.95	3.77
	12/7/2020	27.55	5.17
	3/1/2021	25.45	7.27
	6/14/2021	25.44	7.28
S-2 (33.18)	10/5/2020	29.53	3.65
	12/7/2020	28.46	4.72
	3/1/2021	26.43	6.75
	6/14/2021	26.02	7.16
<i>Multi-Level Monitoring Wells</i>			
MGMS1-3 (43)* (32.86)	6/15/2020	23.30	9.56
	10/5/2020	28.47	4.39
	12/7/2020	28.02	4.84
	3/1/2021	25.43	7.43
MGMS1-2(60)* (32.86)	6/15/2020	23.85	8.74
	10/5/2020	29.32	3.27
	12/7/2020	27.75	4.84
	3/1/2021	25.78	6.81
MGMS1-1(110)* (32.86)	6/15/2020	23.91	8.68
	10/5/2020	29.25	3.34
	12/7/2020	27.81	4.78
	3/1/2021	25.79	6.80
MGMS2-4(40)* (32.59)	6/15/2020	22.71	9.88
	10/5/2020	27.70	4.89
	12/7/2020	27.62	4.97
	3/1/2021	24.89	7.70
MGMS2-3(60)* (32.59)	6/15/2020	23.79	8.80
	10/5/2020	29.46	3.13
	12/7/2020	27.94	4.65
	3/1/2021	25.35	7.24
MGMS2-2(110)* (32.59)	6/15/2020	23.90	8.69
	10/5/2020	29.43	3.16
	12/7/2020	27.86	4.73
	3/1/2021	25.43	7.16

*Please refer to notes at end of table.*



**Table 2**  
**Groundwater Elevation Data: 2020 - 2021**  
**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)	6/15/2020	23.84	8.75
	10/5/2020	29.18	3.41
	12/7/2020	28.00	4.59
	3/1/2021	25.09	7.50
MGMS3-4(40)* (31.65)	6/15/2020	22.56	9.09
	10/5/2020	28.09	3.56
	12/7/2020	26.69	4.96
	3/1/2021	24.19	7.46
MGMS3-3(60)* (31.65)	6/15/2020	22.71	8.94
	10/5/2020	28.38	3.27
	12/7/2020	26.94	4.71
	3/1/2021	24.46	7.19
MGMS3-2(101)* (31.65)	6/15/2020	22.89	8.76
	10/5/2020	28.46	3.19
	12/7/2020	26.68	4.97
	3/1/2021	24.17	7.48
MGMS3-1(132)* (31.65)	6/15/2020	22.81	8.84
	10/5/2020	28.41	3.24
	12/7/2020	26.95	4.70
	3/1/2021	24.47	7.18
<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-31j** (31.33)	10/5/2020	NM	NM
	12/7/2020	NM	NM
	3/1/2021	NM	NM
	6/14/2021	NM	NM
MW-32s (34.34)	10/5/2020	29.68	4.66
	12/7/2020	29.01	5.33
	3/1/2021	NM	NM
	6/14/2021	26.93	7.41
MW-32i (34.41)	10/5/2020	30.09	4.32
	12/7/2020	29.34	5.07
	3/1/2021	27.24	7.17
	6/14/2021	27.01	7.40

*Please refer to notes at end of table.*

**Table 2**  
**Groundwater Elevation Data: 2020 - 2021**  
**NuStar Vancouver Facility**  
**Vancouver, Washington**

Well Number/ (TOC Elevation)	Date of Measurement	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
MW-E ** (30.64)	10/5/2020	NM	NM
	12/7/2020	NM	NM
	3/1/2021	NM	NM
	6/14/2021	NM	NM
MW-F (34.11)	10/5/2020	29.98	4.13
	12/7/2020	NM*	NM*
	3/1/2021	27.27	6.84
	6/14/2021	27.00	7.11
MW-G (31.50)	10/5/2020	NM	NM
	12/7/2020	NM	NM
	3/1/2021	NM	NM
	6/14/2021	NM	NM

**Notes:**

1. TOC = Top of casing; BTOC = Below top of casing.
2. Utilizes survey information from June 2010 and June 2021 (for select wells resurveyed).  
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. NM\* = Well dry or dedicated bladder obstructing ability to measure water levels.

**Table 3**  
**Groundwater Analytical Results: 2020-2021**  
**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	10/7/2020	<b>6.45</b>	<0.400	<0.400	<b>104</b>	<b>1.41</b>	<0.500	<b>26.4</b>	<0.400	<0.500	<b>22.2</b>	<b>1.80</b>
	12/8/2020	<b>5.47</b>	<0.400	<b>0.512</b>	<b>62.6</b>	<b>0.968</b>	<0.500	<b>19.0</b>	<0.400	<0.500	<b>12.3</b>	<b>1.42</b>
	3/4/2021	<b>3.38</b>	<0.400	<0.400	<b>37.2</b>	<b>0.608</b>	<0.500	<b>6.44</b>	<0.400	<0.500	<b>6.60</b>	<b>1.76</b>
	6/16/2021	<b>4.76</b>	<0.400	<b>0.624</b>	<b>75.8</b>	<b>0.892</b>	<0.500	<b>9.95</b>	<0.400	<0.500	<b>14.2</b>	<b>2.05</b>
MW-2	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
	3/4/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/16/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
MW-3	10/7/2020	<b>5.30</b>	<0.400	<0.400	<b>62.9</b>	<b>1.02</b>	<b>1.10</b>	<b>169</b>	<b>1.57</b>	<0.500	<b>32.6</b>	<0.400
	12/8/2020	<2.00	<2.00	<2.00	<b>29.7</b>	<2.00	<2.50	<b>145</b>	<2.00	<2.50	<b>36.1</b>	<2.00
	3/4/2021	<b>1.13</b>	<0.400	<0.400	<b>41.8</b>	<b>1.65</b>	<b>1.06</b>	<b>182</b>	<b>2.65</b>	<0.500	<b>46.7</b>	<0.400
	6/16/2021	<1.00	<1.00	<1.00	<b>31.5</b>	<b>1.44</b>	<1.25	<b>145</b>	<b>1.86</b>	<1.25	<b>36.3</b>	<1.00
MW-5	10/6/2020	<0.400	<0.400	<0.400	<b>5.74</b>	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<b>1.10</b>
	12/10/2020	<b>0.499</b>	<0.400	<0.400	<b>38.4</b>	<0.400	<0.500	<0.400	<0.400	<0.500	<b>3.67</b>	<b>4.77</b>
	3/3/2021	<b>0.664</b>	<0.400	<0.400	<b>10.4</b>	<0.400	<0.500	<b>7.50</b>	<0.400	<0.500	<b>5.55</b>	<b>20.5</b>
	6/16/2021	<b>6.51</b>	<0.400	<b>0.963</b>	<b>697</b>	<b>4.67</b>	<b>0.684</b>	<b>20.5</b>	<0.400	<0.500	<b>26.5</b>	<b>72.3</b>
MW-6	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
	3/4/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/16/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
MW-7	10/8/2020	<b>1.97</b>	<0.400	<b>0.481</b>	<b>23.1</b>	<0.400	<0.500	<b>49.5</b>	<0.400	<0.500	<b>19.7</b>	<0.400
	10/8/2020 DUP	<b>1.96</b>	<0.400	<b>0.431</b>	<b>23.6</b>	<0.400	<0.500	<b>50.2</b>	<0.400	<0.500	<b>19.6</b>	<0.400
	12/9/2020	<b>7.05</b>	<0.400	<b>1.41</b>	<b>56.3</b>	<b>0.552</b>	<0.500	<b>108</b>	<0.400	<0.500	<b>45.4</b>	<0.400
	12/9/2020 DUP	<b>6.83</b>	<0.400	<b>1.38</b>	<b>55.6</b>	<b>0.519</b>	<0.500	<b>106</b>	<0.400	<0.500	<b>44.5</b>	<0.400
	3/3/2021	<b>1.28</b>	<0.400	<0.400	<b>20.0</b>	<0.400	<0.500	<b>56.4</b>	<0.400	<0.500	<b>22.4</b>	<0.400
	3/3/2021 DUP	<b>1.24</b>	<0.400	<0.400	<b>19.2</b>	<0.400	<0.500	<b>54.3</b>	<0.400	<0.500	<b>22.2</b>	<0.400
	6/16/2021	<b>4.30</b>	<0.400	<b>0.927</b>	<b>35.5</b>	<0.400	<0.500	<b>78.0</b>	<0.400	<0.500	<b>39.6</b>	<b>0.450</b>
	6/16/2021 DUP	<b>4.12</b>	<0.400	<b>0.825</b>	<b>32.6</b>	<0.400	<0.500	<b>72.8</b>	<0.400	<0.500	<b>37.3</b>	<b>0.426</b>

Please refer to notes at end of table.

**Table 3**  
**Groundwater Analytical Results: 2020-2021**  
**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	10/6/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>4.56</b>	<0.400	<0.500	<0.400	<0.400
	12/10/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>3.97</b>	<0.400	<0.500	<0.400	<0.400
	3/3/2021	<0.400	<0.400	<0.400	<b>0.575</b>	<0.400	<0.500	<b>2.71</b>	<0.400	<0.500	<0.400	<0.400
	6/16/2021	<0.400	<0.400	<0.400	<b>1.24</b>	<0.400	<0.500	<b>6.32</b>	<0.400	<0.500	<0.400	<0.400
MW-9	10/8/2020	<b>1.78</b>	<0.400	<b>0.817</b>	<b>39.0</b>	<b>1.28</b>	<0.500	<b>191</b>	<b>2.95</b>	<0.500	<b>72.2</b>	<b>1.55</b>
	12/9/2020	<b>6.49</b>	<0.400	<b>1.63</b>	<b>211</b>	<b>6.98</b>	<0.500	<b>262</b>	<b>3.86</b>	<0.500	<b>158</b>	<b>2.68</b>
	3/3/2021	<0.400	<0.400	<0.400	<b>1.56</b>	<0.400	<0.500	<b>73.5</b>	<b>1.38</b>	<0.500	<b>26.4</b>	<0.400
	6/15/2021	<0.400	<0.400	<0.400	<b>1.35</b>	<0.400	<0.500	<b>87.7</b>	<b>1.83</b>	<0.500	<b>32.4</b>	<0.400
MW-10	10/8/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>2.34</b>	<0.400	<0.500	<b>1.81</b>	<0.400
	12/9/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>2.40</b>	<0.400	<0.500	<b>1.95</b>	<0.400
	3/4/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>1.66</b>	<0.400	<0.500	<b>1.84</b>	<0.400
	6/15/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>3.19</b>	<0.400	<0.500	<b>2.60</b>	<0.400
MW-12	10/7/2020	<b>36.6</b>	<0.400	<0.400	<b>80.9</b>	<b>0.582</b>	<0.500	<0.400	<0.400	<0.500	<b>0.745</b>	<b>184</b>
	10/7/2020 DUP	<b>37.8</b>	<0.400	<0.400	<b>81.7</b>	<b>0.632</b>	<0.500	<0.400	<0.400	<0.500	<b>0.750</b>	<b>196</b>
	12/8/2020	<b>1.55</b>	<0.400	<0.400	<b>9.92</b>	<0.400	<0.500	<b>13.5</b>	<0.400	<0.500	<b>6.47</b>	<b>7.36</b>
	12/8/2020 DUP	<b>1.52</b>	<0.400	<0.400	<b>9.61</b>	<0.400	<0.500	<b>12.9</b>	<0.400	<0.500	<b>6.24</b>	<b>7.12</b>
	3/5/2021	<b>1.55</b>	<0.400	<0.400	<b>8.6</b>	<0.400	<0.500	<b>6.73</b>	<0.400	<0.500	<b>4.92</b>	<b>0.436</b>
	3/5/2021 DUP	<b>1.48</b>	<0.400	<0.400	<b>8.21</b>	<0.400	<0.500	<b>5.81</b>	<0.400	<0.500	<b>4.39</b>	<b>0.446</b>
	6/16/2021	<b>6.90</b>	<0.400	<0.400	<b>34.0</b>	<b>0.426</b>	<0.500	<b>8.85</b>	<0.400	<0.500	<b>9.62</b>	<b>35.7</b>
	6/16/2021 DUP	<b>6.53</b>	<0.400	<0.400	<b>32.4</b>	<0.400	<0.500	<b>8.21</b>	<0.400	<0.500	<b>8.87</b>	<b>33.4</b>
MW-13	10/7/2020	<b>18.1</b>	<0.400	<0.400	<b>3.47</b>	<b>0.920</b>	<0.500	<b>0.470</b>	<0.400	<0.500	<b>0.870</b>	<b>98.8</b>
	12/8/2020	<b>2.67</b>	<0.400	<0.400	<b>0.606</b>	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<b>2.30</b>
	3/4/2021	<b>11.9</b>	<0.400	<0.400	<b>3.48</b>	<b>0.494</b>	<0.500	<0.400	<0.400	<0.500	<b>0.996</b>	<b>27.4</b>
	6/15/2021	<b>1.12</b>	<0.400	<0.400	<b>13.4</b>	<b>0.673</b>	<0.500	<b>1.01</b>	<0.400	<0.500	<b>2.56</b>	<b>12.9</b>
MW-14	10/8/2020	<b>14.6</b>	<2.00	<b>4.79</b>	<b>207</b>	<2.00	<2.50	<b>124</b>	<2.00	<2.50	<b>680</b>	<2.00
	12/9/2020	<b>7.77</b>	<2.00	<b>3.04</b>	<b>180</b>	<b>2.52</b>	<2.50	<b>109</b>	<2.00	<2.50	<b>339</b>	<2.00
	3/4/2021	<b>9.39</b>	<0.400	<b>3.76</b>	<b>161</b>	<b>2.51</b>	<0.500	<b>128</b>	<b>1.24</b>	<0.500	<b>410</b>	<0.400
	6/15/2021	<b>0.870</b>	<0.400	<b>0.485</b>	<b>23.8</b>	<0.400	<0.500	<b>28.3</b>	<0.400	<0.500	<b>80.6</b>	<0.400
MW-15	6/6/2019	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<b>0.531</b>	<0.500	<0.500	<0.500	<0.500
	6/18/2020	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<b>0.540</b>	<0.400	<0.500	<0.400	<0.400
	12/10/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>0.599</b>	<0.400	<0.500	<0.400	<0.400
	6/17/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>0.431</b>	<0.400	<0.500	<0.400	<0.400

Please refer to notes at end of table.

**Table 3**  
**Groundwater Analytical Results: 2020-2021**  
**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	10/7/2020	<0.400	<0.400	<0.400	<b>26.7</b>	<0.400	<0.500	<b>172</b>	<b>0.642</b>	<0.500	<b>35.9</b>	<0.400
	12/9/2020	<0.400	<0.400	<0.400	<b>15.7</b>	<0.400	<0.500	<b>122</b>	<b>0.550</b>	<0.500	<b>15.5</b>	<0.400
	3/3/2021	<0.400	<0.400	<0.400	<b>13.2</b>	<0.400	<0.500	<b>71.1</b>	<b>0.457</b>	<0.500	<b>12.2</b>	<0.400
	6/16/2021	<0.400	<0.400	<0.400	<b>11.6</b>	<0.400	<0.500	<b>75.0</b>	<b>0.444</b>	<0.500	<b>12.2</b>	<0.400
MW-17	10/7/2020	<0.400	<0.400	<0.400	<b>2.28</b>	<0.400	<0.500	<b>1.75</b>	<0.400	<0.500	<b>3.61</b>	<0.400
	12/8/2020	<0.400	<0.400	<0.400	<b>17.9</b>	<0.400	<0.500	<b>4.76</b>	<0.400	<0.500	<b>8.70</b>	<0.400
	3/3/2021	<b>0.684</b>	<0.400	<0.400	<b>22.8</b>	<0.400	<0.500	<b>4.19</b>	<0.400	<0.500	<b>11.0</b>	<0.400
	6/15/2021	<0.400	<0.400	<0.400	<b>5.99</b>	<0.400	<0.500	<b>1.90</b>	<0.400	<0.500	<b>3.62</b>	<0.400
MW-18i	10/7/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>0.891</b>	<0.400	<0.500	<b>0.419</b>	<0.400
	12/9/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>0.764</b>	<0.400	<0.500	<0.400	<0.400
	3/3/2021	<0.400	<0.400	<0.400	<b>0.664</b>	<0.400	<0.500	<b>0.808</b>	<0.400	<0.500	<0.400	<0.400
	6/17/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>0.698</b>	<0.400	<0.500	<b>0.450</b>	<0.400
MW-19	10/7/2020	<b>44.5</b>	<20.0	<b>53.2</b>	<b>1,470</b>	<20.0	<25.0	<b>7,450</b>	<b>39.0</b>	<25.0	<b>2,760</b>	<b>52.4</b>
	10/7/2020 DUP	<b>46.9</b>	<20.0	<b>58.8</b>	<b>1,510</b>	<20.0	<25.0	<b>8,110</b>	<b>39.0</b>	<25.0	<b>2,920</b>	<b>53.8</b>
	12/8/2020	<b>54.5</b>	<40.0	<40.0	<b>1,150</b>	<40.0	<50.0	<b>3,880</b>	<40.0	<50.0	<b>1,110</b>	<b>117</b>
	12/8/2020 DUP	<b>70.8</b>	<40.0	<40.0	<b>1,330</b>	<40.0	<50.0	<b>3,300</b>	<40.0	<50.0	<b>1,210</b>	<b>87.9</b>
	3/3/2021	<b>41.4</b>	<0.400	<b>51.0</b>	<b>1,120</b>	<b>11.4</b>	<0.500	<b>4,470</b>	<b>27.8</b>	<0.500	<b>1,880</b>	<b>53.6</b>
	3/3/2021 DUP	<b>35.8</b>	<20.0	<b>48.5</b>	<b>1,140</b>	<20.0	<25.0	<b>4,620</b>	<b>26.4</b>	<25.0	<b>1,920</b>	<b>50.0</b>
	6/16/2021	<b>58.0</b>	<10.0	<b>28.2</b>	<b>1,260</b>	<b>15.1</b>	<12.5	<b>4,770</b>	<b>22.5</b>	<12.5	<b>1,190</b>	<b>80.8</b>
	6/16/2021 DUP	<b>54.1</b>	<10.0	<b>26.8</b>	<b>1,160</b>	<10.0	<12.5	<b>4,430</b>	<b>19.9</b>	<12.5	<b>1,090</b>	<b>76.1</b>
MW-19i	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	<b>0.489</b>	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/3/2021	<0.400	<0.400	<0.400	<b>0.566</b>	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/17/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
MW-20i	10/7/2020	<0.400	<0.400	<0.400	<b>7.66</b>	<0.400	<0.500	<b>1.11</b>	<0.400	<0.500	<b>0.850</b>	<0.400
	12/9/2020	<0.400	<0.400	<0.400	<b>10.0</b>	<0.400	<0.500	<b>1.57</b>	<0.400	<0.500	<b>0.856</b>	<0.400
	3/2/2021	<0.400	<0.400	<0.400	<b>8.68</b>	<0.400	<0.500	<b>1.16</b>	<0.400	<0.500	<b>0.902</b>	<0.400
	6/17/2021	<0.400	<0.400	<0.400	<b>9.16</b>	<0.400	<0.500	<b>1.66</b>	<0.400	<0.500	<b>1.12</b>	<0.400

Please refer to notes at end of table.

**Table 3**  
**Groundwater Analytical Results: 2020-2021**  
**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-105	10/8/2020	<0.400	<0.400	<0.400	<b>1.76</b>	<0.400	<0.500	<b>4.60</b>	<0.400	<0.500	<b>1.96</b>	<0.400
MW-21i-105	10/8/2020	<0.400	<0.400	<0.400	<b>1.76</b>	<0.400	<0.500	<b>4.60</b>	<0.400	<0.500	<b>1.96</b>	<0.400
	12/9/2020	<0.400	<0.400	<0.400	<b>1.88</b>	<0.400	<0.500	<b>3.53</b>	<0.400	<0.500	<b>1.62</b>	<0.400
	3/4/2021	<0.400	<0.400	<0.400	<b>2.23</b>	<0.400	<0.500	<b>3.32</b>	<0.400	<0.500	<b>1.74</b>	<0.400
MW-21i-40	10/7/2020	<b>2.16</b>	<0.400	<b>0.527</b>	<b>50.7</b>	<b>0.433</b>	<0.500	<b>32.7</b>	<0.400	<0.500	<b>18.7</b>	<0.400
	12/9/2020	<b>2.46</b>	<0.400	<b>0.558</b>	<b>53.3</b>	<b>0.486</b>	<0.500	<b>30.0</b>	<0.400	<0.500	<b>15.8</b>	<0.400
	3/2/2021	<b>1.73</b>	<0.400	<b>0.403</b>	<b>38.1</b>	<0.400	<0.500	<b>19.6</b>	<0.400	<0.500	<b>12.7</b>	<0.400
	6/16/2021	<b>1.62</b>	<0.400	<0.400	<b>35.1</b>	<0.400	<0.500	<b>19.0</b>	<0.400	<0.500	<b>13.2</b>	<0.400
MW-22i	10/8/2020	<b>0.502</b>	<0.400	<0.400	<b>16.0</b>	<0.400	<0.500	<b>3.68</b>	<0.400	<0.500	<b>8.02</b>	<0.400
	12/9/2020	<b>0.565</b>	<0.400	<0.400	<b>15.6</b>	<0.400	<0.500	<b>4.07</b>	<0.400	<0.500	<b>7.86</b>	<0.400
	3/4/2021	<b>0.510</b>	<0.400	<0.400	<b>13.3</b>	<0.400	<0.500	<b>2.12</b>	<0.400	<0.500	<b>6.62</b>	<0.400
	6/15/2021	<b>0.643</b>	<0.400	<0.400	<b>16.5</b>	<0.400	<0.500	<b>4.47</b>	<0.400	<0.500	<b>8.86</b>	<0.400
MW-23i	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
	3/2/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/17/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
MW-24i	10/9/2020	<0.400	<0.400	<0.400	<b>1.08</b>	<0.400	<0.500	<b>1.35</b>	<0.400	<0.500	<0.400	<0.400
	12/10/2020	<b>1.73</b>	<0.400	<0.400	<b>20.0</b>	<0.400	<0.500	<b>29.7</b>	<0.400	<0.500	<b>13.0</b>	<0.400
	3/3/2021	<0.400	<0.400	<0.400	<b>0.505</b>	<0.400	<0.500	<b>0.955</b>	<0.400	<0.500	<0.400	<0.400
	6/17/2021	<b>0.989</b>	<0.400	<0.400	<b>9.31</b>	<0.400	<0.500	<b>15.7</b>	<0.400	<0.500	<b>8.00</b>	<0.400
MW-24d	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
	10/09/20	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/3/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
MW-25i	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
	3/2/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/17/2021	<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.

**Table 3**  
**Groundwater Analytical Results: 2020-2021**  
**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-26	10/7/2020	<b>2.64</b>	<2.00	<2.00	<b>62.8</b>	<2.00	<2.50	<b>118</b>	<2.00	<2.50	<b>208</b>	<2.00
	12/9/2020	<b>3.34</b>	<2.00	<2.00	<b>64.3</b>	<2.00	<2.50	<b>147</b>	<2.00	<2.50	<b>218</b>	<2.00
	3/4/2021	<b>5.92</b>	<0.400	<b>1.89</b>	<b>89.4</b>	<b>2.39</b>	<0.500	<b>151</b>	<b>2.04</b>	<0.500	<b>320</b>	<0.400
	6/17/2021	<b>4.35</b>	<1.00	<b>1.43</b>	<b>72.3</b>	<b>1.92</b>	<1.25	<b>132</b>	<b>2.06</b>	<1.25	<b>366</b>	<1.00
MW-32s	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
	3/2/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
EW-1	10/7/2020	<0.400	<0.400	<0.400	<b>3.30</b>	<0.400	<0.500	<b>44.7</b>	<b>0.449</b>	<0.500	<b>10.6</b>	<0.400
	12/9/2020	<0.400	<0.400	<0.400	<b>1.61</b>	<0.400	<0.500	<b>32.2</b>	<b>0.766</b>	<0.500	<b>8.64</b>	<0.400
	3/2/2021	<0.400	<0.400	<0.400	<b>0.609</b>	<0.400	<0.500	<b>37.8</b>	<b>0.938</b>	<0.500	<b>15.0</b>	<0.400
	6/16/2021	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>21.6</b>	<b>0.711</b>	<0.500	<b>8.39</b>	<0.400
S-1	10/7/2020	<0.400	<0.400	<0.400	<b>2.95</b>	<0.400	<0.500	<b>1.20</b>	<0.400	<0.500	<b>2.06</b>	<0.400
	12/8/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<b>1.30</b>	<0.400
	3/3/2021	<0.400	<0.400	<0.400	<b>2.20</b>	<0.400	<0.500	<b>0.852</b>	<0.400	<0.500	<b>1.60</b>	<0.400
	6/15/2021	<0.400	<0.400	<0.400	<b>0.849</b>	<0.400	<0.500	<b>0.571</b>	<0.400	<0.500	<b>0.881</b>	<0.400
S-2	10/7/2020	<b>10.2</b>	<0.400	<0.400	<b>54.4</b>	<b>0.539</b>	<0.500	<0.400	<b>1.01</b>	<0.500	<b>3.08</b>	<b>0.448</b>
	12/8/2020	<b>7.72</b>	<0.400	<0.400	<b>31.4</b>	<0.400	<0.500	<0.400	<0.400	<0.500	<b>1.13</b>	<0.400
	3/3/2021	<b>8.00</b>	<0.400	<0.400	<b>37.2</b>	<b>0.578</b>	<0.500	<0.400	<0.400	<0.500	<b>1.44</b>	<0.400
	6/15/2021	<b>6.15</b>	<0.400	<0.400	<b>29.9</b>	<0.400	<0.500	<0.400	<0.400	<0.500	<b>1.17</b>	<0.400
MGMS1-3(43)	10/6/2020	<b>124</b>	<10.0	<b>26.0</b>	<b>2,980</b>	<b>45.5</b>	<12.5	<b>219</b>	<10.0	<12.5	<b>507</b>	<b>48.2</b>
	12/10/2020	<b>131</b>	<20.0	<20.0	<b>2,620</b>	<b>34.3</b>	<25.0	<b>151</b>	<20.0	<25.0	<b>294</b>	<b>40.6</b>
	3/4/2021	<b>128</b>	<0.400	<b>29.0</b>	<b>2,840</b>	<b>38.5</b>	<0.500	<b>135</b>	<0.400	<0.500	<b>388</b>	<b>161</b>
	6/16/2021	<b>103</b>	<10.0	<b>20.8</b>	<b>2,690</b>	<b>34.9</b>	<12.5	<b>90.5</b>	<10.0	<12.5	<b>297</b>	<b>153</b>
MGMS1-2(60)	10/6/2020	<b>1.16</b>	<0.400	<0.400	<b>16.5</b>	<0.400	<0.500	<b>24.0</b>	<0.400	<0.500	<b>15.3</b>	<0.400
	12/10/2020	<b>1.54</b>	<0.400	<0.400	<b>13.1</b>	<0.400	<0.500	<b>20.3</b>	<0.400	<0.500	<b>10.0</b>	<b>0.640</b>
	3/4/2021	<b>1.19</b>	<0.400	<0.400	<b>18.4</b>	<0.400	<0.500	<b>20.3</b>	<0.400	<0.500	<b>14.9</b>	<0.400
	6/16/2021	<0.400	<0.400	<0.400	<b>6.28</b>	<0.400	<0.500	<b>13.0</b>	<0.400	<0.500	<b>7.17</b>	<0.400

Please refer to notes at end of table.

**Table 3**  
**Groundwater Analytical Results: 2020-2021**  
**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)										
MGMS1-1(110)	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
	6/16/2021	4.87	<0.400	0.408	166	0.464	<0.500	14.1	<0.400	<0.500	34.6	<0.400
MGMS2-4(40)	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
	3/4/2021	25.1	<0.400	3.83	159	1.12	<0.500	115	<0.400	<0.500	59.9	72.5
	6/17/2021	20.7	<0.400	3.25	181	0.975	<0.500	68.8	<0.400	<0.500	35.6	66.3
MGMS2-3(60)	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
	3/4/2021	0.455	<0.400	<0.400	10.2	<0.400	<0.500	11.7	<0.400	<0.500	5.95	0.524
	6/17/2021	0.621	<0.400	<0.400	11.8	<0.400	<0.500	15.5	<0.400	<0.500	8.23	0.602
MGMS2-2(110)	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
	6/17/2021	<0.400	<0.400	<0.400	5.23	<0.400	<0.500	2.89	<0.400	<0.500	3.01	1.74
MGMS2-1(132)	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
	6/17/2021	<0.400	<0.400	<0.400	7.06	<0.400	<0.500	2.90	<0.400	<0.500	3.34	2.54
MGMS3-4(40)	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
	3/4/2021	6.69	<0.400	<0.400	111	<0.400	<0.500	0.698	<0.400	<0.500	<0.400	137
	3/4/2021 DUP	6.81	<0.400	<0.400	116	<0.400	<0.500	0.617	<0.400	<0.500	<0.400	137
	6/16/2021	4.74	<0.400	<0.400	16.3	<0.400	<0.500	0.486	<0.400	<0.500	<0.400	109
6/16/2021 DUP	4.80	<0.400	<0.400	17.0	<0.400	<0.500	0.466	<0.400	<0.500	<0.400	108	

Please refer to notes at end of table.



**Table 3**  
**Groundwater Analytical Results: 2020-2021**  
**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)										
MGMS3-3(60)	10/6/2020	<b>0.444</b>	<0.400	<0.400	<b>10.9</b>	<0.400	<0.500	<b>2.36</b>	<0.400	<0.500	<b>2.03</b>	<0.400
	12/10/2020	<0.400	<0.400	<0.400	<b>5.76</b>	<0.400	<0.500	<b>1.86</b>	<0.400	<0.500	<b>1.11</b>	<0.400
	3/4/2021	<0.400	<0.400	<0.400	<b>9.54</b>	<0.400	<0.500	<b>2.44</b>	<0.400	<0.500	<b>1.95</b>	<0.400
	6/16/2021	<0.400	<0.400	<0.400	<b>4.65</b>	<0.400	<0.500	<b>1.38</b>	<0.400	<0.500	<b>0.949</b>	<0.400
MGMS3-2(110)	12/4/2019	<0.400	<0.400	<0.400	<b>0.852</b>	<0.400	<0.500	<b>1.84</b>	<0.400	<0.500	<b>0.958</b>	<0.400
	6/16/2020	<0.400	<0.400	<0.400	<b>1.00</b>	<0.400	<0.500	<b>3.01</b>	<0.400	<0.500	<b>1.33</b>	<0.400
	12/10/2020	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<b>1.45</b>	<0.400	<0.500	<0.400	<0.400
	6/16/2021	<0.400	<0.400	<0.400	<b>0.482</b>	<0.400	<0.500	<b>1.34</b>	<0.400	<0.500	<b>0.572</b>	<0.400
MGMS3-1(132)	6/5/2019	<0.400	<b>0.412</b>	<0.400	<b>3.45</b>	<0.400	<0.400	<b>9.45</b>	<0.400	<0.500	<b>6.79</b>	<0.400
	12/4/2019	<0.400	<0.400	<0.400	<b>5.34</b>	<0.400	<0.500	<b>8.69</b>	<0.400	<0.500	<b>6.21</b>	<0.400
	6/16/2020	<b>0.430</b>	<0.400	<0.400	<b>4.61</b>	<0.400	<0.500	<b>9.87</b>	<0.400	<0.500	<b>6.01</b>	<0.400
	12/10/2020	<0.400	<0.400	<0.400	<b>2.73</b>	<0.400	<0.500	<b>3.61</b>	<0.400	<0.500	<b>2.46</b>	<0.400
EX*	6/28/2018	<b>4.55</b>	<0.500	<b>1.11</b>	<b>722.0</b>	<b>8.72</b>	<0.500	<b>1.91</b>	<0.500	<0.500	<b>0.758</b>	<b>424.0</b>
	9/24/2018	<b>1.42</b>	<0.400	<0.400	<b>3.38</b>	<b>0.751</b>	<0.500	<b>3.07</b>	<0.400	<0.500	<b>2.42</b>	<b>7.56</b>
	12/4/2018	<b>0.876</b>	<0.400	<0.400	<b>8.18</b>	<0.400	<0.500	<b>6.35</b>	<0.400	<0.500	<b>3.60</b>	<b>1.88</b>
	6/17/2021	<b>4.55</b>	<0.400	<b>3.90</b>	<b>415</b>	<b>2.33</b>	<0.500	<b>4,570</b>	<b>12.4</b>	<0.500	<b>322</b>	<b>22.2</b>
MP-1	10/8/2020	<2.00	<2.00	<2.00	<b>36.7</b>	<2.00	<2.50	<b>510</b>	<2.00	<2.50	<b>52.3</b>	<2.00
	12/9/2020	<b>1.15</b>	<0.800	<0.800	<b>29.5</b>	<0.800	<1.00	<b>362</b>	<0.800	<1.00	<b>41.3</b>	<0.800
	3/3/2021	<2.00	<2.00	<b>2.34</b>	<b>70.1</b>	<2.00	<2.5	<b>831</b>	<2.00	<2.5	<b>100</b>	<2.00
	6/16/2021	<0.400	<0.400	<0.400	<b>70.7</b>	<4.00	<5.00	<b>309</b>	<4.00	<5.00	<b>52.0</b>	<4.00
MP-3	6/28/2018	<b>5.24</b>	<0.500	<b>1.78</b>	<b>203</b>	<b>1.31</b>	<0.500	<b>398</b>	<b>1.82</b>	<0.500	<b>65.1</b>	<b>8.96</b>
	9/27/2018	<b>4.06</b>	<0.400	<b>3.52</b>	<b>187</b>	<b>1.60</b>	<0.500	<b>721</b>	<b>0.950</b>	<0.500	<b>148</b>	<b>0.730</b>

**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.
5. \*This well was decommissioned during the third quarter 2019 and a replacement well was installed adjacent (offset 3-4 ft) in April 2021. Historically the well has been referred to as EX or EX-1.

**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
	6/17/2021	32.7	140	0.589
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
	3/4/2021	461	15.9	<0.250
	6/16/2021	323	62.6	<0.250
MW-2	11/6/2017	6.34	0.26	<0.10
	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
	3/4/2021	8.75	<0.250	<0.250
	6/16/2021	9.31	<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)		
<b>MW-3</b> (continued)	3/4/2021	<b>0.0420</b>	<b>15.1</b>	<0.250
	6/16/2021	<b>0.0230</b>	<b>9.06</b>	<0.250
<b>MW-5</b>	11/7/2017	<b>2.86</b>	<0.10	<0.10
	3/21/2018	<0.05	<b>2.63</b>	<0.10
	6/29/2018	<b>0.819</b>	<0.10	<0.10
	9/27/2018	<b>9.55</b>	<0.250	<0.250
	12/7/2018	<b>1.22</b>	<0.250	<0.250
	3/26/2019	<b>2.40</b>	<b>0.866</b>	<0.250
	6/7/2019	<b>2.94</b>	<0.250	<0.250
	12/4/2019	<b>0.570</b>	<0.250	<0.250
	3/12/2020	<b>0.114</b>	<0.250	<0.250
	6/18/2020	<b>0.114</b>	<0.250	<0.250
	10/6/2020	<b>9.20</b>	<0.250	<0.250
	12/10/2020	<b>0.294</b>	<0.250	<0.250
	3/3/2021	<b>0.543</b>	<b>4.64</b>	<0.250
6/16/2021	<b>1.39</b>	<0.250	<0.250	
<b>MW-6</b>	11/7/2017	<b>0.608</b>	<b>0.35</b>	<0.10
	7/1/2018	<b>4.17</b>	<0.10	<0.10
	9/25/2018	<b>4.30</b>	<0.250	<0.250
	3/20/2019	<b>5.17</b>	<b>0.738</b>	<0.250
	6/5/2019	<b>0.964</b>	<b>0.883</b>	<0.250
	9/27/2019	<b>6.36</b>	<0.250	<0.250
	12/4/2019	<b>2.18</b>	<0.250	<0.250
	3/12/2020	<b>9.42</b>	<0.250	<0.250
	6/17/2020	<b>1.87</b>	<0.250	<0.250
	10/8/2020	<b>3.14</b>	<0.250	<0.250
	12/9/2020	<b>2.67</b>	<b>0.315</b>	<0.250
	3/4/2021	<b>4.56</b>	<0.250	<0.250
	6/16/2021	<b>3.05</b>	<0.250	<0.250
<b>MW-7</b>	2/6/2007	<b>3.00</b>	<b>60.7</b>	< 0.100
	6/10/2008	<b>4.89</b>	<b>67.5</b>	<b>0.1</b>
	3/23/2009	<b>11</b>	<b>56</b>	<0.10
	3/16/2010	<b>2.4</b>	<b>99</b>	<0.50
	6/7/2011	--	<b>140</b>	<0.10
	12/9/2011	--	<0.50	<0.10
	11/7/2017	<b>9.09</b>	<0.10	<0.10
	3/21/2018	<b>13.4</b>	<0.10	<0.10
	3/21/2018 DUP	<b>16.9</b>	<0.10	<0.10
	6/29/2018	<b>7.9</b>	<b>10.8</b>	0.10
	9/27/2018	<b>16.7</b>	<0.250	<0.250
	12/7/2018	<b>22.4</b>	<b>13.3</b>	<0.250
	12/7/2018 DUP	<b>22.1</b>	<b>13.5</b>	<0.250
	3/20/2019	<b>34.5</b>	<b>13.1</b>	<0.250
	3/20/2019 DUP	<b>33.7</b>	<b>13.4</b>	<0.250
	6/5/2019	<b>16.6</b>	<b>30.4</b>	<0.250
	6/5/2019 DUP	<b>17.0</b>	<b>30.3</b>	<0.250
	9/26/2019	<b>19.8</b>	<b>11.5</b>	<0.250
	9/26/2019 DUP	<b>20.3</b>	<b>11.5</b>	<0.250
	12/3/2019	<b>33.1</b>	<b>47.4</b>	<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)		
<b>MW-7</b> <b>(continued)</b>	12/3/19 DUP	<b>34.9</b>	<b>49.7</b>	<0.250
	3/11/2020	<b>6.89</b>	<b>18.7</b>	<0.250
	3/11/2020 DUP	<b>6.89</b>	<b>18.7</b>	<0.250
	6/18/2020	<b>5.21</b>	<b>27.6</b>	<0.250
	6/18/2020 DUP	<b>6.33</b>	<b>27.6</b>	<0.250
	10/8/2020	<b>14.5</b>	<b>1.92</b>	<0.250
	10/8/2020 DUP	<b>14.3</b>	<b>1.83</b>	<0.250
	12/9/2020	<b>34.5</b>	<b>88.6</b>	<0.250
	12/9/2020 DUP	<b>33.3</b>	<b>88.9</b>	<0.250
	3/3/2021	<b>5.94</b>	<b>10.6</b>	<0.250
	3/3/2021 DUP	<b>5.97</b>	<b>10.7</b>	<0.250
	6/16/2021	<b>16.1</b>	<b>94.9</b>	<0.250
	6/16/2021 DUP	<b>16.7</b>	<b>79.1</b>	<0.250
<b>MW-8</b>	6/10/2008	<0.0500	<b>167</b>	<0.1
	11/6/2017	<0.050	<b>207</b>	<0.10
	3/19/2018	<0.40	<b>284</b>	<0.10
	6/29/2018	<0.050	<b>333</b>	<0.10
	9/25/2018	<0.0200	<b>235</b>	<0.250
	12/7/2018	<b>0.0230</b>	<b>260</b>	<0.250
	3/22/2019	<b>0.0350</b>	<b>544</b>	<0.250
	6/3/2019	<0.0200	<b>176</b>	<0.250
	12/3/2019	<0.0200	<b>276 E</b>	<0.250
	3/11/2020	<b>0.732</b>	<b>311</b>	<1.25
	6/17/2020	<0.0200	<b>108 H-01</b>	<0.250
	10/6/2020	<0.0200	<b>248 H-01</b>	<0.250
	12/10/2020	<0.0200	<b>276</b>	<0.250
	3/3/2021	<0.0200	<b>317</b>	<0.250
6/16/2021	<0.0200	<b>206</b>	<1.25 R-04	
<b>MW-9</b>	9/21/2010	<b>1.4</b>	<b>89</b>	<0.10
	11/9/2017	<b>17.4</b>	<b>559</b>	<0.10
	3/21/2018	<0.050	<b>230</b>	<0.10
	6/29/2018	<b>14.2</b>	<b>382</b>	<b>0.61</b>
	9/27/2018	<b>17.0</b>	<b>468</b>	<0.250
	12/7/2018	<b>5.60</b>	<b>311</b>	<0.250
	3/20/2019	<b>0.198</b>	<b>173</b>	<0.250
	6/7/2019	<b>0.022</b>	<b>125</b>	<0.250
	9/26/2019	<b>0.680</b>	<b>138</b>	<0.250
	12/3/2019	<b>0.618</b>	<b>101</b>	<0.250
	3/11/2020	<b>0.0850</b>	<b>264</b>	<0.250
	6/18/2020	<0.0200	<b>128</b>	<0.250
	10/8/2020	<b>5.76</b>	<b>172</b>	<0.250
	12/9/2020	<b>11.1</b>	<b>302</b>	<0.250
	3/3/2021	<0.0200	<b>298</b>	<0.250
6/15/2021	<b>0.0260</b>	<b>156</b>	<1.25 R-04	
<b>MW-10</b>	11/6/2017	<b>35.6</b>	<b>333</b>	<b>0.270</b>
	6/29/2018	<b>29.0</b>	<b>486</b>	<0.10
	9/25/2018	<b>37.2</b>	<b>413</b>	<0.250
	9/25/2018 DUP	<b>38.0</b>	<b>412</b>	<0.250
	3/21/2019	<b>45.0</b>	<b>412</b>	<0.250
	6/6/2019	<b>36.5</b>	<b>363</b>	<b>0.463</b>

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)		
<b>MW-10</b> (continued)	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
	3/4/2021	14.1	420	<0.250
	6/15/2021	17.0	430	<1.25 R-04
<b>MW-12</b>	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
	3/5/2021	27.6	0.861	<0.250
	3/5/2021 DUP	28.2	0.920	<0.250
6/16/2021	35.6	71.8	3.52	
6/16/2021 DUP	30.8	70.3	3.41	
<b>MW-13</b>	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

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)		
<b>MW-13</b> (continued)	12/3/2019	<b>63.2</b>	<0.250	<0.250
	3/10/2020	<b>52.0</b>	<0.250	<0.250
	6/18/2020	<b>18.1</b>	<0.250	<0.250
	10/7/2020	<b>56.6</b>	<0.250	<0.250
	12/8/2020	<b>39.8</b>	<0.250	<0.250
	3/4/2021	<b>32.1</b>	<0.250	<0.250
	6/15/2021	<b>21.2</b>	<b>11.0</b>	<0.250
<b>MW-14</b>	11/8/2017	<b>34.7</b>	<b>50.3</b>	<1.0
	3/20/2018	<b>50.7</b>	<b>17.1</b>	<0.10
	6/28/2018	<b>31.6</b>	<b>104</b>	<2.5
	9/26/2018	<b>41.0</b>	<b>150</b>	<0.250
	12/5/2018	<b>53.7</b>	<b>75.5</b>	<0.250
	3/19/2019	<b>190</b>	<b>51.3</b>	<0.250
	6/6/2019	<b>33.9</b>	<b>28.6</b>	<b>0.958</b>
	9/25/2019	<b>29.6</b>	<b>145</b>	<0.250
	12/4/2019	<b>245</b>	<b>85.5</b>	<0.250
	3/11/2020	<b>32.0</b>	<b>137</b>	<0.250
	6/17/2020	<b>23.9</b>	<b>118 H-01</b>	<0.250
	10/8/2020	<b>32.5</b>	<b>305</b>	<0.250
	12/9/2020	<b>21.3</b>	<b>200</b>	<0.250
	3/4/2021	<b>15.9</b>	<b>258</b>	<0.250
6/15/2021	<b>6.79</b>	<b>158</b>	<1.25 R-04	
<b>MW-15</b>	11/6/2017	<0.050	<b>9.78</b>	<0.10
	7/2/2018	<0.050	<b>6.06</b>	<0.10
	6/6/2019	<0.0200	<b>2.42</b>	<0.250
	6/18/2020	<0.0200	<b>1.34</b>	<0.250
	12/10/2020	<0.0200	<b>5.85</b>	<0.250
	6/17/2021	<0.0200	<b>5.38</b>	<0.250
<b>MW-16</b>	11/6/2017	<0.050	<b>9.95</b>	<0.10
	3/19/2018	<0.40	<b>15.7</b>	<0.10
	7/2/2018	<0.050	<b>19.4</b>	<0.10
	9/25/2018	<0.0200	<b>6.10</b>	<0.250
	12/6/2018	<0.0200	<b>10.2</b>	<0.250
	3/22/2019	<b>5.31</b>	<b>7.90</b>	<0.250
	6/4/2019	<0.0200	<b>8.58</b>	<0.250
	9/25/2019	<0.0200	<b>7.15</b>	<0.250
	12/3/2019	<0.0200	<b>7.93</b>	<0.250
	3/11/2020	<b>0.465</b>	<b>10.5</b>	<0.250
	6/18/2020	<0.0200	<b>2.44</b>	<0.250
	10/7/2020	<0.0200	<b>7.10</b>	<0.250
	12/9/2020	<0.0200	<b>9.58</b>	<0.250
	3/3/2021	<0.0200	<b>7.09</b>	<0.250
6/16/2021	<b>0.022</b>	<b>8.66</b>	<0.250	
<b>MW-17</b>	11/8/2017	<b>0.634</b>	<b>43.4</b>	<1.0
	6/28/2018	<0.050	<b>7.84</b>	<0.10
	9/26/2018	<b>2.13</b>	<b>0.760</b>	<0.250
	3/19/2019	<b>5.77</b>	<b>25.3</b>	<0.250
	6/6/2019	<b>0.119</b>	<b>24.7</b>	<0.250
	9/26/2019	<b>2.12</b>	<b>1.10</b>	<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)		
<b>MW-17</b> (continued)	12/3/2019	<b>0.353</b>	<b>15.9</b>	<0.250
	3/10/2020	<b>1.21</b>	<b>11.5</b>	<0.250
	6/17/2020	<0.0200	<b>10.6 H-01</b>	<0.250
	10/7/2020	<b>3.44</b>	<b>0.636</b>	<0.250
	12/8/2020	<b>0.481</b>	<b>24.3</b>	<0.250
	3/3/2021	<b>1.00</b>	<b>2.95</b>	<0.250
	6/15/2021	<b>0.146</b>	<b>28.1</b>	<0.250
<b>MW-18i</b>	6/10/2008	<0.0500	<b>0.35</b>	<0.1
	11/7/2017	<0.050	<b>1.07</b>	<0.10
	3/21/2018	<0.050	<b>0.75</b>	<0.10
	7/2/2018	<0.050	<b>1.13</b>	<0.10
	9/27/2018	<0.0200	<b>1.00</b>	<0.250
	12/6/2018	<0.0200	<b>0.715</b>	<0.250
	3/21/2019	<0.0200	<b>0.509</b>	<0.250
	6/3/2019	<0.0200	<b>0.755</b>	<0.250
	9/25/2019	<0.0200	<b>0.831</b>	<0.250
	12/3/2019	<0.0200	<b>0.846</b>	<0.250
	3/11/2020	<0.0200	<b>0.445</b>	<0.250
	6/17/2020	<0.0200	<b>0.420</b>	<0.250
	10/7/2020	<0.0200	<b>0.415</b>	<0.250
	12/9/2020	<0.0200	<b>0.618</b>	<0.250
	3/3/2021	<0.0200	<b>0.528</b>	<0.250
6/17/2021	<0.0200	<b>0.467</b>	<0.250	
<b>MW-19</b>	10/19/2010	--	<b>19</b>	--
	9/22/2015	<b>46</b>	<b>135</b>	--
	11/9/2017	<b>80</b>	<b>41</b>	<1.0
	3/21/2018	<b>150</b>	<b>47.8</b>	<0.10
	3/21/2018 DUP	<b>152</b>	<b>46.5</b>	<0.10
	6/28/2018	<b>194</b>	<0.10	<0.10
	9/25/2018	<b>122</b>	<b>120</b>	<0.250
	9/25/2018 DUP	<b>125</b>	<b>121</b>	<0.250
	12/5/2018	<b>188</b>	<b>118</b>	<0.250
	12/5/2018 DUP	<b>188</b>	<b>119</b>	<0.250
	3/20/2019	<b>242</b>	<b>195</b>	<0.250
	3/20/2019 DUP	<b>192</b>	<b>191</b>	<0.250
	6/7/2019	<b>145</b>	<b>34.8</b>	<b>1.06</b>
	9/26/2019	<b>113</b>	<b>232</b>	<0.250
	9/26/2019 DUP	<b>119</b>	<b>233</b>	<0.250
	12/3/2019	<b>131</b>	<b>129</b>	<0.250
	12/3/2019 DUP	<b>125</b>	<b>136</b>	<0.250
	3/11/2020	<b>109</b>	<b>213</b>	<1.25
	3/11/2020 DUP	<b>107</b>	<b>205</b>	<1.25
	6/18/2020	<b>88.0</b>	<b>30.8</b>	<0.250
	6/18/2020 DUP	<b>90.4</b>	<b>27.2</b>	<0.250
	10/7/2020	<b>187</b>	<b>224</b>	<0.250
10/7/2020 DUP	<b>155</b>	<b>228</b>	<0.250	
12/8/2020	<b>180</b>	<b>147</b>	<0.250	
12/8/2020 DUP	<b>176</b>	<b>157</b>	<0.250	
3/3/2021	<b>156</b>	<b>137</b>	<0.250	
3/3/2021 DUP	<b>166</b>	<b>160</b>	<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)		
<b>MW-19</b> <b>(continued)</b>	6/16/2021	<b>115 D</b>	<b>152</b>	<1.25 R-04
	6/16/2021 DUP	<b>23.4 D</b>	<b>146</b>	<1.25 R-04
<b>MW-19i</b>	11/8/2017	<b>0.236</b>	<0.10	<0.10
	3/20/2018	<0.40	<0.10	<0.10
	7/2/2018	<b>0.158</b>	<0.10	<0.10
	9/27/2018	<b>0.213</b>	<0.250	<0.250
	12/6/2018	<b>0.240</b>	<0.250	<0.250
	3/25/2019	<b>0.212</b>	<0.250	<0.250
	6/3/2019	<b>0.178</b>	<0.250	<0.250
	12/4/2019	<b>0.169</b>	<0.250	<0.250
	3/12/2020	<0.0200	<0.250	<0.250
	6/18/2020	<b>0.191</b>	<0.250	<0.250
	10/7/2020	<b>0.178</b>	<0.250	<0.250
	12/10/2020	<b>0.226</b>	<0.250	<0.250
	3/3/2021	<b>0.198</b>	<0.250	<0.250
6/17/2021	<b>0.187</b>	<0.250	<0.250	
<b>MW-20i</b>	11/7/2017	<b>0.125</b>	<b>0.28</b>	<0.10
	3/21/2018	<b>1.01</b>	<b>1.06</b>	<0.10
	7/2/2018	<b>0.115</b>	<b>0.37</b>	<0.10
	9/25/2018	<b>0.244</b>	<b>1.11</b>	<0.250
	12/6/2018	<0.0200	<0.250	<0.250
	3/22/2019	<b>0.0270</b>	<b>0.261</b>	<0.250
	6/3/2019	<b>0.353</b>	<b>1.77</b>	<0.250
	9/25/2019	<0.0200	<b>0.617</b>	<0.250
	12/3/2019	<b>0.0300</b>	<b>1.84</b>	<0.250
	3/11/2020	<0.0200	<b>0.332</b>	<0.250
	6/17/2020	<0.0200	<b>0.585</b>	<0.250
	10/7/2020	<0.0200	<b>0.360</b>	<0.250
	12/9/2020	<b>0.176</b>	<b>0.643</b>	<0.250
	3/2/2021	<0.0200	<b>0.330</b>	<0.250
6/17/2021	<0.0200	<0.250	<0.250	
<b>MW-21i-40</b>	6/10/2008	<b>0.0594</b>	<0.100	<0.100
	11/8/2017	<0.050	<b>1.90</b>	<1.0
	3/22/2018	<b>0.071</b>	<b>1.70</b>	<0.10
	6/29/2018	<0.050	<b>5.12</b>	<1.0
	9/27/2018	<0.0200	<b>3.61</b>	<0.250
	12/6/2018	<0.0200	<b>3.16</b>	<0.250
	3/21/2019	<b>0.0360</b>	<b>3.41</b>	<0.250
	6/3/2019	<0.0200	<b>1.49</b>	<0.250
	9/25/2019	<0.0200	<b>3.49</b>	<0.250
	12/3/2019	<0.0200	<b>4.61</b>	<0.250
	3/11/2020	<0.0200	<b>2.90</b>	<0.250
	6/17/2020	<0.0200	<b>2.11</b>	<0.250
	10/7/2020	<0.0200	<b>5.67</b>	<0.250
	12/9/2020	<0.0200	<b>6.15</b>	<0.250
	3/2/2021	<b>0.117</b>	<b>3.70</b>	<0.250
6/16/2021	<b>0.0620</b>	<b>5.77</b>	<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)		
<b>MW-21i-105</b>	6/10/2008	<b>0.0645</b>	<0.100	<0.100
	11/8/2017	<0.050	<b>1.6</b>	<1.0
	3/22/2018	<b>13.0</b>	<b>15.8</b>	<b>0.10</b>
	6/29/2018	<b>12.3</b>	<b>13.1</b>	<0.10
	9/26/2018	<b>0.409</b>	<b>0.759</b>	<0.250
	12/6/2018	<b>3.05</b>	<b>5.29</b>	<0.250
	3/21/2019	<b>49.6</b>	<b>0.755</b>	<0.250
	6/6/2019	<b>45.7</b>	<b>7.57</b>	<b>1.25</b>
	9/25/2019	<b>28.3</b>	<b>4.46</b>	<b>1.81</b>
	12/4/2019	<b>42.5</b>	<b>4.15</b>	<b>2.11</b>
	3/12/2020	<b>32.6</b>	<b>3.54</b>	<b>4.79</b>
	6/18/2020	<b>44.6</b>	<b>4.18</b>	<b>12.1</b>
	10/8/2020	<b>45.6</b>	<b>5.85</b>	<b>10.6</b>
	12/9/2020	<b>34.4</b>	<b>8.54</b>	<b>5.76</b>
	3/4/2021	<b>2.30</b>	<b>7.39</b>	<b>2.47</b>
6/15/2021	<b>17.6</b>	<b>11.0</b>	<b>2.99</b>	
<b>MW-22i</b>	11/7/2017	<b>0.354</b>	<1.0	<1.0
	3/22/2018	<b>1.25</b>	<b>0.63</b>	<0.10
	6/29/2018	<b>0.469</b>	<1.0	<1.0
	9/26/2018	<b>0.369</b>	<0.250	<0.250
	12/5/2018	<b>0.378</b>	<0.250	<0.250
	3/21/2019	<b>0.448</b>	<0.250	<0.250
	6/6/2019	<b>0.329</b>	<0.250	<0.250
	9/25/2019	<b>0.339</b>	<0.250	<0.250
	12/4/2019	<b>0.395</b>	<0.250	<0.250
	3/12/2020	<b>0.111</b>	<0.250	<0.250
	6/18/2020	<b>0.331</b>	<0.250	<0.250
	10/8/2020	<b>0.325</b>	<0.250	<0.250
	12/9/2020	<b>0.339</b>	<0.250	<0.250
	3/4/2021	<b>0.206</b>	<0.250	<0.250
6/15/2021	<b>0.328</b>	<0.250	<0.250	
<b>MW-23i</b>	6/10/2008	<0.0500	<b>0.440</b>	<0.100
	11/8/2017	<0.0500	<b>0.78</b>	<0.100
	3/21/2018	<0.0500	<b>0.72</b>	<0.100
	6/28/2018	<0.0500	<b>0.53</b>	<0.100
	9/27/2018	<0.0200	<b>1.04</b>	<0.250
	12/6/2018	<0.0200	<b>0.520</b>	<0.250
	3/22/2019	<0.0200	<b>0.592</b>	<0.250
	6/3/2019	<0.0200	<b>0.604</b>	<0.250
	12/4/2019	<0.0200	<b>0.534</b>	<0.250
	3/12/2020	<0.0200	<b>0.639</b>	<0.250
	6/17/2020	<0.0200	<b>0.372</b>	<0.250
	10/7/2020	<0.0200	<b>0.796</b>	<0.250
	12/9/2020	<0.0200	<b>0.667</b>	<0.250
	3/2/2021	<0.0200	<b>0.616</b>	<0.250
	6/17/2021	<b>0.0410</b>	<b>0.650</b>	<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	--	<b>0.50</b>	<0.10
	12/7/2011	--	<b>1.60</b>	<0.10
	11/9/2017	<0.050	<b>3.09</b>	<0.10
	3/21/2018	<b>0.687</b>	<b>7.36</b>	<0.10
	6/28/2018	<0.050	<b>2.37</b>	<0.050
	9/27/2018	<0.0200	<b>7.56</b>	<0.250
	12/4/2018	<b>0.0670</b>	<b>2.97</b>	<0.250
	3/25/2019	<b>0.0200</b>	<b>4.07</b>	<0.250
	6/7/2019	<0.0200	<b>2.19</b>	<0.250
	9/27/2019	<b>0.116</b>	<0.250	<0.250
	12/3/2019	<0.0200	<b>2.86</b>	<0.250
	3/12/2020	<0.0200	<b>4.87</b>	<0.250
	6/18/2020	<0.0200	<b>2.70</b>	<0.250
	10/9/2020	<0.0200	<b>1.70</b>	<0.250
	12/10/2020	<0.0200	<b>9.40</b>	<0.250
	3/3/2021	<0.0200	<b>1.30</b>	<0.250
6/17/2021	<b>0.0260</b>	<b>5.43</b>	<0.250	
MW-24d	11/6/2017	<b>0.153</b>	<0.10	<0.10
	3/20/2018	<0.40	<0.10	<0.10
	6/27/2018	<b>0.160</b>	<0.10	<0.050
	9/28/2018	<b>0.145</b>	<0.250	<0.250
	12/10/2018	<b>0.993</b>	<0.250	<0.250
	3/25/2019	<b>0.147</b>	<0.250	<0.250
	6/4/2019	<b>0.131</b>	<0.250	<0.250
	9/27/2019	<b>0.050</b>	<b>3.76</b>	<0.250
	12/3/2019	<b>0.142</b>	<0.250	<0.250
	3/12/2020	<b>0.130</b>	<0.250	<0.250
	6/18/2020	<b>0.211</b>	<0.250	<0.250
	10/9/2020	<b>0.140</b>	<0.250	<0.250
3/3/2021	<b>0.163</b>	<0.250	<0.250	
MW-25i	11/8/2017	<b>0.138</b>	<b>0.53</b>	<0.25
	3/21/2018	<0.050	<b>0.40</b>	<0.10
	6/29/2018	<0.050	<b>0.27</b>	<0.10
	9/27/2018	<0.0200	<b>0.775</b>	<0.250
	12/6/2018	<0.0200	<b>0.541</b>	<0.250
	3/22/2019	<b>0.0250</b>	<b>0.0389</b>	<0.250
	6/3/2019	<0.0200	<b>0.383</b>	<0.250
	9/25/2019	<0.0200	<b>0.710</b>	<0.250
	12/3/2019	<0.0200	<b>0.405</b>	<0.250
	3/12/2020	<0.0200	<b>0.453</b>	<0.250
	6/18/2020	<0.0200	<b>0.357</b>	<0.250
	10/7/2020	<0.0200	<b>0.644</b>	<0.250
	12/9/2020	<0.0200	<b>0.485</b>	<0.250
	3/2/2021	<0.0200	<b>0.797</b>	<0.250
	6/17/2021	<0.0200	<b>0.675</b>	<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
	3/4/2021	55.2	457	<0.250
6/17/2021	55.3	583 H-01	<0.250	
MW-32i	11/10/2017	<0.050	1.33	<0.10
	3/2/2021	<0.0200	1.36	<0.250
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
3/2/2021	<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
	3/2/2021	<0.0200	25.3	<0.250
6/16/2021	<0.0200	28.4	<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	

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)		
<b>S-1</b> <b>(continued)</b>	10/7/2020	<0.0200	<b>1.86</b>	<0.250
	12/8/2020	<b>0.0210</b>	<b>1.40</b>	<0.250
	3/3/2021	<0.0200	<b>1.39</b>	<0.250
	6/15/2021	<0.0200	<b>1.54</b>	<0.250
<b>S-2</b>	11/8/2017	<b>5.64</b>	<b>1.05</b>	<0.10
	3/20/2018	<b>6.1</b>	<b>1.25</b>	<0.10
	6/28/2018	<b>8.05</b>	<b>3.28</b>	<b>0.054</b>
	9/26/2018	<b>7.55</b>	<b>5.93</b>	<0.250
	12/5/2018	<b>7.76</b>	<0.250	<0.250
	3/19/2019	<b>25.6</b>	<b>3.23</b>	<b>0.259</b>
	6/5/2019	<b>6.06</b>	<0.250	<0.250
	9/25/2019	<b>0.691</b>	<b>1.77</b>	<0.250
	12/4/2019	<b>6.83</b>	<b>0.408</b>	<0.250
	3/10/2020	<b>6.96</b>	<b>0.906</b>	<0.250
	6/17/2020	<b>6.34</b>	<0.250	<0.250
	10/7/2020	<b>5.97</b>	<b>5.45</b>	<0.250
	12/8/2020	<b>6.85</b>	<0.250	<0.250
	3/3/2021	<b>5.61</b>	<0.250	<0.250
6/15/2021	<b>5.56</b>	<0.250	<0.250	
<b>MGMS1-3(43)</b>	10/19/2010	--	<b>390</b>	--
	11/7/2017	<b>217</b>	<b>120</b>	<1.0
	3/22/2018	<b>214</b>	<0.10	<0.10
	7/1/2018	<b>198</b>	<0.10	<0.10
	9/28/2018	<b>240</b>	<b>75.8</b>	<0.250
	12/4/2018	<b>246</b>	<b>30.6</b>	<0.250
	3/26/2019	<b>238</b>	<b>13.5</b>	<0.250
	6/7/2019	<b>209</b>	<0.25	<0.250
	9/27/2019	<b>233</b>	<b>84.1</b>	<0.250
	12/4/2019	<b>216</b>	<b>45.3</b>	<0.250
	3/11/2020	<b>199</b>	<b>12.3</b>	<0.250
	6/16/2020	<b>157</b>	<0.250	<0.250
	10/6/2020	<b>214</b>	<b>40.7</b>	<0.250
	12/10/2020	<b>190</b>	<b>10.8</b>	<0.250
3/4/2021	<b>233</b>	<b>0.731</b>	<0.250	
6/16/2021	<b>188</b>	<b>0.398</b>	<0.250	
<b>MGMS1-2(60)</b>	11/7/2017	<0.050	<b>1.91</b>	<0.10
	3/22/2018	<b>0.054</b>	<b>3.18</b>	<0.10
	7/1/2018	<0.050	<b>1.83</b>	<0.10
	10/1/2018	<0.0200	<b>3.65</b>	<0.250
	12/4/2018	<b>0.104</b>	<b>0.697</b>	<0.250
	3/26/2019	<0.0200	<b>1.39</b>	<0.250
	6/7/2019	<0.0200	<b>1.08</b>	<0.250
	9/27/2019	<0.0200	<b>2.58</b>	<0.250
	12/4/2019	<0.0200	<b>0.732</b>	<0.250
	3/12/2020	<0.0200	<b>3.25</b>	<0.250
	6/16/2020	<0.0200	<b>0.375</b>	<0.250
	10/6/2020	<0.0200	<b>2.49 M-02</b>	<0.250
	12/10/2020	<0.0200	<b>1.46</b>	<0.250
	3/4/2021	<0.0200	<b>2.18</b>	<0.250
6/16/2021	<0.0200	<b>0.908</b>	<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)		
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
	6/16/2021	0.130	0.552	<0.250
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
3/4/2021	115	3.23	<0.250	
6/17/2021	60.9	<0.250	<0.250	
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
	3/4/2021	<0.0200	0.606	<0.250
6/17/2021	<0.0200	0.590	<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
	6/17/2021	<0.0200	0.282	<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)		
MGMS2-1(132)	11/9/2017	<0.050	<0.10	<0.10
	7/1/2018	<0.050	<0.10	<0.10
	9/28/2018	<b>0.0500</b>	<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	<b>0.0230</b>	<0.250	<0.250
	6/17/2021	<0.0200	<0.250	<0.250
MGMS3-4(40)	9/22/2015	<b>1.1</b>	<b>&lt;.10</b>	--
	11/10/2017	<b>1.71</b>	<0.10	<0.10
	3/22/2018	<b>1.55</b>	<0.10	<0.10
	7/1/2018	<b>0.971</b>	<0.10	<0.10
	9/28/2018	<b>1.71</b>	<0.250	<0.250
	9/28/2018 DUP	<b>1.68</b>	<0.250	<0.250
	12/10/2018	<b>1.04</b>	<0.250	<0.250
	3/26/2019	<b>2.67</b>	<0.250	<0.250
	6/3/2019	<b>1.31</b>	<0.250	<0.250
	6/3/2019 DUP	<b>1.32</b>	<0.250	<0.250
	6/3/2019 DUP	<b>1.32</b>	<0.250	<0.250
	9/27/2019	<b>1.14</b>	<0.250	<0.250
	9/27/2019 DUP	<b>1.26</b>	<0.250	<0.250
	12/4/2019	<b>0.906</b>	<0.250	<0.250
	12/4/2019 DUP	<b>0.918</b>	<0.250	<0.250
	3/12/2020	<b>2.09</b>	<0.250	<0.250
	6/16/2020	<b>0.784</b>	<0.250	<0.250
	6/16/2020 DUP	<b>0.789</b>	<0.250	<0.250
	10/6/2020	<b>1.68</b>	<0.250	<0.250
	10/6/2020 DUP	<b>1.64</b>	<0.250	<0.250
12/10/2020	<b>1.73</b>	<0.250	<0.250	
12/10/2020 DUP	<b>1.76</b>	<0.250	<0.250	
3/4/2021	<b>2.35</b>	<0.250	<0.250	
3/4/2021 DUP	<b>2.30</b>	<0.250	<0.250	
6/16/2021	<b>2.33</b>	<0.250	<0.250	
6/16/2021 DUP	<b>2.35</b>	<0.250	<0.250	
MGMS3-3(60)	11/10/2017	<0.050	<0.10	<0.10
	3/22/2018	<b>0.272</b>	<b>0.39</b>	<0.10
	7/1/2018	<b>0.100</b>	<b>0.29</b>	<0.10
	9/28/2018	<0.0200	<b>0.393</b>	<0.250
	12/10/2018	<0.0200	<0.250	<0.250
	3/26/2019	<0.0200	<b>0.495</b>	<0.250
	6/3/2019	<0.0200	<b>0.371</b>	<0.250
	9/27/2019	<0.0200	<0.250	<0.250
	12/4/2019	<0.0200	<b>0.364</b>	<0.250
	3/12/2020	<0.0200	<b>0.257</b>	<0.250
	6/16/2020	<0.0200	<b>0.262</b>	<0.250
	10/6/2020	<0.0200	<b>0.296</b>	<0.250
	12/10/2020	<0.0200	<b>0.310</b>	<0.250
	3/4/2021	<0.0200	<b>0.376</b>	<0.250
6/16/2021	<0.0200	<b>0.318</b>	<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)		
MGMS3-2(110)	11/10/2017	<0.050	<b>0.48</b>	<0.10
	7/1/2018	<0.050	<b>0.43</b>	<0.10
	9/28/2018	<0.0200	<b>0.506</b>	<0.250
	6/3/2019	<0.0200	<b>0.467</b>	<0.250
	12/4/2019	<0.0200	<b>0.451</b>	<0.250
	6/16/2020	<0.0200	<b>0.370</b>	<0.250
	12/10/2020	<0.0200	<b>0.389</b>	<0.250
	6/16/2021	<0.0200	<b>0.352</b>	<0.250
MGMS3-1(132)	11/10/2017	<0.050	<b>0.52</b>	<0.10
	7/1/2018	<0.050	<b>0.46</b>	<0.10
	9/28/2018	<0.0200	<b>0.468</b>	<0.250
	6/5/2019	<0.0200	<b>0.560</b>	<0.250
	12/4/2019	<0.0200	<b>0.629</b>	<0.250
	6/16/2020	<0.0200	<b>0.591</b>	<0.250
	12/10/2020	<0.0200	<b>0.412</b>	<0.250
	MP-1	2/6/2007	<b>42.4</b>	<b>247</b>
3/23/2009		<b>35</b>	<b>210</b>	<b>1.2</b>
3/16/2010		<b>37</b>	<b>990</b>	<b>0.76</b>
6/7/2011		--	<b>160</b>	<0.10
12/9/2011		--	<b>120</b>	<b>0.91</b>
11/9/2017		<b>12.2</b>	<b>23.0</b>	<0.50
3/21/2018		<b>7.13</b>	<b>37.8</b>	<0.10
6/28/2018		<b>8.71</b>	<b>38.2</b>	<0.10
9/26/2018		<b>10.9</b>	<b>113</b>	<0.250
12/4/2018		<b>6.01</b>	<b>80.8</b>	<0.250
3/20/2019		<b>7.05</b>	<b>77.6</b>	<0.250
6/7/2019		<b>8.24</b>	<b>61.6</b>	<b>0.366</b>
9/26/2019		<b>2.15</b>	<b>97.7</b>	<b>0.384</b>
12/3/2019		<b>2.39</b>	<b>118</b>	<0.250
3/11/2020		<b>8.82</b>	<b>110</b>	<0.250
6/17/2020		<b>5.81</b>	<b>161 H-01</b>	<0.250
10/8/2020		<b>5.22</b>	<b>115</b>	<0.250
12/9/2020		<b>1.95</b>	<b>106</b>	<0.250
3/3/2021	<b>6.68</b>	<b>140</b>	<0.250	
6/16/2021	<b>2.71</b>	<b>70.1</b>	<b>0.690</b>	
MP-3	6/28/2018	<b>18.8</b>	<b>138</b>	<b>0.42</b>

**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.
10. D = Relative percent difference (RPD) between sample and duplicate is outside of the acceptable range of +/- 30%.

**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	
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	

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)	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
	3/3/2021	56.4	22.4	20.0	<0.400	<0.400	<1.0	1.28	<0.400	<0.400	<0.400	4.53	2.79	103.9
	6/16/2021	78.0	39.6	35.5	<0.400	0.450	<1.0	4.30	0.927	<0.400	<0.400	8.63	2.55	195.0
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
	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	

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)	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	
3/3/2021	831	100	70.1	<2.00	<2.00	<1.0	<2.00	2.34	<2.00	<2.00	1.83	6.85	19.3	
6/16/2021	309	52.0	70.7	<4.00	<4.00	<1.0	<4.00	<4.00	<4.00	<4.00	2.81	1.88	266.0	
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	

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)	
EX (continued)	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	--	--	
	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		
6/17/2021	4,570	322	415	2.33	22.2	<1.0	4.55	3.90	<0.400	12.4	5.3	3.02	67.5		

Please refer to notes at end of table.

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**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-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
	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

Please refer to notes at end of table.

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**NuStar Vancouver Facility**  
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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)
<b>MW-12 (continued)</b>	10/7/2020	<0.400	<b>0.750</b>	<b>81.7</b>	<b>0.632</b>	<b>196</b>	<b>56</b>	<0.400	<b>37.8</b>	<0.400	<0.400	<b>39.5</b>	2.49	-156.9
	12/8/2020	<b>13.5</b>	<b>6.47</b>	<b>9.92</b>	<0.400	<b>7.36</b>	<b>3.6</b>	<0.400	<b>1.55</b>	<0.400	<0.400	<b>4.60</b>	2.34	120.9
	3/5/2021	<b>6.73</b>	<b>4.92</b>	<b>8.6</b>	<0.400	<b>0.436</b>	<1.0	<b>1.55</b>	<0.400	<0.400	<0.400	<b>8.33</b>	0.68	-4.2
	6/16/2021	<b>8.85</b>	<b>9.62</b>	<b>34.0</b>	<b>0.426</b>	<b>35.7</b>	<b>14.0</b>	<b>6.90</b>	<0.400	<0.400	<0.400	<b>10.7</b>	2.90	273.2
<b>MW-24i</b>	6/7/2011	<b>6.6</b>	<b>1.4</b>	<b>2.0</b>	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<b>1.2</b>	6.40	59.0
	9/16/2011	<b>27</b>	<b>24</b>	<b>270</b>	<b>1.7</b>	<b>19</b>	N/A	<b>2.5</b>	<b>13</b>	<0.50	<b>5.6</b>	<b>7.0</b>	0.61	646.9
	12/7/2011	<b>19</b>	<b>14</b>	<b>100</b>	<0.50	<b>7.5</b>	<b>2.29</b>	<b>0.84</b>	<b>5.0</b>	<0.50	<b>2.9</b>	<b>290</b>	3.50	-147.5
	3/12/2012	<b>30</b>	<b>11</b>	<b>79</b>	<0.50	<b>4.5</b>	<b>2.03</b>	<0.50	<b>5.9</b>	<0.50	<b>2.3</b>	<b>33</b>	2.11	-1.2
	6/22/2012	<b>0.85</b>	<0.50	<b>14</b>	<0.50	<b>2.6</b>	<b>1.52</b>	<0.50	<b>1.8</b>	<0.50	<0.50	<b>44</b>	3.50	-147.5
	9/14/2012	<b>31</b>	<b>20</b>	<b>58</b>	<0.50	<0.50	<1.0	<b>0.87</b>	<b>4.4</b>	<0.50	<b>0.79</b>	<b>15</b>	0.40	-54.0
	12/14/2012	<b>2.1</b>	<b>0.65</b>	<b>51</b>	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<b>16</b>	2.11	6.3
	3/15/2013	<b>23</b>	<b>15</b>	<b>48</b>	<0.50	<0.50	<1.0	<0.50	<b>2.8</b>	<0.50	<b>0.57</b>	<b>9.5</b>	0.79	13.1
	6/14/2013	<b>6.2</b>	<b>3.6</b>	<b>28</b>	<0.50	<0.80	<1.0	<0.50	<b>2.7</b>	<0.50	<0.50	<b>11</b>	0.39	130.2
	9/20/2013	<b>15</b>	<b>5.9</b>	<b>15</b>	<0.50	<0.80	<1.0	<0.50	<b>1.0</b>	<0.50	<0.50	<b>11</b>	1.92	-31.2
	12/16/2013	<b>6.7</b>	<b>3.4</b>	<b>8.4</b>	<0.50	<0.50	<1.0	<0.50	<b>1.3</b>	<0.50	<0.50	<b>7.9</b>	3.08	16.9
	3/24/2014	<b>10</b>	<b>5.5</b>	<b>16</b>	<0.50	<0.80	<1.0	<0.50	<b>1.3</b>	<0.50	<0.50	<b>9.4</b>	3.16	-55.4
	6/23/2014	<b>1.3</b>	<b>5.2</b>	<b>13</b>	<0.50	<b>2.1</b>	<b>29.1</b>	<0.50	<b>1.2</b>	<0.50	<0.50	<b>8.4</b>	4.70	-49.7
	9/30/2014	<b>20</b>	<b>10</b>	<b>21</b>	<0.50	<0.50	<1.0	<0.50	<b>1.8</b>	<0.50	<0.50	<b>12.0</b>	2.01	129.7
	12/15/2014	<b>2.4</b>	<b>1.1</b>	<b>12</b>	<0.50	<0.50	<1.0	<0.50	<b>0.60</b>	<0.50	<0.50	<1.0	6.27	-13.9
	3/20/2015	<b>6.1</b>	<b>3.1</b>	<b>5.9</b>	<0.50	<0.50	<6.2	<0.50	<b>0.58</b>	<0.50	<0.50	<1.0	10.28	38.6
	6/18/2015	<0.50	<0.50	<b>3.4</b>	<0.50	<0.50	<10.0	<0.50	<0.50	<0.50	<0.50	<b>1.6</b>	1.08	-158.7
	9/22/2015	<b>2.2</b>	<b>0.8</b>	<b>4.7</b>	<0.50	<0.50	<1.0	<0.50	<b>1.9</b>	<0.50	<0.50	<b>2.3</b>	1.85	99.4
	12/8/2015	<b>189</b>	<b>36.4</b>	<b>18</b>	<0.50	<0.50	<1.0	<0.50	<b>0.74</b>	<0.50	<0.50	<b>3.5</b>	1.36	99.2
	3/8/2016	<b>4.1</b>	<b>1.6</b>	<b>3.5</b>	<0.50	<0.50	<10.0	<0.50	<0.50	<0.50	<0.50	<b>1.0</b>	1.75	47.8
	6/17/2016	<b>11.5</b>	<b>6.3</b>	<b>7.8</b>	<0.50	<0.50	<10.0	<0.50	0.99	<0.50	<0.50	<1.0	3.12	14.0
	9/28/2016	<b>5.8</b>	<b>3.1</b>	<b>5.4</b>	<0.50	<0.50	<10.0	<0.50	<b>0.53</b>	<0.50	<0.50	<b>5.3</b>	2.58	123.9
	12/12/2016	<b>1.1</b>	<0.50	<0.50	<0.50	<0.50	<10.0	<0.50	<0.50	<0.50	<0.50	<b>1.5</b>	5.64	2.6
	3/30/2017	<b>1.0</b>	<0.50	<b>0.70</b>	<0.50	<0.50	<10.0	<0.50	<0.50	<0.50	<0.50	<b>3.4</b>	5.24	14.3
6/15/2017	<b>6.6</b>	<b>2.8</b>	<b>3.2</b>	<0.50	<0.50	<10.0	<0.50	<0.50	<1.0	<0.50	<b>1.2</b>	3.72	-13.4	
9/26/2017	<b>30.1</b>	<b>16.6</b>	<b>24.5</b>	<0.50	<0.50	<10.0	<0.50	<b>2.1</b>	<1.0	<0.50	<b>1.2</b>	1.21	-10.7	
11/9/2017	<b>12.7</b>	<b>5.9</b>	<b>9.6</b>	<0.50	<0.50	<10.0	<0.50	<b>1.1</b>	<0.50	<0.50	<b>1.3</b>	3.11	-100.1	
3/21/2018	<b>19.1</b>	<b>10.2</b>	<b>13.5</b>	<0.500	<0.500	<13.0	<0.500	<b>1.42</b>	<0.500	<0.500	<b>0.734 B J</b>	0.95	129.6	
6/28/2018	<b>10.3</b>	<b>5.93</b>	<b>13.6</b>	<b>1.09</b>	<0.500	<10.0	<0.500	<b>1.44</b>	<0.500	<0.500	<1.0	2.69	129.9	
9/27/2018	<b>24.8</b>	<b>14.3</b>	<b>25.0</b>	<0.400	<0.400	N/A	<0.400	<b>2.18</b>	<0.400	<0.400	N/A	1.67	106.3	
12/4/2018	<b>10.2</b>	<b>3.76</b>	<b>5.13</b>	<0.400	<0.400	N/A	<0.400	<b>0.800</b>	<0.400	<0.400	N/A	5.24	-6.9	
3/25/2019	<b>11.7</b>	<b>5.91</b>	<b>8.46</b>	<0.400	<0.400	<1.0	<0.400	<b>0.888</b>	<0.400	<0.400	<1.00	4.52	18.1	

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)
<b>MW-24i</b> <b>(continued)</b>	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
	3/3/2021	0.955	<0.400	0.505	<0.400	<0.400	<1.0	<0.400	<0.400	<0.400	<0.400	<1.00	6.41	22.2
6/17/2021	15.7	8.00	9.31	<0.400	<0.400	<1.0	0.989	<0.400	<0.400	<0.400	<1.50	2.99	132.0	
<b>MGMS2-40</b>	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
	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	

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)	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
	3/4/2021	115	59.9	159	1.12	72.5	<1.0	25.1	3.83	<0.400	<0.400	5.17	1.97	-19.5
	6/17/2021	68.8	35.6	181	0.975	66.3	<1.0	20.7	3.25	<0.400	<0.400	4.93	2.75	82.2
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	
3/4/2021	<0.400	0.996	3.48	0.494	27.4	16.0	11.9	<0.400	<0.400	<0.400	12.9	3.06	-120.8	
6/15/2021	1.01	2.56	13.4	0.673	12.9	1.00	1.12	<0.400	<0.400	<0.400	20.9	4.20	10.0	
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

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)
<b>MW-14</b> <b>(continued)</b>	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
	3/4/2021	128	410	161	2.51	<0.400	<1.0	9.39	3.76	<0.400	1.24	2.16	8.52	84.7
6/15/2021	28.3	80.6	23.8	<0.400	<0.400	<1.0	0.87	0.485	<0.400	<0.400	2.44	7.35	-23.0	
<b>MW-19</b>	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-19 (continued)	3/3/2021	4,470	1,880	1,120	11.4	53.6	<1.0	41.4	51.0	<0.4	27.8	5.84	6.47	24.6
	6/16/2021	4,770	1,190	1,260	15.1	80.8	1.3	58.0	28.2	<10	22.5	7.63	2.95	391.7
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
3/4/2021	151	320	89.4	2.39	<0.4	<1.0	5.92	1.89	<0.4	2.04	2.87	1.97	141.5	
6/17/2021	132	366	72.3	1.92	<1.0	<1.0	4.35	1.43	<1.0	2.06	3.42	6.13	226.5	
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

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)
<b>MGMS1-43</b> (continued)	6/16/2020	<b>116</b>	<b>264</b>	<b>2,520</b>	<b>31.5</b>	<b>152</b>	<b>3.4</b>	<b>21.8</b>	<b>114</b>	<10.0	<10.0	<b>6.56</b>	1.3	166.4
	10/6/2020	<b>219</b>	<b>507</b>	<b>2,980</b>	<b>45.5</b>	<b>48.2</b>	<1.0	<b>26.0</b>	<b>124</b>	<10.0	<10.0	<b>5.30</b>	1.07	127.5
	12/10/2020	<b>151</b>	<b>294</b>	<b>2,620</b>	<b>34.3</b>	<b>40.6</b>	<1.0	<20.0	<b>131</b>	<20.0	<20.0	<b>5.51</b>	1.26	95.2
	3/4/2021	<b>135</b>	<b>388</b>	<b>2,840</b>	<b>38.5</b>	<b>161</b>	<1.0	<b>128</b>	<b>29.0</b>	<4	<4	<b>5.64</b>	1.46	-22.8
	6/16/2021	<b>90.5</b>	<b>297</b>	<b>2,690</b>	<b>34.9</b>	<b>153</b>	<b>1.6</b>	<b>103</b>	<b>20.8</b>	<10	<10	<b>6.53</b>	0.58	-71.8
<b>MGMS3-40</b>	9/26/2016	<b>1.7</b>	<b>1.4</b>	<b>226</b>	<b>2.0</b>	<b>52.1</b>	<10.0	<b>0.60</b>	<b>4.5</b>	<0.50	<0.50	<b>36.2</b>	2.7	165.3
	12/16/2016	<b>0.63</b>	<0.50	<b>1.3</b>	<b>0.97</b>	<b>0.88</b>	<b>55.2</b>	<0.50	<b>1.0</b>	<0.50	<0.50	<b>86.9</b>	5.95	-9.20
	3/28/2017	<b>1.4</b>	<b>0.60</b>	<b>1,050</b>	<b>6.0</b>	<b>323</b>	<b>68.1</b>	<b>3.3</b>	<b>22.5</b>	<b>0.68</b>	<0.50	<b>5.0</b>	1.57	-125.8
	6/12/2017	<b>0.97</b>	<0.50	<b>1.7</b>	<0.50	<0.50	N/A	<0.50	<b>3.3</b>	<0.50	<0.50	N/A	5.22	-94.1
	9/26/2017	<b>0.79</b>	<0.50	<b>0.69</b>	<0.50	<0.50	<b>22.8</b>	<0.50	<b>1.1</b>	<1.0	<0.50	<b>3.8</b>	10.02	-82.8
	11/10/2017	<b>0.85</b>	<0.50	<b>8.0</b>	<0.50	<b>15.8</b>	<b>54.8</b>	<0.50	<b>4.3</b>	<0.50	<0.50	<b>6.5</b>	0.93	-111.6
	3/22/2018	<b>1.45</b>	<b>0.528</b>	<b>9.81</b>	<b>0.179 J</b>	<b>39.8</b>	<b>242</b>	<0.500	<b>8.57</b>	<0.500	<0.500	<b>8.74</b>	6.95	-130.8
	7/1/2018	<b>0.498 J</b>	<b>0.169 J</b>	<b>7.58</b>	<0.500	<b>8.98</b>	<b>27.4</b>	<0.500	<b>1.39</b>	<0.500	<0.500	<b>4.6</b>	3.18	-28.6
	9/28/2018	<b>0.970</b>	<0.400	<b>143</b>	<0.400	<b>129</b>	<b>33</b>	<b>0.560</b>	<b>9.08</b>	<0.400	<0.400	<b>4.38</b>	6.62	-61.7
	12/10/2018	<b>0.603</b>	<0.400	<b>1.77</b>	<0.400	<b>5.44</b>	<b>4.9</b>	<0.400	<b>1.54</b>	<0.400	<0.400	<b>3.42</b>	1.05	-122.9
	3/26/2019	<b>0.680</b>	<0.400	<b>117</b>	<0.400	<b>151</b>	<b>38</b>	<b>0.709</b>	<b>8.36</b>	<0.400	<0.400	<b>4.00</b>	0.74	92.6
	6/3/2019	<b>0.530</b>	<0.400	<b>74.7</b>	<0.400	<b>157</b>	<b>45</b>	<b>0.440</b>	<b>7.22</b>	<0.400	<0.400	<b>3.66</b>	0.89	-24.3
	9/27/2019	<b>0.578</b>	<0.400	<b>80.5</b>	<0.400	<b>106</b>	<b>8.4</b>	<b>0.413</b>	<b>5.09</b>	<0.400	<0.400	<b>2.86</b>	0.35	-182.8
	12/4/2019	<b>1.35</b>	<0.400	<b>2.66</b>	<0.400	<b>5.79</b>	<1.0	<0.400	<b>1.67</b>	<0.400	<0.400	<b>2.69</b>	2.92	-91.1
	3/12/2020	<b>0.529</b>	<b>0.439</b>	<b>418</b>	<b>0.638</b>	<b>330</b>	<b>40</b>	<b>2.43</b>	<b>12.8</b>	<0.400	<0.400	<b>4.00</b>	3.98	-136.4
	6/16/2020	<b>0.660</b>	<0.400	<b>138</b>	<0.400	<b>134</b>	<b>12.0</b>	<0.400	<b>3.71</b>	<0.400	<0.400	<b>3.08</b>	0.48	186.5
	10/6/2020	<b>0.850</b>	<0.400	<b>67.2</b>	<0.400	<b>84.0</b>	<b>4.1</b>	<0.400	<b>4.38</b>	<0.400	<0.400	<b>3.15</b>	0.56	-84.6
	12/10/2020	<8.00	<8.00	<b>125</b>	<8.00	<b>155</b>	<b>16</b>	<8.00	<8.00	<8.00	<8.00	<b>3.49</b>	0.70	-93.0
3/4/2021	<b>0.698</b>	<0.400	<b>111</b>	<0.400	<b>137</b>	<b>13</b>	<b>6.69</b>	<0.400	<0.400	<0.400	<b>3.35</b>	2.96	-137.2	
6/16/2021	<b>0.486</b>	<0.400	<b>16.3</b>	<0.400	<b>109</b>	<b>6.2</b>	<b>4.74</b>	<0.400	<0.400	<0.400	<b>2.87</b>	0.74	-152.3	

**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 = photionization 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-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	North_EFF-20111012	10/12/2011	<b>69</b>	<16	<b>160</b>	<16	<14	<b>9,500</b>	<b>16</b>	<b>700</b>	<10
System Effluent	Post Blower_North_012312	1/23/2012	<170	<120	<120	<120	<110	<b>16,000</b>	<120	<b>530</b>	<79
System Effluent	North_Effluent_0121712	2/17/2012	<140	<100	<100	<100	<91	<b>11,000</b>	<99	<b>300</b>	<67
System Effluent	North Effluent-032212	3/22/2012	<28	<54	<27	<27	<23	<b>6,600</b>	<25	<b>140</b>	<8.6
System Effluent	North_Effluent_062012	6/20/2012	<1.6	<3.2	<1.6	<1.6	<b>5.3</b>	<b>250</b>	<1.5	<b>15</b>	<0.51
System Effluent	North_Effluent_082212	8/22/2012	<1.6	<3.2	<1.6	<1.6	<1.4	<b>140</b>	<1.5	<b>11</b>	<0.51
System Effluent	North_Effluent_112612	11/26/2012	<b>39</b>	<14	<b>52</b>	<7.1	<6.2	<b>22,000</b>	<6.8	<b>510</b>	<4.6
System Effluent	North_Effluent_122112	12/21/2012	<31	<59	<30	<30	<26	<b>3,500</b>	<28	<b>61</b>	<19
System Effluent	North_Effluent_022813	2/28/2013	<36	<70	<35	<35	<31	<b>4,400</b>	<33	<b>160</b>	<22
System Effluent	SVE North	5/24/2013	<240	<170	<b>280</b>	<170	<380	<b>23,000</b>	<160	<b>1,100</b>	<110
System Effluent	SVE North	6/25/2013	<b>76</b>	<51	<b>88</b>	<51	<110	<b>13,000</b>	<49	<b>730</b>	<33
System Effluent	SVE North	8/27/2013	<150	<110	<110	<110	<230	<b>17,000</b>	<100	<b>800</b>	<69
System Effluent	SVE North Effluent	10/24/2013	<82	<60	<60	<60	<130	<b>10,000</b>	<57	<b>570</b>	<39
System Effluent	SVE North Effluent	12/27/2013	<44	<32	<32	<32	<69	<b>7,000</b>	<30	<b>470</b>	<20
System Effluent	SVE North Effluent	1/29/2014	<10	<40	<b>22</b>	<40	<87	<b>1,300</b>	<38	<b>110</b>	<26
System Effluent	SVE_North_Post Carbon	2/24/2014	<b>55</b>	<83	<b>68</b>	<41	<36	<b>8,700</b>	<39	<b>760</b>	<27
System Effluent	SVE North Post Carbon	3/5/2014	<b>25</b>	<39	<b>29</b>	<20	<17	<b>4,600</b>	<19	<b>300</b>	<13
System Effluent	VCP_North_Effluent	3/31/2014	<b>19</b>	<13	<b>18</b>	<13	<28	<b>3,500</b>	<12	<b>200</b>	<8.2
System Effluent	North_SVE_Effluent_042914	4/29/2014	<b>22</b>	<15	<b>17</b>	<15	<33	<b>3,500</b>	<14	<b>220</b>	<9.8
System Effluent	North_SVE_Effluent_052714	5/27/2014	<31	<23	<23	<23	<50	<b>4,100</b>	<22	<b>280</b>	<15
System Effluent	North_VCP_Effluent	7/3/2014	<23	<17	<b>20</b>	<17	<37	<b>4,500</b>	<16	<b>290</b>	<11
System Effluent	SVE North	7/28/2014	<120	<88	<b>&lt;88</b>	<88	<190	<b>7,200</b>	<84	<b>460</b>	<22

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	North SVE	9/30/2014	<48	<35	<b>48</b>	<35	<76	<b>7,300</b>	<33	<b>480</b>	<22
System Effluent	SVE North Effluent	10/27/2014	<110	<80	<80	<80	<180	<b>15,000</b>	<76	<b>410</b>	<52
System Effluent	SVE North 11.25.14	11/25/2014	<39	<28	<28	<28	<62	<b>7,100</b>	<27	<b>390</b>	<18
System Effluent	SVENorth122914	12/29/2014	<140	<99	<99	<99	<220	<b>15,000</b>	<94	<b>290</b>	<64
System Effluent	SVE North	1/26/2015	<b>16</b>	<31	<16	<16	<14	<b>1,500</b>	<15	<b>130</b>	<10
System Effluent	SVE North	2/26/2015	<1.6	<3.2	<1.6	<1.6	<1.5	<b>32</b>	<1.5	<2.1	<1.0
System Effluent	SVE North	3/30/2015	<b>15</b>	<9.6	<b>9.5</b>	<4.8	<4.2	<b>1,700</b>	<4.6	<b>130</b>	<3.1
System Effluent	SVE N	4/24/2015	<8.5	<16	<8.2	<8.2	<7.2	<b>550</b>	<7.8	<b>50</b>	<5.3
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	<b>360</b>	<b>3.6</b>	<b>8.0</b>	<2.4
System Effluent	SVE North	7/29/2015	<b>19</b>	<33	<b>21</b>	<16	<14	<b>2,000</b>	<16	<b>210</b>	<11
System Effluent	SVE North	8/31/2015	<b>65</b>	<65	<b>62</b>	<33	<28	<b>7,100</b>	<31	<b>600</b>	<21
System Effluent	SVE North	9/28/2015	<b>21</b>	<22	<11	<11	<9.7	<b>1,400</b>	<11	<b>190</b>	<7.1
System Effluent	SVE North	10/29/2015	<56	<110	<b>59</b>	<55	<48	<b>6,300</b>	<52	<b>550</b>	<35
System Effluent	SVE_North_Effluent_113015	11/30/2015	<54	<140	<72	<72	<72	<b>2,300</b>	<72	<b>86</b>	<72
System Effluent	SVE_North_Effluent_122815	12/28/2015	<32	<62	<31	<31	<27	<b>5,600</b>	<30	<b>110</b>	<20
System Effluent	North_Effluent_020116	2/1/2016	<53	<100	<51	<51	<45	<b>11,000</b>	<48	<b>150</b>	<33
System Effluent	SVE_North_Effluent_022916	2/29/2016	<b>30</b>	<33	<b>29</b>	<16	<14	<b>7,800</b>	<16	<b>160</b>	<11
System Effluent	SVE_North_Effluent_032916	3/29/2016	<b>19</b>	<14	<7.2	<7.2	<6.3	<b>920</b>	<6.9	<b>19</b>	<4.7
System Effluent	North_Effluent	4/27/2016	<15	<29	<14	<14	<13	<b>1,500</b>	<14	<b>75</b>	<9.2
System Effluent	North_Effluent_62816	6/28/2016	<11	<22	<11	<13	<9.6	<b>1,800</b>	<10	<b>83</b>	<7.1
System Effluent	SVE-North-Effluent 72616	7/26/2016	<1.6	<3.2	<1.6	<1.6	<1.4	<b>84</b>	<b>2.0</b>	<b>6</b>	<1.0

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-Effluent 83016	8/30/2016	<0.30	<0.80	<0.40	<0.40	<0.40	<b>54</b>	<0.40	<b>2</b>	<0.40
System Effluent	SVE_North_Effluent_092916	9/29/2016	<1.6	<3.2	<1.6	<1.6	<1.4	<b>15</b>	<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	<b>7.9</b>	<b>3.0</b>	<2.1	<1.0
System Effluent	SVE_North_Effluent_112816	11/28/2016	<1.6	<3.2	<1.6	<1.6	<1.4	<b>2.8</b>	<b>3.9</b>	<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	<b>1.7</b>	<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	<b>4.6</b>	<2.1	<1.0
System Effluent	SVE_North_Effluent_022817	2/28/2017	<1.6	<3.2	<1.6	<1.6	<1.4	<b>5.9</b>	<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	<b>3.2</b>	<b>2.9</b>	<2.1	<1.0
System Effluent	SVE_North_Effluent	4/24/2017	<1.6	<3.2	<1.6	<1.6	<1.4	<b>3.9</b>	<b>3.7</b>	<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.
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	Used Apex PID #3
4/24/2018	2.2	-20	26.8	31.0	29.2	19.0	18.8	8.0	Used Apex PID #3
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	Used Cascadia PID
3/8/2019	0.7	-24	19.2	28.0	12.1	16.0	12.4	6.0	Used Cascadia PID
5/7/2019	4.0	-20	33.0	29.0	25.4	17.0	25.8	7.0	Used Cascadia PID
7/8/2019	0.6	-21	33.6	29.0	26.1	17.0	27.1	7.0	Used Cascadia PID
9/9/2019	1.0	-21	29.7	29.0	27.1	17.0	22.8	6.0	Used Cascadia PID
11/4/2019	0.9	-21	31.6	29.0	18.1	12.0	16.2	6.0	Used Cascadia PID
1/10/2020	0.1	-21	6.3	29.0	4.2	16.0	3.5	6.0	Used Cascadia PID
12/14/2020	0.6	-18	52.9	30.0	25.2	17.0	21.9	6.0	Used Cascadia PID
2/23/2021	0.1	-21	13.1	30.0	16.8	17.0	7.2	6.0	Used Cascadia PID
4/9/2021	0.0	-17	303.4	30.0	281.1	18.0	278.6	7.0	Used FEI miniRAE 30.00 PID
6/18/2021	0.2	-16	26.7	30.0	32.4	18.0	25.3	7.0	Used Cascadia PID

**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 <sup>3</sup>										
Pre Carbon	INF 1006	10/6/2011	<330	<320	<b>470</b>	<320	<280	<b>40,000</b>	<300	<b>520</b>	<b>5,100</b>	<210	<350
Post Carbon	EFF 1006	10/6/2011	<16	<16	<b>390</b>	<16	<14	<27	<15	<b>140</b>	<b>50</b>	<10	<17
Pre Carbon	Post Blower 110211	11/2/2011	<290	<280	<b>430</b>	<280	<250	<b>26,000</b>	<270	<390	<b>2,100</b>	<180	<310
Pre Carbon	SOUTHSVE_PRECARBON_121411	12/14/2011	<580	<570	<b>620</b>	<570	<500	<b>54,000</b>	<540	<780	<b>2,800</b>	<360	<620
Post Carbon	SOUTHSVE_POSTCARBON_121411	12/14/2011	<16	<b>35</b>	<b>23</b>	<16	<b>17</b>	<b>1,600</b>	<15	<b>78</b>	<b>1,300</b>	<b>12</b>	<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	<b>460</b>	<300	<260	<b>28,000</b>	<280	<410	<b>1,200</b>	<190	<330
Post Carbon	South_PostCarbon_021712	2/17/2012	<16	<16	<16	<16	<14	<27	<15	<22	<21	<17	<10
Pre Carbon	South Influent - 032212	3/22/2012	<190	<190	<b>310</b>	<95	<84	<b>30,000</b>	<91	<b>99</b>	<b>960</b>	<31	<100
Post Carbon	South Effluent - 032212	3/22/2012	<1.2	<3.2	<1.6	<1.6	<b>4</b>	<2.7	<1.5	<1.6	<2.1	<b>6.4</b>	<3.5
Pre Carbon	South_SVE_PRECARBON	4/26/2012	<210	<560	<280	<280	<240	<b>32,000 S</b>	<270	<290	<b>640 S</b>	<90	<610
Post Carbon	South-SVE_POSTCARBON	4/26/2012	<1.2	<3.2	<1.6	<1.6	<b>4</b>	<2.7	<1.5	<1.6	<2.1	<b>2.4</b>	<3.5
Pre Carbon	SOUTH_SVE_PRECARBON	5/23/2012	<100	<260	<b>200</b>	<130	<120	<b>19,000</b>	<130	<140	<b>780</b>	<43	<290
Post Carbon	South_SVE_PRECARBON	5/23/2012	<1.2	<3.2	<1.6	<1.6	<b>3</b>	<2.7	<1.5	<1.6	<2.1	<b>3.7</b>	<3.5
Pre Carbon	South_PreCarbon_062012	6/20/2012	<240	<630	<b>360</b>	<320	<280	<b>35,000</b>	<300	<330	<b>1,400</b>	<100	<1040
Post Carbon	South_PostCarbon_062012	6/20/2012	<0.30	<0.80	<0.40	<0.40	<b>1.0</b>	<0.40	<0.40	<0.30	<0.40	<b>1.2</b>	<1.2
Pre Carbon	South_PreCarbon_072412	7/24/2012	<150	<390	<b>240</b>	<200	<170	<b>33,000</b>	<190	<200	<b>1,100</b>	<63	<640
Post Carbon	South_PostCarbon_072412	7/24/2012	<1.2	<b>11</b>	<1.6	<1.6	<b>3.0</b>	<2.7	<b>2.2</b>	<1.6	<2.1	<b>3.9</b>	<5.2
Pre Carbon	South_PreCarbon_082212	8/22/2012	<250	<660	<b>760</b>	<330	<290	<b>47,000</b>	<310	<340	<b>2,000</b>	<110	<b>1,080</b>
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	<b>500</b>	<400	<310	<b>50,000</b>	<330	<360	<b>1,900</b>	<230	<770
Post Carbon	South_PostCarbon_092512	9/25/2012	<b>13</b>	<b>18</b>	<b>1,200</b>	<b>11</b>	<b>5.7</b>	<2.7	<1.5	<1.6	<2.1	<b>6.2</b>	<3.5
Pre Carbon	South_PreCarbon_102912	10/29/2012	<320	<850	<b>440</b>	<480	<370	<b>60,000</b>	<400	<440	<b>2,200</b>	<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	<b>10,000</b>	<120	<130	<b>530</b>	<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	<b>110</b>	<93	<82	<b>14,000</b>	<89	<96	<b>600</b>	<60	<300
Post Carbon	South_PostCarbon_122112	12/21/2012	<1.2	<3.2	<1.6	<1.6	<b>1.6</b>	<2.7	<1.5	<1.6	<2.1	<b>3.0</b>	<5.2
Pre Carbon	South_PreCarbon_012413	1/24/2013	<9.2	<24	<b>14</b>	<12	<11	<b>1,700</b>	<11	<12	<b>100</b>	<7.8	<39
Post Carbon	South_PostCarbon_012413	1/24/2013	<1.2	<3.2	<1.6	<1.6	<b>3.3</b>	<2.7	<1.5	<1.6	<2.1	<b>3.7</b>	<5.2
Pre Carbon	South_PreCarbon_022813	2/28/2013	<5.9	<15	<b>8.5</b>	<7.7	<6.7	<b>940</b>	<7.3	<7.9	<b>84</b>	<5.0	<25.4
Post Carbon	South_PostCarbon_022813	2/28/2013	<1.2	<3.2	<1.6	<1.6	<b>8.1</b>	<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	<b>3,700</b>	<36	<39	<b>160</b>	<24	<123
Post Carbon	South_PostCarbon_032513	3/25/2013	<1.2	<3.2	<1.6	<1.6	<b>2.0</b>	<2.7	<1.5	<1.6	<2.1	<b>2.0</b>	<5.2
Pre Carbon	SVE South Pre Carbon	4/29/2013	<6.3	<16	<b>10</b>	<8.2	<7.2	<b>950</b>	<7.8	<8.4	<b>48</b>	<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	<b>0.93</b>	<1.2
Pre Carbon	SVE South Pre Carbon	5/24/2013	<1,100	<1,100	<b>2,400</b>	<1,100	<2,400	<b>240,000</b>	<1,100	<1,500	<b>8,400</b>	<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 <sup>3</sup>										
Pre Carbon	SVE South Pre Carbon	6/25/2013	<150	<150	<b>630</b>	<150	<330	<b>39,000</b>	<140	<210	<b>1,800</b>	<97	<570
Post Carbon	SVE South Post Carbon	6/25/2013	<0.81	<b>8.1</b>	<b>3.8</b>	<0.79	<b>5.6</b>	<1.4	<0.75	<1.1	<1.1	<b>3.1</b>	<3.1
Pre Carbon	SVE South Pre Carbon	7/25/2013	<120	<120	<b>380</b>	<120	<260	<b>22,000</b>	<110	<160	<b>1,200</b>	<77	<460
Post Carbon	SVE South Post Carbon	7/25/2013	<0.81	<b>17</b>	<b>65</b>	<b>2.1</b>	<b>3.4</b>	<1.4	<b>1.2</b>	<1.1	<1.1	<b>2.6</b>	<b>1.4</b>
Pre Carbon	SVE South Pre Carbon	8/27/2013	<150	<150	<b>520</b>	<150	<330	<b>28,000</b>	<140	<210	<b>1,500</b>	<97	<580
Post Carbon	SVE South Post Carbon	8/27/2013	<b>3.3</b>	<b>13</b>	<b>270</b>	<b>7.0</b>	<b>4.7</b>	<2.7	<1.5	<2.2	<2.1	<b>3.7</b>	<6.0
Pre Carbon	SVE South Precarbon	9/30/2013	<110	<110	<b>450</b>	<110	<240	<b>26,000</b>	<110	<150	<b>1,400</b>	<72	<420
Pre Carbon	SVE South Pre Carbon	10/24/2013	<140	<140	<b>430</b>	<140	<310	<b>27,000</b>	<130	<190	<b>1,100</b>	<90	<530
Post Carbon	SVE South Post Carbon	10/24/2013	<b>3.8</b>	<b>4.9</b>	<b>390</b>	<b>3.3</b>	<5.2	<b>4.3</b>	<2.3	<b>5.4</b>	<3.2	<b>2.6</b>	<5.1
Pre Carbon	SVE South Pre Carbon	11/25/2013	<100	<98	<b>250</b>	<98	<220	<b>21,000</b>	<93	<140	<b>840</b>	<63	<380
Post Carbon	SVE South Post Carbon	11/25/2013	<2.8	<b>4.1</b>	<b>250</b>	<2.8	<b>7.3</b>	<4.8	<2.6	<b>17</b>	<b>56</b>	<1.8	<10.6
Pre Carbon	SVE South Pre Carbon	12/27/2013	<110	<110	<b>270</b>	<110	<240	<b>20,000</b>	<100	<150	<b>900</b>	<70	<420
Post Carbon	SVE South Post Carbon	12/27/2013	<b>2.5</b>	<b>4.5</b>	<b>220</b>	<b>2.4</b>	<b>3.8</b>	<b>3.5</b>	<1.1	<b>6.8</b>	<b>62</b>	<0.77	<4.6
Pre Carbon	SVE South Pre-Carbon	1/29/2014	<80	<79	<b>260</b>	<79	<170	<b>20,000</b>	<75	<110	<b>800</b>	<51	<306
Post Carbon	SVE South Post-Carbon	1/29/2014	<b>4.5</b>	<b>7.2</b>	<b>330</b>	<b>4.8</b>	<8.7	<b>7.9</b>	<3.8	<b>13</b>	<b>98</b>	<b>3.1</b>	<15.3
Pre Carbon	SVE_South_Pre_Carbon	2/24/2014	<190	<490	<b>430</b>	<240	<b>240.0</b>	<b>34,000</b>	<b>600</b>	<250	<b>1,500</b>	<160	<800
Post Carbon	SVE_South_Effluent	2/24/2014	<1.2	<3.2	<b>41</b>	<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	<b>270</b>	<140	<120	<b>16,000</b>	<b>660</b>	<140	<b>660</b>	<90	<b>1,090</b>
Post Carbon	SVE South Effluent	3/5/2014	<b>3.7</b>	<8.3	<b>310</b>	<b>4.2</b>	<b>4.4</b>	<7.1	<4.0	<4.3	<b>21</b>	<2.7	<13.7
Pre Carbon	VCP_South_Post_Blower	3/31/2014	<83	<82	<b>260</b>	<82	<180	<b>20,000</b>	<78	<110	<b>630</b>	<53	<309
Post Carbon	VCP_South_Effluent	3/31/2014	<b>3.3</b>	<b>4.9</b>	<b>290</b>	<b>4.2</b>	<4.3	<3.4	<1.9	<b>3.3</b>	<b>21</b>	<b>1.4</b>	<7.6
Pre Carbon	South_SVE_Postblower_042914	4/29/2014	<47	<46	<b>180</b>	<46	<100	<b>13,000</b>	<44	<63	<b>550</b>	<30	<180
Post Carbon	South_SVE_Effluent_042914	4/29/2014	<b>5.1</b>	<b>5.0</b>	<b>540</b>	<4.8	<11	<8.2	<4.6	<6.6	<b>37</b>	<3.1	<18.3
Pre Carbon	South_SVE_Postblower_052714	5/27/2014	<57	<55	<b>160</b>	<55	<120	<b>12,000</b>	<53	<76	<b>490</b>	<36	<201
Post Carbon	South_SVE_PostCarbon_052714	5/27/2014	<b>5.0</b>	<4.8	<b>530</b>	<4.8	<11	<8.2	<4.6	<b>14</b>	<b>8.1</b>	<3.1	<18.3
Pre Carbon	South_VCP_Post Blower	7/3/2014	<18	<18	<b>56</b>	<18	<45	<b>2,800</b>	<18	<18	<b>150</b>	<18	<63
Post Carbon	South_VCP_Post Carbon	7/3/2014	<16	<16	<b>760</b>	<16	<35	<b>55</b>	<15	<b>430</b>	<b>3,200</b>	<10	<60
Pre Carbon	SVE Pre Carbon	7/28/2014	<69	<67	<b>200</b>	<67	<150	<b>15,000</b>	<64	<93	<b>750</b>	<43	<254
Post Carbon	SVE Post Carbon	7/28/2014	<68	<67	<b>270</b>	<67	<150	<b>13,000</b>	<63	<b>530</b>	<b>12,000</b>	<43	<253
Pre Carbon	South SVE Pre Carbon	8/25/2014	<140	<130	<b>340</b>	<130	<290	<b>20,000</b>	<130	<180	<b>1,100</b>	<86	<520
Post Carbon	South SVE Post Carbon	8/25/2014	<140	<130	<b>270</b>	<130	<290	<b>9,600</b>	<130	<180	<b>2,700</b>	<86	<520
Pre Carbon	South SVE_Pre Carbon	9/30/2014	<110	<110	<b>250</b>	<110	<230	<b>17,000</b>	<100	<150	<b>930</b>	<69	<410
Post Carbon	South SVE_Post Carbon	9/30/2014	<130	<120	<b>280</b>	<120	<270	<b>23,000</b>	<120	<170	<b>620</b>	<80	<480
Pre Carbon	SVE South Post Blower	11/3/2014	<130	<130	<b>320</b>	<130	<280	<b>24,000</b>	<120	<170	<b>1,100</b>	<81	<490
Post Carbon	SVE South Post Carbon	11/3/2014	<81	<81	<b>130</b>	<81	<180	<b>12,000</b>	<77	<110	<b>290</b>	<52	<309
Pre Carbon	SVE South Pre Carbon	1/26/2015	<190	<500	<b>420</b>	<250	<220	<b>21,000</b>	<b>240</b>	<260	<b>860</b>	<160	<820
Post Carbon	SVE South Post Carbon	1/26/2015	<78	<200	<100	<100	<90	<170	<b>190</b>	<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 <sup>3</sup>										
Pre Carbon	SVE South Pre Carbon	2/26/2015	<150	<390	<b>260</b>	<200	<170	<b>18,000</b>	<b>280</b>	<200	<b>660</b>	<130	<650
Post Carbon	SVE South Post Carbon	2/26/2015	<1.2	<3.2	<1.6	<1.6	<b>3.2</b>	<2.7	<1.5	<1.6	<2.1	<b>2.5</b>	<5.2
Pre Carbon	SVE South Pre Carbon	3/30/2015	<61	<160	<b>200</b>	<79	<b>160</b>	<b>17,000</b>	<b>180</b>	<82	<b>570</b>	<51	<257
Post Carbon	SVE South Post Carbon	3/30/2015	<1.2	<3.2	<1.6	<1.6	<b>2.8</b>	<2.7	<b>2.7</b>	<1.6	<b>51</b>	<b>2.5</b>	<5.2
Pre Carbon	SVE S Pre Carbon	4/24/2015	<37	<97	<b>170</b>	<49	<43	<b>5,400</b>	<46	<50	<b>410</b>	<31	<163
Post Carbon	SVE S Post Carbon	4/24/2015	<6.2	<16	<8.1	<8.1	<7.1	<b>660</b>	<7.7	<8.3	<b>19</b>	<5.2	<b>18</b>
Pre Carbon	SVE South Pre Carbon	5/28/2015	<60	<160	<b>140</b>	<79	<b>92</b>	<b>8,000</b>	<b>240</b>	<81	<b>460</b>	<51	<256
Post Carbon	SVE South Post Carbon	5/28/2015	<4.9	<13	<6.3	<6.3	<5.6	<b>650</b>	<6.0	<6.5	<b>16</b>	<4.1	<b>22.1</b>
Pre Carbon	SVE South Pre Carbon	7/29/2015	<65	<170	<b>190</b>	<85	<75	<b>12,000</b>	<81	<88	<b>790</b>	<55	<183
Post Carbon	SVE South Post Carbon	7/29/2015	<b>10</b>	<27	<b>960</b>	<b>16</b>	<12	<b>440</b>	<13	<14	<18	<8.7	<45
Pre Carbon	SVE South Pre Carbon	8/31/2015	<64	<170	<b>160</b>	<83	<73	<b>12,000</b>	<79	<86	<b>780</b>	<54	<171
Post Carbon	SVE South Post Carbon	8/31/2015	<21	<55	<b>530</b>	<27	<24	<b>3,400</b>	<26	<28	<b>94</b>	<18	<90
Pre Carbon	SVE South Pre Carbon	9/28/2015	<83	<220	<b>170</b>	<110	<94	<b>9,900</b>	<100	<110	<b>660</b>	<70	<360
Post Carbon	SVE South Post Carbon	9/28/2015	<b>3.4</b>	<6.0	<b>340</b>	<b>3.6</b>	<2.6	<b>300</b>	<2.8	<b>39</b>	<b>59</b>	<1.9	<9.8
Pre Carbon	SVE South Pre Carbon	10/29/2015	<130	<350	<b>230</b>	<170	<150	<b>18,000</b>	<170	<180	<b>790</b>	<110	<570
Post Carbon	SVE South Post Carbon	10/29/2015	<b>4.2</b>	<b>5.2</b>	<b>340</b>	<b>4.5</b>	<b>2.6</b>	<b>26</b>	<1.5	<b>67</b>	<b>310</b>	<b>1.7</b>	<5.2
Pre Carbon	SVE_South_Precarbon_113015	11/30/2015	<29	<77	<b>54</b>	<38	<38	<b>3,000</b>	<38	<29	<b>300</b>	<38	<77
Post Carbon	SVE_South_Postcarbon_113015	11/30/2015	<0.80	<0.80	<b>27</b>	<b>0.60</b>	<0.40	<0.40	<0.40	<b>6</b>	<b>11</b>	<0.40	<0.80
Pre Carbon	SVE_SOUTH_PRE CARBON_12/28/15	12/28/2015	<120	<320	<b>180</b>	<160	<140	<b>35,000</b>	<150	<170	<b>1,200</b>	<100	<530
Post Carbon	SVE_SOUTH_POST CARBON_12/28/15	12/28/2015	<1.2	<3.2	<b>28</b>	<1.6	<1.4	<2.7	<b>1.5</b>	<b>2</b>	<b>6.5</b>	<1.0	<4.2
Pre Carbon	SVE_SOUTH_PRE CARBON	2/1/2016	<8.6	<22	<b>20</b>	<11	<9.8	<b>2,900</b>	<11	<b>14</b>	<b>120</b>	<7.2	<37
Post Carbon	SVE_SOUTH_POST CARBON	2/1/2016	<b>2.2</b>	<3.2	<b>160</b>	<b>2.90</b>	<1.4	<2.7	<1.5	<b>92</b>	<b>260</b>	<1.0	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON	3/29/2016	<230	<610	<b>710</b>	<300	<270	<b>71,000</b>	<290	<b>520</b>	<b>2,800</b>	<200	<670
Post Carbon	SVE_SOUTH_POST CARBON	3/29/2016	<69	<180	<b>490</b>	<23	<79	<b>9,300</b>	<86	<b>1500</b>	<b>9,300</b>	<58	<200
Pre Carbon	SVE_SOUTH_PRE CARBON	4/27/2016	<6.4	<17	<b>12</b>	<8.4	<7.4	<b>910</b>	<8.0	<8.7	<b>23</b>	<5.4	<18
Post Carbon	SVE_SOUTH_POST CARBON	4/27/2016	<63	<160	<b>180</b>	<82	<72	<b>11,000</b>	<78	<b>110</b>	<b>2,200</b>	<53	<180
Pre Carbon	SVE_SOUTH_PRE CARBON	5/25/2016	<1.2	<3.2	<b>4</b>	<1.6	<1.4	<b>550</b>	<b>2.9</b>	<b>3</b>	<b>22</b>	<1.0	<b>3.9</b>
Post Carbon	SVE_SOUTH_POST CARBON	5/25/2016	<16	<41	<b>2300</b>	<b>30.00</b>	<18	<b>14,000</b>	<19	<b>130</b>	<b>3,300</b>	<13	<45
Pre Carbon	SVE_SOUTH_PRE CARBON	7/26/2016	<98	<260	<b>340</b>	<130	<110	<b>18,000</b>	<120	<130	<b>970</b>	<83	<420
Post Carbon	SVE_SOUTH_POST CARBON	7/26/2016	<78	<200	<b>760</b>	<120	<89	<b>15,000</b>	<97	<b>220</b>	<b>1,400</b>	<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 <sup>3</sup>										
Pre Carbon	SVE_SOUTH_PRE CARBON	8/30/2016	<86	<230	<b>340</b>	<110	<99	<b>28,000</b>	<110	<120	<b>1,400</b>	<73	<370
Post Carbon	SVE_SOUTH_POST CARBON	8/30/2016	<81	<210	<b>370</b>	<110	<93	<b>19,000</b>	<100	<b>210</b>	<b>910</b>	<68	<350
Pre Carbon	SVE_SOUTH_PRE CARBON	9/29/2016	<73	<190	<b>340</b>	<95	<83	<b>25,000</b>	<90	<b>110</b>	<b>1,300</b>	<61	<310
Post Carbon	SVE_SOUTH_POST CARBON	9/29/2016	<46	<120	<b>410</b>	<60	<53	<b>14,000</b>	<57	<b>140</b>	<b>1,900</b>	<39	<196
Pre Carbon	SVE-SOUTH_PRE CARBON_102516	10/25/2016	<150	<390	<b>380</b>	<190	<170	<b>32,000</b>	<180	<200	<b>1,500</b>	<120	<630
Post Carbon	SVE-SOUTH_POST CARBON_102516	10/25/2016	<100	<260	<b>530</b>	<130	<120	<b>19,000</b>	<130	<b>180</b>	<b>2,700</b>	<85	<430
Pre Carbon	SVE_SOUTH_PRE CARBON_112816	11/28/2016	<260	<670	<b>420</b>	<340	<290	<b>52,000</b>	<320	<350	<b>2,100</b>	<220	<1110
Post Carbon	SVE_SOUTH_POST CARBON_112816	11/28/2016	<79	<210	<100	<100	<90	<b>18,000</b>	<98	<b>360</b>	<b>3,200</b>	<66	<340
Pre Carbon	SVE_SOUTH_PRE CARBON_013017	1/30/2017	<260	<690	<b>660</b>	<340	<300	<b>61,000</b>	<330	<b>400</b>	<b>2,400</b>	<220	<1130
Post Carbon	SVE_SOUTH_POST CARBON_013017	1/30/2017	<1.2	<3.2	<1.6	<1.6	<1.4	<b>24</b>	<b>1.8</b>	<1.6	<2.1	<1.0	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_073117	7/31/2017	<100	<260	<b>400</b>	<130	<110	<b>17,000</b>	<b>340</b>	<130	<b>1,000</b>	<84	<430
Post Carbon	SVE_SOUTH_POST CARBON_073117	7/31/2017	<1.2	<3.2	<1.6	<1.6	<b>2.4</b>	<b>6.5</b>	<b>8.2</b>	<1.6	<b>3.9</b>	<b>2.4</b>	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_082817	8/28/2017	<60	<160	<b>320</b>	<79	<69	<b>32,000</b>	<75	<b>90</b>	<b>1,100</b>	<51	<256
Post Carbon	SVE_SOUTH_POST CARBON_082817	8/28/2017	<1.2	<b>5.8</b>	<b>2</b>	<1.6	<b>2.4</b>	<b>160</b>	<b>2.3</b>	<1.6	<b>3.9</b>	<b>2.2</b>	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_092517	9/25/2017	<21	<55	<b>200</b>	<27	<24	<b>23,000</b>	<26	<b>45</b>	<b>460</b>	<18	<90
Post Carbon	SVE_SOUTH_POST CARBON_092517	9/25/2017	<1.2	<b>8.0</b>	<b>16</b>	<1.6	<b>5.3</b>	<b>6.8</b>	<1.5	<1.6	<2.1	<b>2.2</b>	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_102617	10/26/2017	<40	<100	<b>230</b>	<52	<45	<b>13,000</b>	<49	<b>64</b>	<b>700</b>	<33	<167
Post Carbon	SVE_SOUTH_POST CARBON_102617	10/26/2017	<b>2.0</b>	<b>15</b>	<b>98</b>	<b>2.1</b>	<b>1.6</b>	<b>9.7</b>	<1.5	<b>3.9</b>	<2.1	<b>1.5</b>	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_112917	11/29/2017	<140	<370	<b>280</b>	<180	<160	<b>22,000</b>	<170	<190	<b>820</b>	<120	<600
Post Carbon	SVE_SOUTH_POST CARBON_112917	11/29/2017	<b>3.8</b>	<b>8.5</b>	<b>220</b>	<b>4.0</b>	<2.0	<4.0	<2.2	<b>12</b>	<3.2	<b>2.5</b>	<5.7
Pre Carbon	SVE_SOUTH_PRE CARBON_122117	12/21/2017	--	--	--	--	--	--	--	--	--	--	--
Post Carbon	SVE_SOUTH_POST CARBON_122117	12/21/2017	<b>4.6</b>	<b>4.9</b>	<b>300</b>	<b>5.2</b>	<b>1.7</b>	<2.7	<1.5	<b>20</b>	<b>7.2</b>	<b>1.8</b>	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_012218	1/22/2018	<110	<290	<b>150</b>	<150	<130	<b>13,000</b>	<140	<150	<b>390</b>	<95	<480
Post Carbon	SVE_SOUTH_POST CARBON_012218	1/22/2018	<b>4.3</b>	<6.5	<b>380</b>	<3.2	<2.8	<b>8.1</b>	<3.1	<b>11</b>	<b>16</b>	<b>2.1</b>	<10.6
Pre Carbon	SVE_SOUTH_PRE CARBON_022818	2/28/2018	<19	<49	<b>200</b>	<25	<22	<b>13,000</b>	<23	<b>52</b>	<b>440</b>	<16	<81
Post Carbon	SVE_SOUTH_POST CARBON_022818	2/28/2018	<b>2.8</b>	<3.2	<b>300</b>	<b>4.0</b>	<1.4	<2.7	<1.5	<b>14</b>	<b>51</b>	<b>5.1</b>	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_032918	3/29/2018	<23	<60	<b>180</b>	<30	<26	<b>13,000</b>	<28	<b>46</b>	<b>470</b>	<19	<98
Post Carbon	SVE_SOUTH_POST CARBON_032918	3/29/2018	<b>4.2</b>	<b>5.2</b>	<b>500</b>	<b>7.4</b>	<b>1.5</b>	<b>7.8</b>	<1.5	<b>15</b>	<b>110</b>	<b>1.7</b>	<5.2
Pre Carbon	SVE_SOUTH_PRE CARBON_042418	4/24/2018	<69	<180	<b>140</b>	<90	<79	<b>12,000</b>	<86	<58	<b>350</b>	<58	<299
Post Carbon	SVE_SOUTH_POST CARBON_042418	4/24/2018	<b>3.4</b>	<b>4.2</b>	<b>470</b>	<b>7.6</b>	<b>1.5</b>	<b>6.6</b>	<b>3.1</b>	<b>8.4</b>	<b>76</b>	<b>1.4</b>	<b>17.9</b>
Pre Carbon	SVE_SOUTH_PRE CARBON_051618	5/16/2018	<50	<130	<b>160</b>	<65	<57	<b>7,800</b>	<62	<68	<b>370</b>	<42	<212
Post Carbon	SVE_SOUTH_POST CARBON_051618	5/16/2018	<4.7	<12	<b>480</b>	<b>6.6</b>	<0.97	<1.3	<0.75	<b>7.1</b>	<b>33</b>	<4	<19.7
Pre Carbon	SVE_South_72318-Pre Carbon	7/23/2018	<63	<170	<b>170</b>	<83	<73	<b>18,000</b>	<79	<85	<b>770</b>	<53	<271
Post Carbon	SVE_South_Post Carbon-72318	7/23/2018	<25	<65	<b>230</b>	<33	<29	<b>8,300</b>	<31	<b>520</b>	<b>6,400</b>	<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 <sup>3</sup>										
Pre Carbon	SVE_South_PreCarbon_110718	11/7/2018	<64	<170	<b>310</b>	<84	<74	<b>31,000</b>	<80	<b>91</b>	<b>1,300</b>	<54	<180
Post Carbon	SVE_South_PostCarbon_110718	11/7/2018	<1.2	<3.2	<1.6	<1.6	<1.4	<b>15</b>	<1.5	<1.6	<2.1	<b>1.6</b>	<3.5
Pre Carbon	SVE_South_PreCarbon_010419	1/4/2019	<64	<160	<b>280</b>	<82	<71	<b>32,000</b>	<77	<b>84</b>	<b>920</b>	<53	<180
Post Carbon	SVE_South_PostCarbon_010419	1/4/2019	<1.2	<3.2	<1.6	<1.6	<b>2.1</b>	<2.7	<b>2.3</b>	<1.6	<2.1	<b>1.5</b>	<b>7.3</b>
Pre Carbon	SVE_South_PreCarbon_030819	3/8/2019	<69	<180	<b>180</b>	<90	<79	<b>21,000</b>	<86	<93	<b>570</b>	<58	<200
Post Carbon	SVE_South_PostCarbon_030819	3/8/2019	<1.2	<3.2	<1.6	<1.6	<b>1.8</b>	<b>5.5</b>	<1.5	<1.6	<2.1	<b>1.3</b>	<3.5
Pre Carbon	SVE_South_PreCarbon_050719	5/7/2019	<69	<180	<b>140</b>	<90	<79	<b>17,000</b>	<85	<93	<b>450</b>	<58	<200
Post Carbon	SVE_South_PostCarbon_050719	5/7/2019	<1.2	<3.2	<b>9.9</b>	<1.6	<1.4	<b>1,300</b>	<b>13</b>	<b>3.0</b>	<b>31</b>	<1.0	<b>11.7</b>
Pre Carbon	SVE_South_PreCarbon_070819	7/8/2019	<64	<170	<b>100</b>	<83	<73	<b>16,000</b>	<79	<86	<b>530</b>	<54	<180
Post Carbon	SVE_South_PostCarbon_070819	7/8/2019	<1.2	<b>6.3</b>	<1.6	<1.6	<b>1.6</b>	<b>7.9</b>	<1.5	<1.6	<2.1	<1.0	<b>1.7</b>
Pre Carbon	SVE_South_PreCarbon_090919	9/9/2019	<28	<74	<b>120</b>	<37	<32	<b>15,000</b>	<35	<b>48</b>	<b>590</b>	<24	<81
Post Carbon	SVE_South_PostCarbon_090919	9/9/2019	<b>2.8</b>	<b>3.6</b>	<b>160</b>	<b>9.1</b>	<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	<b>300</b>	<43	<38	<b>38,000</b>	<41	<b>87</b>	<b>990</b>	<28	<95
Post Carbon	SVE_South_PostCarbon_110419	11/4/2019	<b>2.2</b>	<5.2	<b>160</b>	<b>5.6</b>	<2.3	<4.4	<2.5	<2.7	<3.5	<b>3.2</b>	<5.7
Pre Carbon	SVE-South-PreCarbon-011020	1/10/2020	<12	<31	<b>110</b>	<16	<14	<b>9,200</b>	<15	<b>33</b>	<b>420</b>	<10	<17
Post Carbon	SVE-South-PostCarbon-011020	1/10/2020	<1.7	<4.5	<b>130</b>	<2.3	<2.0	<3.9	<2.2	<b>5.1</b>	<3.1	<1.5	<5.0
Pre Carbon	SVE_South_PreCarbon_121420	12/14/2020	<62	<160	<b>400</b>	<82	<b>160</b>	<b>32,000</b>	<b>130</b>	<b>100</b>	<b>1,300</b>	<53	<180
Post Carbon	SVE_South_PostCarbon_121420	12/14/2020	<b>2.3</b>	<5.4	<b>180</b>	<2.7	<2.4	<4.6	<2.6	<b>8.9</b>	<3.6	<1.7	<5.9
Pre Carbon	SVE_South_PreCarbon_022321	2/23/2021	<35	<91	<b>120</b>	<46	<500	<b>18,000</b>	<43	<47	<b>390</b>	<29	<100
Post Carbon	SVE_South_PostCarbon_022321	2/23/2021	<b>2.4</b>	<b>6.0</b>	<b>150</b>	<b>3.5</b>	<27	<4.2	<2.3	<b>7.0</b>	<b>36</b>	<1.6	<5.4
Pre Carbon	SVE_South_PreCarbon_040921	4/9/2021	<13	<34	<b>150</b>	<17	<190	<b>14,000</b>	<16	<b>32</b>	<b>450</b>	<11	<38
Post Carbon	SVE_South_PostCarbon_040921	4/9/2021	<b>5.0</b>	<4.2	<b>390</b>	<b>9.7</b>	<23	<3.6	<2.0	<b>7.1</b>	<b>41</b>	<1.3	<4.6
Pre Carbon	SVE_South_PreCarbon_061721	6/17/2021	<11	<29	<b>94</b>	<15	<160	<b>11,000</b>	<14	<b>31</b>	<b>380</b>	<9.4	<32
Post Carbon	SVE_South_PostCarbon_061721	6/17/2021	<7.8	<20	<b>400</b>	<10	<110	<b>340</b>	<9.7	<b>940</b>	<b>4,800</b>	<6.6	<22

**Notes:**

1. µg/m<sup>3</sup> = 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 <sup>(1)</sup> (cfm)	Total VOCs (mg/m <sup>3</sup> )	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 <sub>2</sub> O)	Air Flow Rate <sup>(1)</sup> (cfm)	Total VOCs (mg/m <sup>3</sup> )	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/m<sup>3</sup> = 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 <sup>(1)</sup> (cfm)	Total VOCs (mg/m <sup>3</sup> )	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	-- <sup>6</sup>	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 <sup>(1)</sup> (cfm)	Total VOCs (mg/m <sup>3</sup> )	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 <sup>(1)</sup> (cfm)	Total VOCs (mg/m <sup>3</sup> )	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**

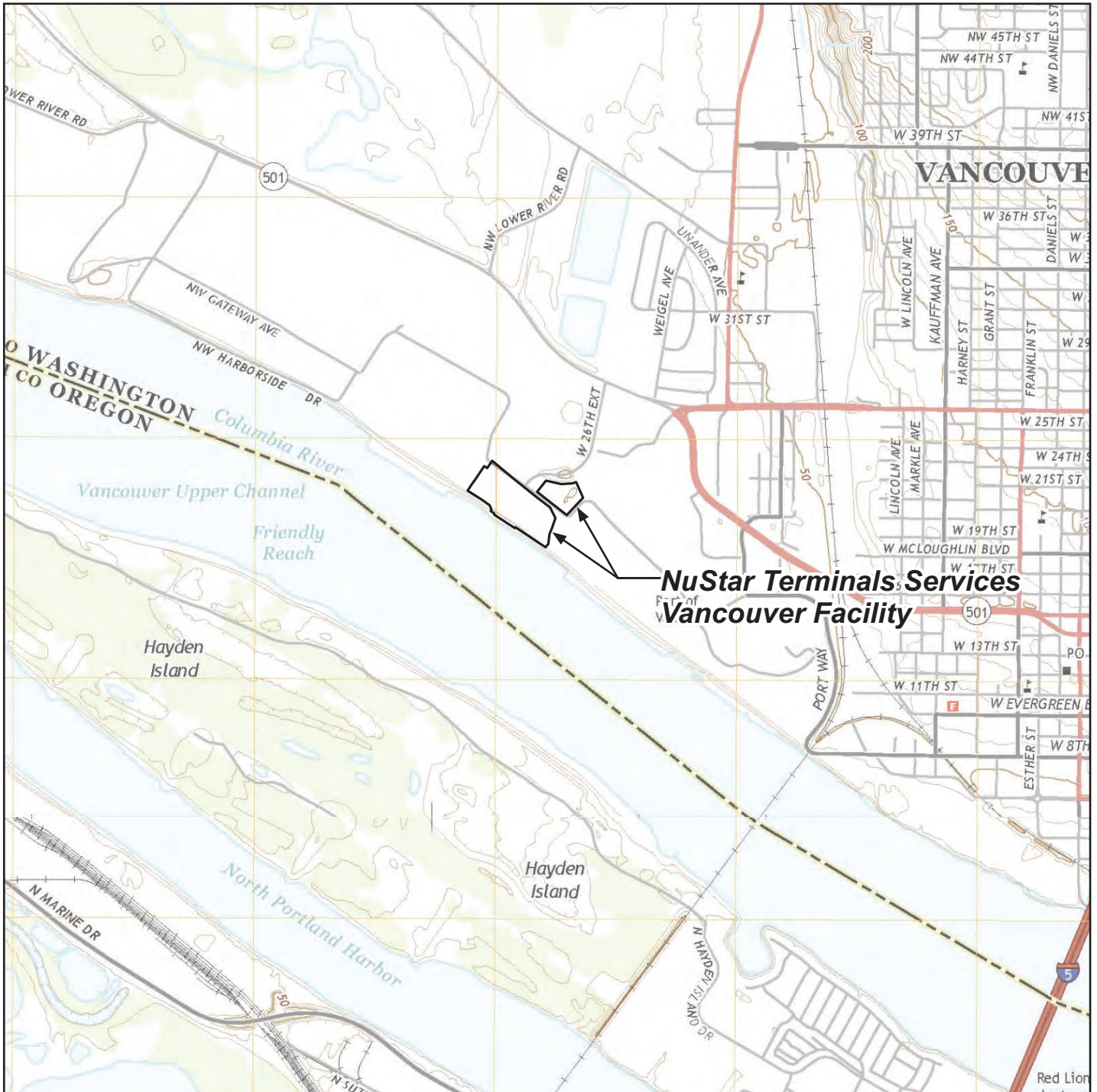
Sample Date	Activity	Post-Blower Pressure (in water)	Air Flow Rate <sup>(1)</sup> (cfm)	Total VOCs (mg/m <sup>3</sup> )	VOC Removal (lb/day)	Days of Operation	Approximate VOCs Removed (lbs)	Approximate Cumulative VOCs Removed (lbs)
1/4/2019	Sample	28.0	--	33	2.0	58	114	3,989
3/8/2019	Sample	28.0	--	22	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
2/23/2021	Sample	30.0	--	19	0.8	71	79	4,514
4/9/2021	Sample	30.0	--	15	0.6	45	32	4,546
6/17/2021	Sample	30.0	--	12	0.5	69	38	4,584

**Notes:**

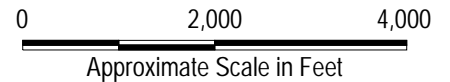
1. Air flow rate read from system gauge.
2. cfm = cubic feet per minute
3. mg/m<sup>3</sup> = Milligrams per cubic meter
4. lb/day = pounds per day
5. lbs = pounds
6. Flow rate was not measured on dates with dashes (--). For calculations, rate is assumed to be the same as measured the date before
7. 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.



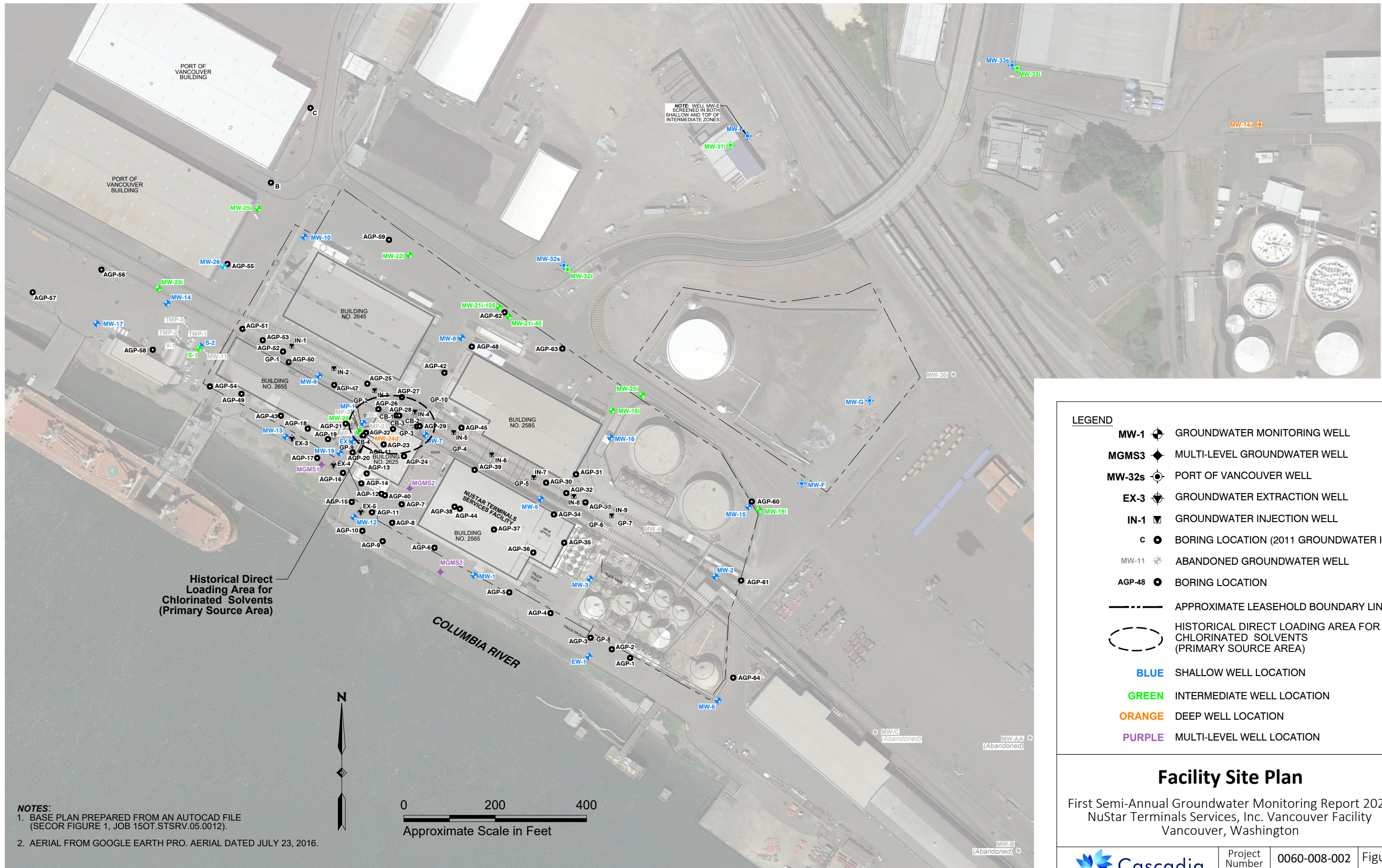
### Facility Location Map

First Semi-Annual Groundwater Monitoring Report 2021  
 NuStar Terminals Services, Inc. Vancouver Facility  
 Vancouver, Washington



Project Number	0060-002-008
August 2021	

Figure  
**1**

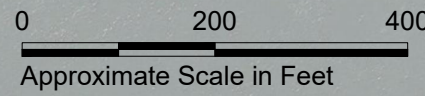


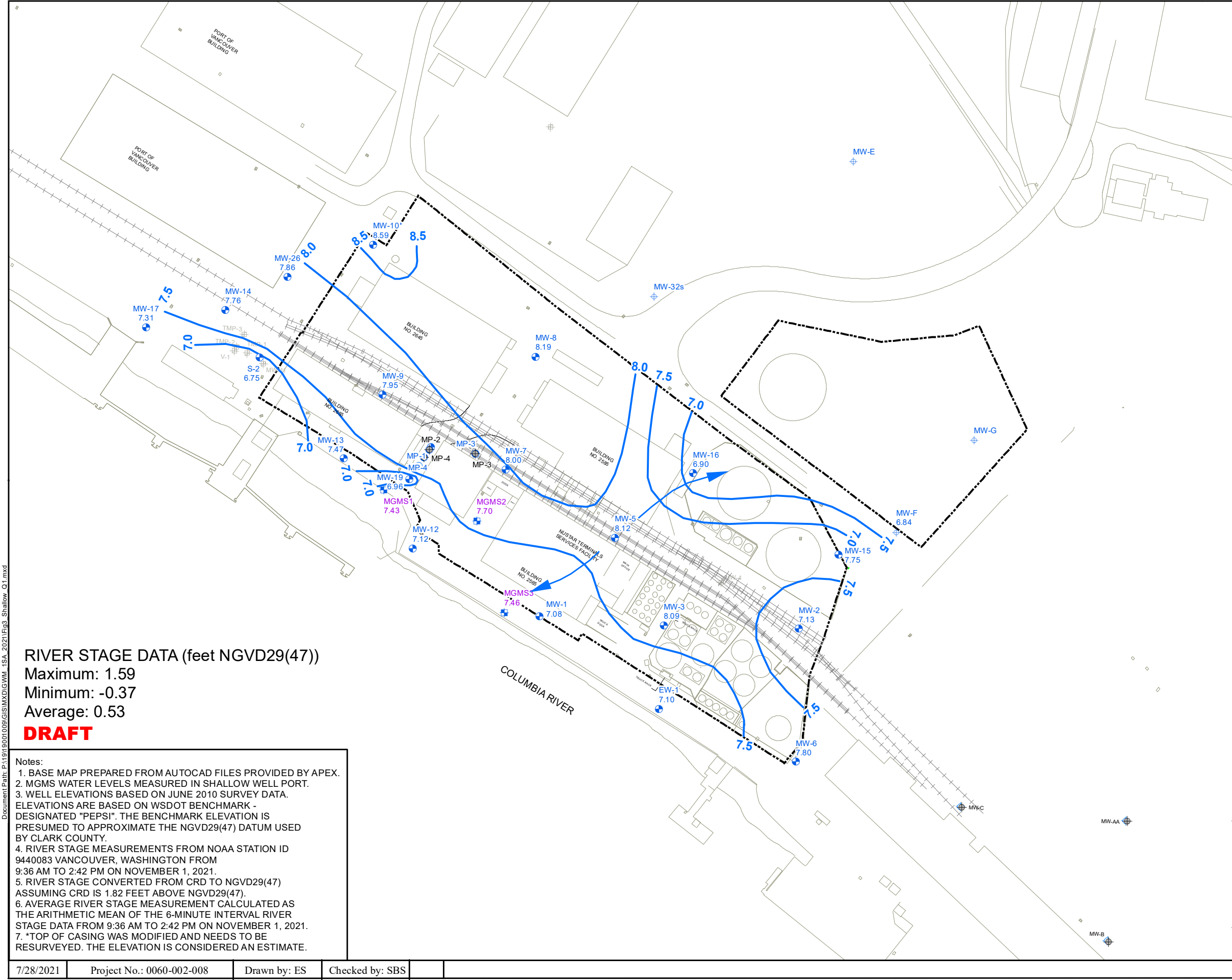
- LEGEND**
- MW-1** GROUNDWATER MONITORING WELL
  - MGMS3** MULTI-LEVEL GROUNDWATER WELL
  - MW-32s** PORT OF VANCOUVER WELL
  - EX-3** GROUNDWATER EXTRACTION WELL
  - IN-1** GROUNDWATER INJECTION WELL
  - c** BORING LOCATION (2011 GROUNDWATER INV.)
  - MW-11** ABANDONED GROUNDWATER WELL
  - AGP-48** 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**

First Semi-Annual Groundwater Monitoring Report 2021  
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.



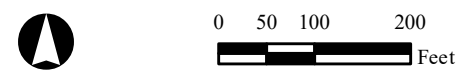


- Legend**
- Port of Vancouver Well
  - Multi-Level Groundwater Well
  - Monitoring Well
  - Historical Groundwater Extraction Well
  - Abandoned Groundwater Well
  - Groundwater Elevation Contour (Feet)
  - Approximate Property Line
  - 5.32 - Groundwater Elevation in Feet
  - NM - Not Measured
  - 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  
**DRAFT**

**Notes:**

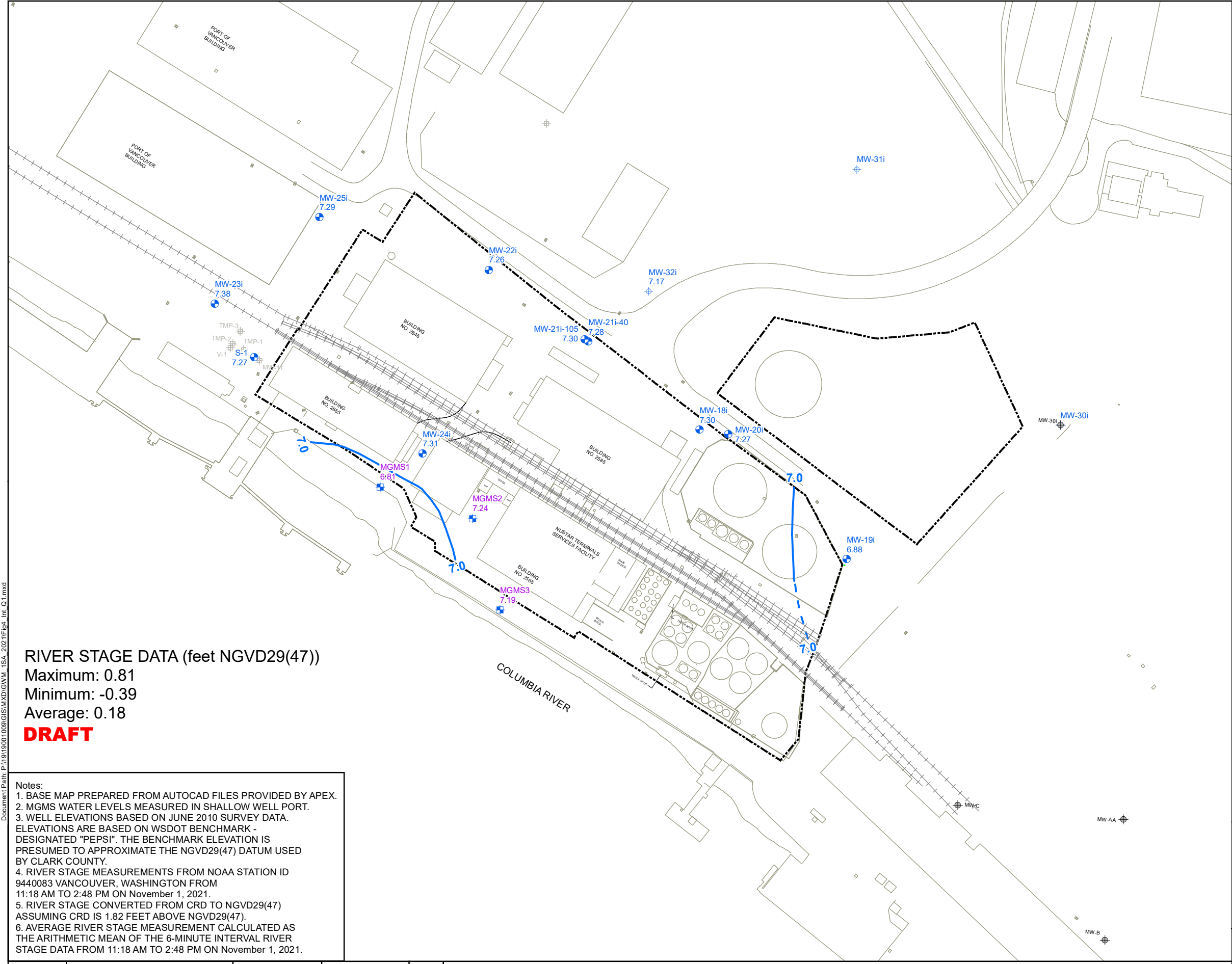
1. BASE MAP PREPARED FROM AUTOCAD FILES PROVIDED BY APEX.
2. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.
3. WELL ELEVATIONS BASED ON JUNE 2010 SURVEY DATA. ELEVATIONS ARE BASED ON WSDOT BENCHMARK - DESIGNATED "PEPSI". THE BENCHMARK ELEVATION IS PRESUMED TO APPROXIMATE THE NGVD29(47) DATUM USED BY CLARK COUNTY.
4. RIVER STAGE MEASUREMENTS FROM NOAA STATION ID 9440083 VANCOUVER, WASHINGTON FROM 9:36 AM TO 2:42 PM ON NOVEMBER 1, 2021.
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 NOVEMBER 1, 2021.
7. \*TOP OF CASING WAS MODIFIED AND NEEDS TO BE RESURVEYED. THE ELEVATION IS CONSIDERED AN ESTIMATE.



**First Quarter- Shallow Groundwater (March 2021)**

First Semi-Annual Groundwater Monitoring Report 2021  
 NuStar Terminals Services, Inc. Vancouver Facility  
 Vancouver, Washington

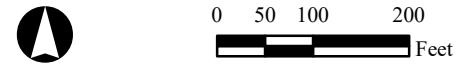




- Legend**
- Port of Vancouver Well
  - Multi-Level Groundwater Well
  - Monitoring Well
  - Historical Groundwater Extraction Well
  - Abandoned Groundwater Well
  - Groundwater Elevation Contour (Feet)
  - Approximate Property Line
  - 4.14 - Groundwater Elevation in Feet
  - NM - Not Measured
  -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

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

**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 November 1, 2021.  
 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 November 1, 2021.

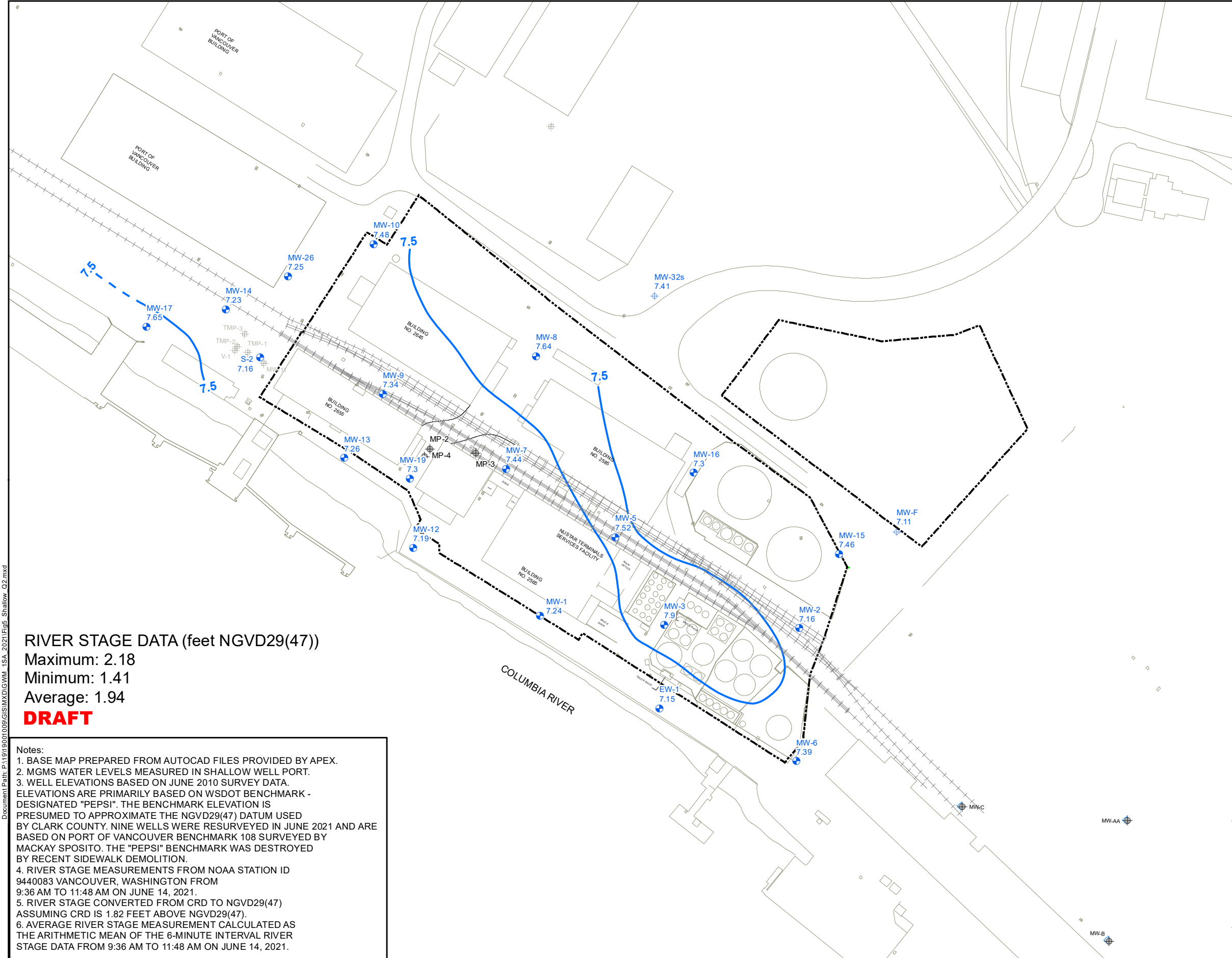


**First Quarter- Intermediate  
(March 2021)**  
 First Semi-Annual Groundwater Monitoring Report 2021  
 NuStar Terminals Services, Inc. Vancouver Facility  
 Vancouver, Washington



**Figure  
4**

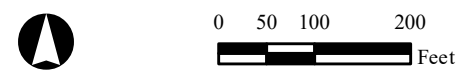
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- Legend**
- Port of Vancouver Well
  - Multi-Level Groundwater Well
  - Monitoring Well
  - Historical Groundwater Extraction Well
  - Abandoned Groundwater Well
  - Groundwater Elevation Contour (Feet)
  - Approximate Property Line
  - 5.75 - Groundwater 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  
**DRAFT**

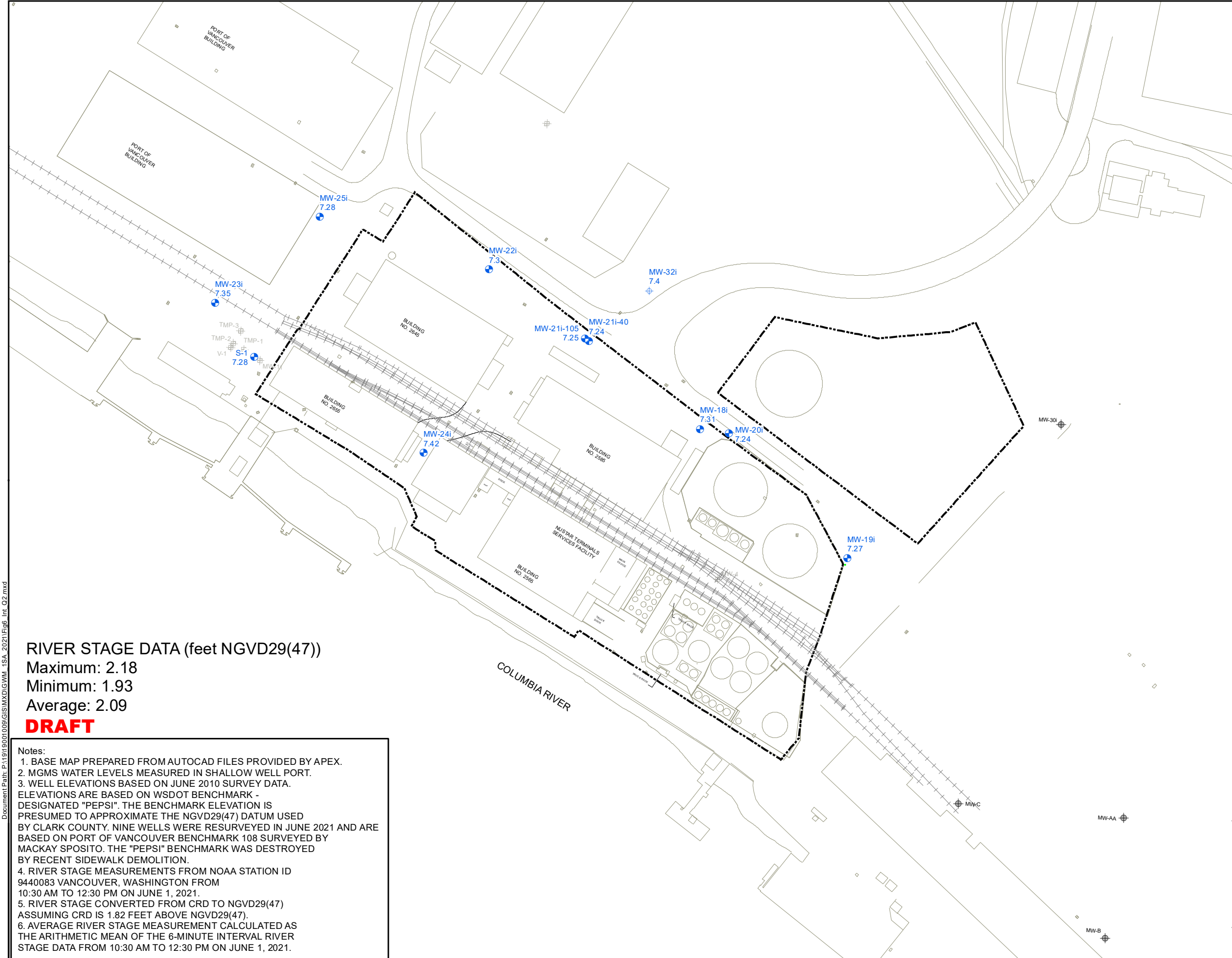
**Notes:**  
 1. BASE MAP PREPARED FROM AUTOCAD FILES PROVIDED BY APEX.  
 2. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.  
 3. WELL ELEVATIONS BASED ON JUNE 2010 SURVEY DATA. ELEVATIONS ARE PRIMARILY BASED ON WSDOT BENCHMARK - DESIGNATED "PEPSI". THE BENCHMARK ELEVATION IS PRESUMED TO APPROXIMATE THE NGVD29(47) DATUM USED BY CLARK COUNTY. NINE WELLS WERE RESURVEYED IN JUNE 2021 AND ARE BASED ON PORT OF VANCOUVER BENCHMARK 108 SURVEYED BY MACKAY SPOSITO. THE "PEPSI" BENCHMARK WAS DESTROYED BY RECENT SIDEWALK DEMOLITION.  
 4. RIVER STAGE MEASUREMENTS FROM NOAA STATION ID 9440083 VANCOUVER, WASHINGTON FROM 9:36 AM TO 11:48 AM ON JUNE 14, 2021.  
 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 JUNE 14, 2021.



**Second Quarter- Shallow Groundwater (June 2021)**  
 First Semi-Annual Groundwater Monitoring Report 2021  
 NuStar Terminals Services, Inc. Vancouver Facility  
 Vancouver, Washington



**Figure 5**



- Legend**
- Port of Vancouver Well
  - Multi-Level Groundwater Well
  - Monitoring Well
  - Historical Groundwater Extraction Well
  - Abandoned Groundwater Well
  - 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  
**DRAFT**

**Notes:**

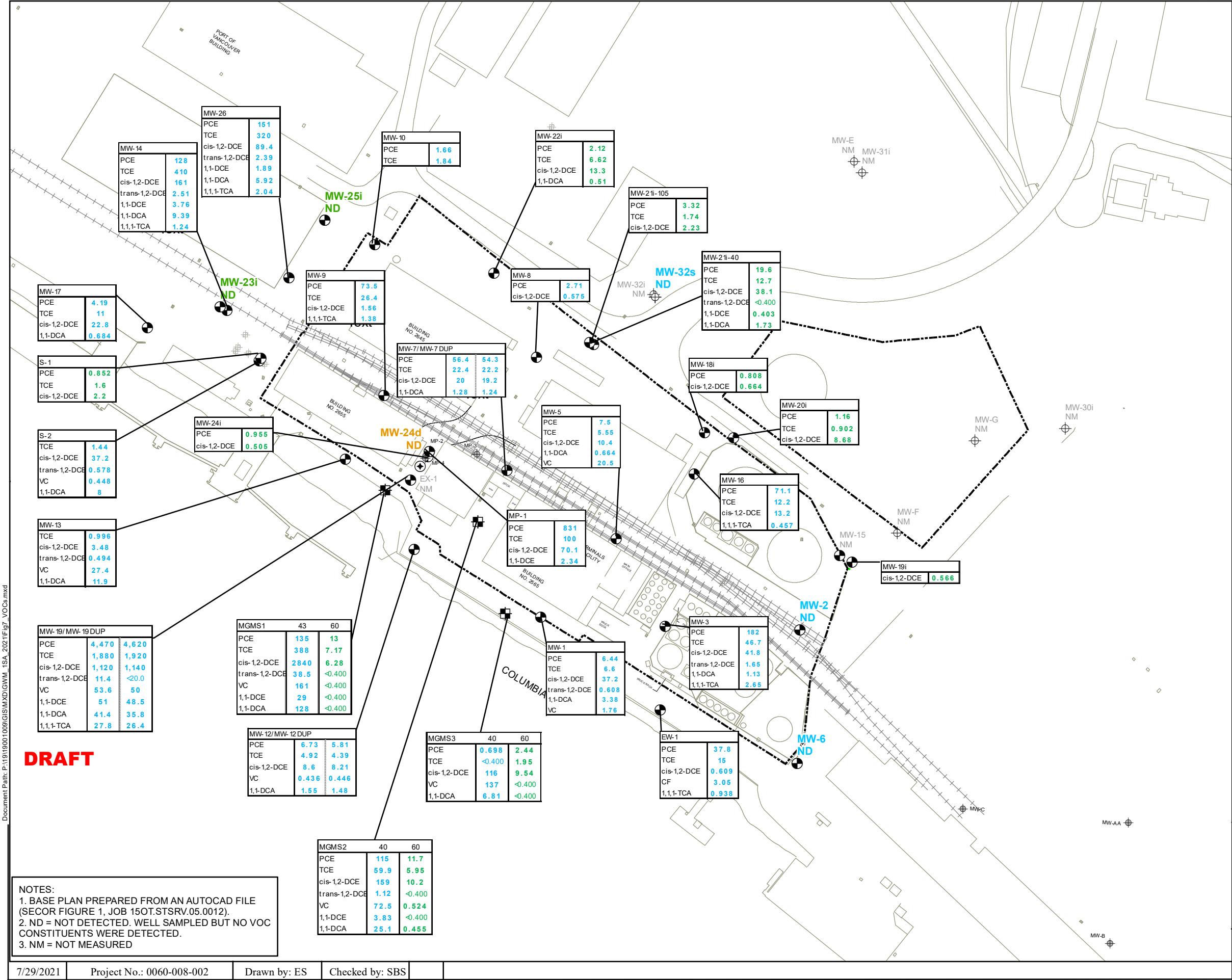
1. BASE MAP PREPARED FROM AUTOCAD FILES PROVIDED BY APEX.
2. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.
3. WELL ELEVATIONS BASED ON JUNE 2010 SURVEY DATA. ELEVATIONS ARE BASED ON WSDOT BENCHMARK - DESIGNATED "PEPSI". THE BENCHMARK ELEVATION IS PRESUMED TO APPROXIMATE THE NGVD29(47) DATUM USED BY CLARK COUNTY. NINE WELLS WERE RESURVEYED IN JUNE 2021 AND ARE BASED ON PORT OF VANCOUVER BENCHMARK 108 SURVEYED BY MACKAY SPOSITO. THE "PEPSI" BENCHMARK WAS DESTROYED BY RECENT SIDEWALK DEMOLITION.
4. RIVER STAGE MEASUREMENTS FROM NOAA STATION ID 9440083 VANCOUVER, WASHINGTON FROM 10:30 AM TO 12:30 PM ON JUNE 1, 2021.
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 JUNE 1, 2021.



**Second Quarter- Intermediate  
(June 2021)**

First Semi-Annual Groundwater Monitoring Report 2021  
 NuStar Terminals Services, Inc. Vancouver Facility  
 Vancouver, Washington

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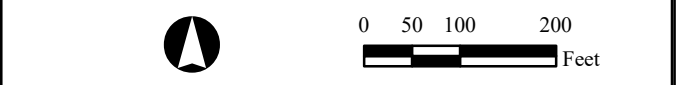
WELL IDENTIFICATION		DEPTH OF PORT SAMPLED (IF NOT SPECIFIED - SINGLE PORT WELL)	
MGMS1	43	60	
PCE	219	24	
TCE	507	15.3	
cis-1,2-DCE	2,980	16.5	
trans-1,2-DCE	45.5	<0.400	
VC	48.2	<0.400	
1,1-DCE	26.0	<0.400	
1,1-DCA	124	1.16	

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

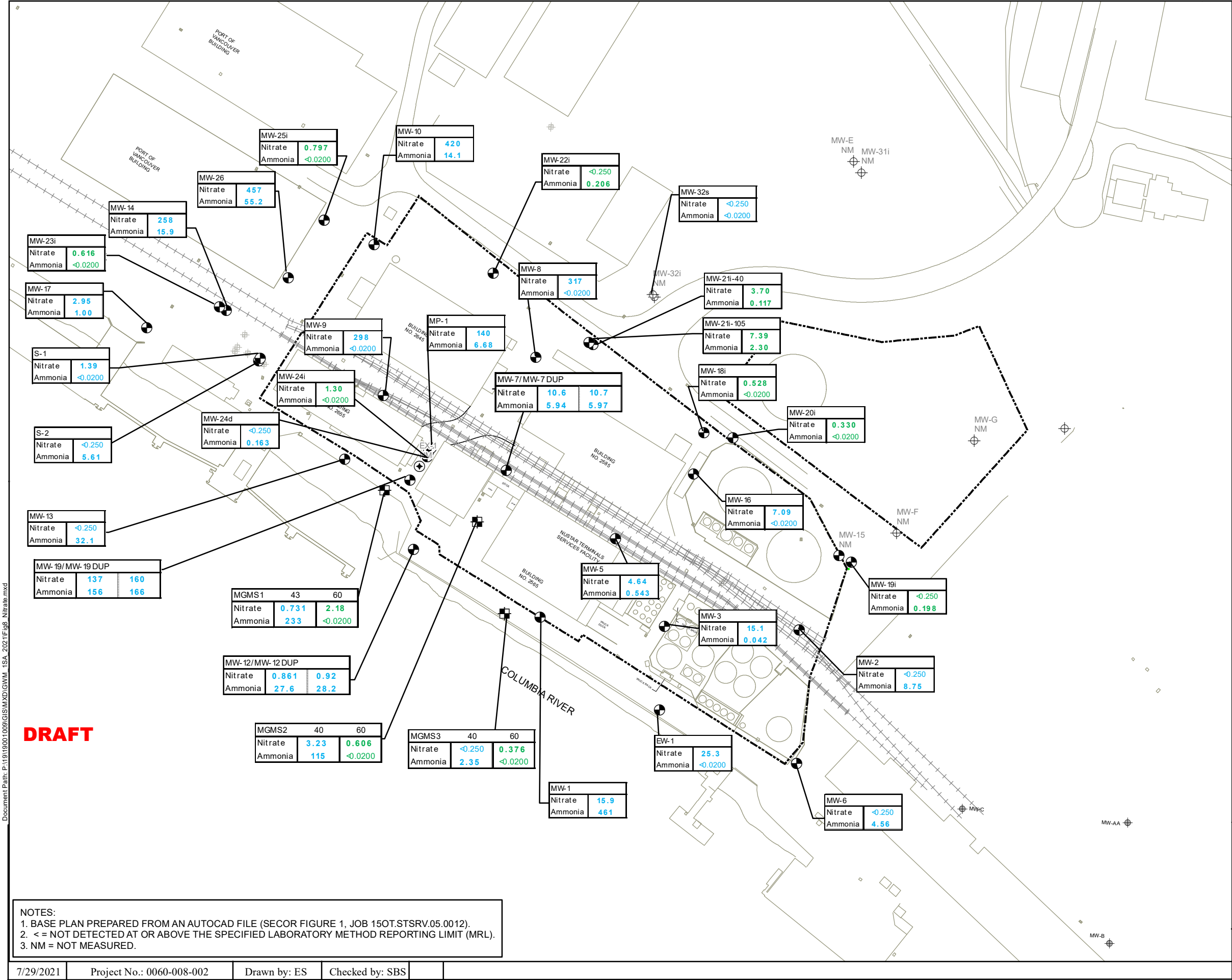


**VOC Concentrations in Groundwater (March 2021)**  
 First Semi-Annual Groundwater Monitoring Report 2021  
 NuStar Terminals Services, Inc. Vancouver Facility  
 Vancouver, Washington

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**DRAFT**

**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

**DRAFT**

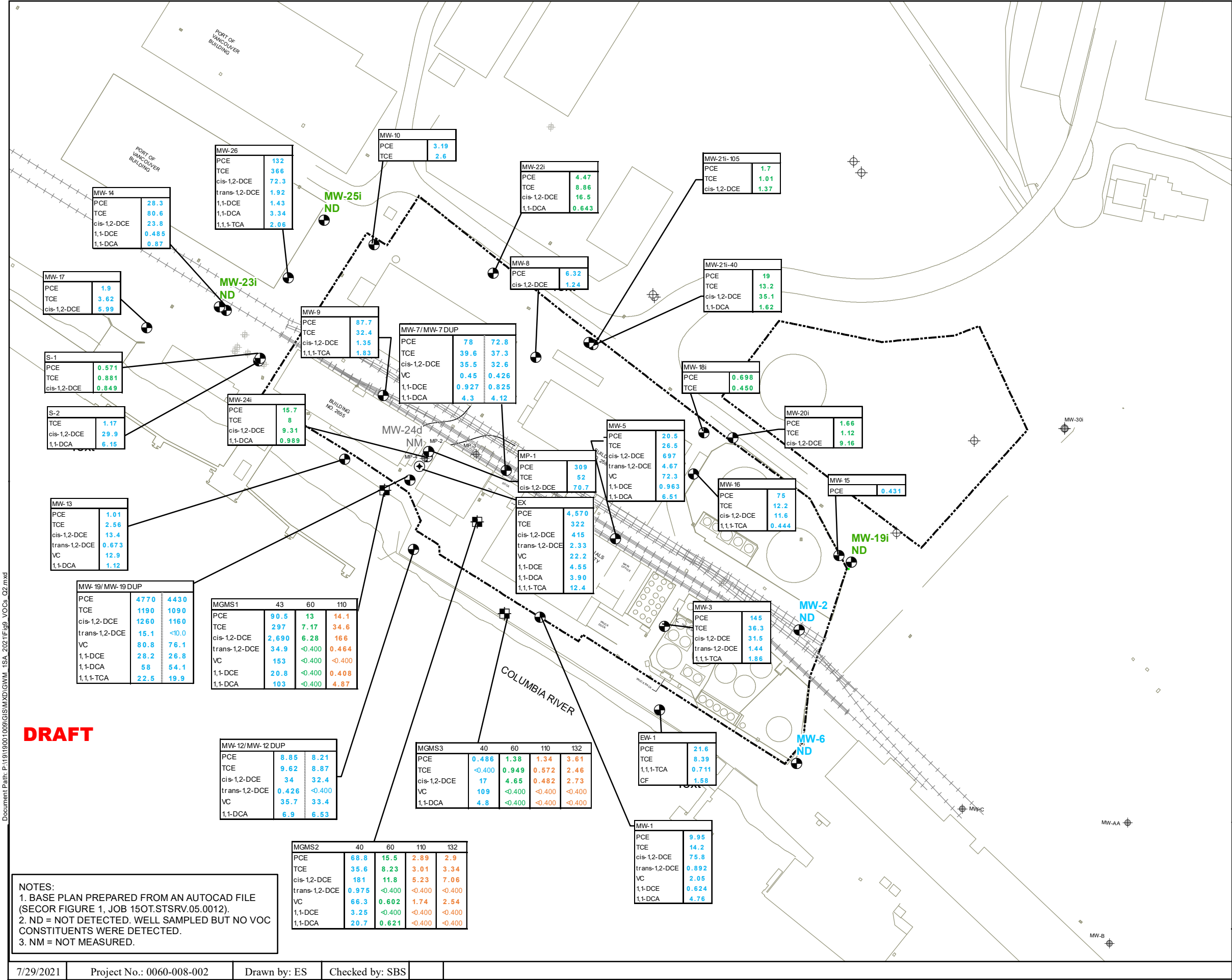
Document Path: P:\191900\009\GIS\MXD\GWM - SA 2021\Fig8 - Nitrate.mxd

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

**Nitrate and Ammonia Concentrations in Groundwater (March 2021)**  
 First Semi-Annual Groundwater Monitoring Report 2021  
 NuStar Terminals Services, Inc. Vancouver Facility  
 Vancouver, Washington







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

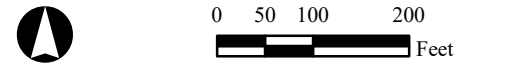
MGMS1	43	60	110
PCE	151	20.3	16.1
TCE	294	10.0	32.7
cis-1,2-DCE	2,620	13.1	163
trans-1,2-DCE	34.3	<0.400	0.49
VC	40.6	0.640	<0.400
1,1-DCE	<20.0	<0.400	0.52
1,1-DCA	131	1.54	5.56

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

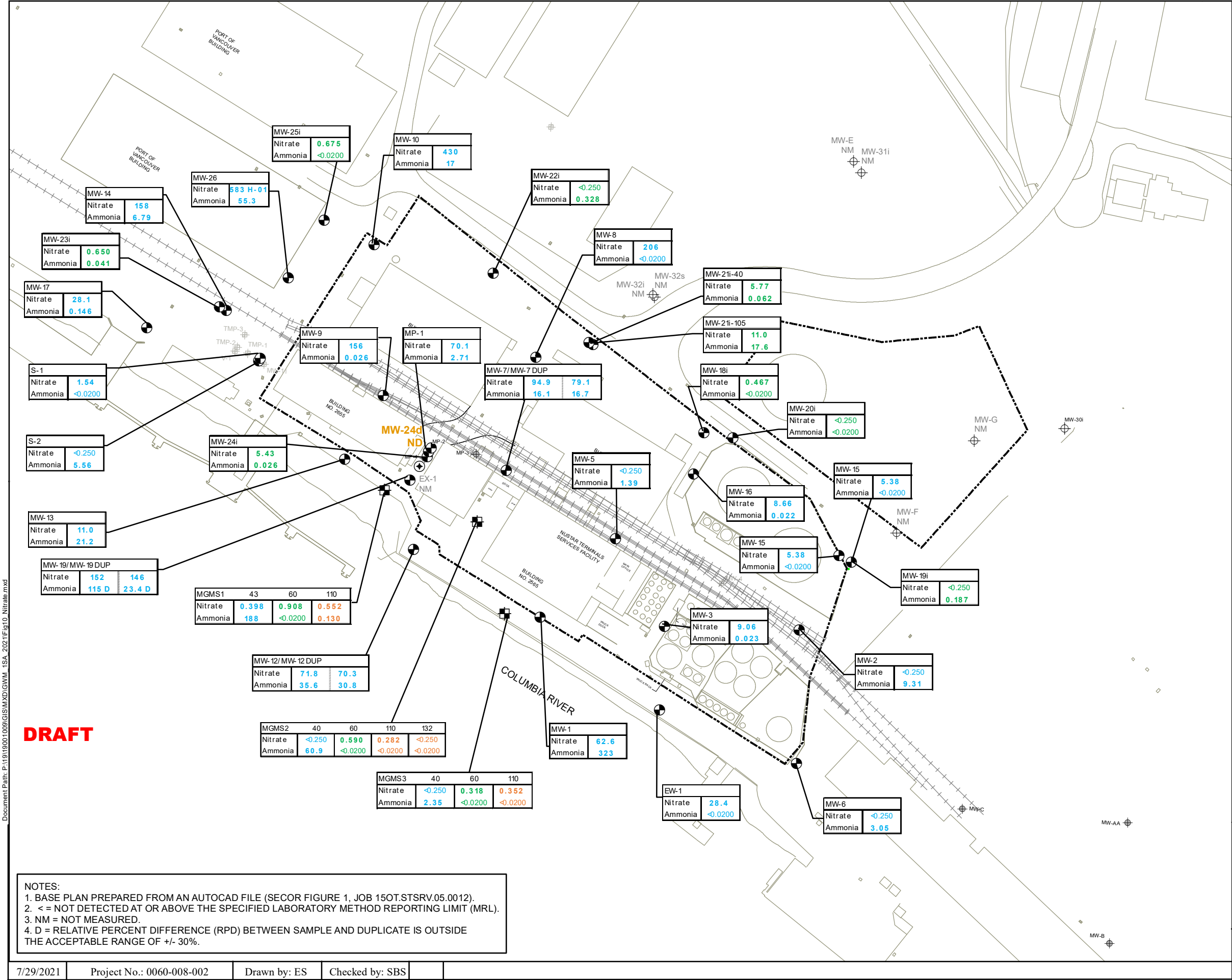


### VOC Concentrations in Groundwater (June 2021)

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**DRAFT**

**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)

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

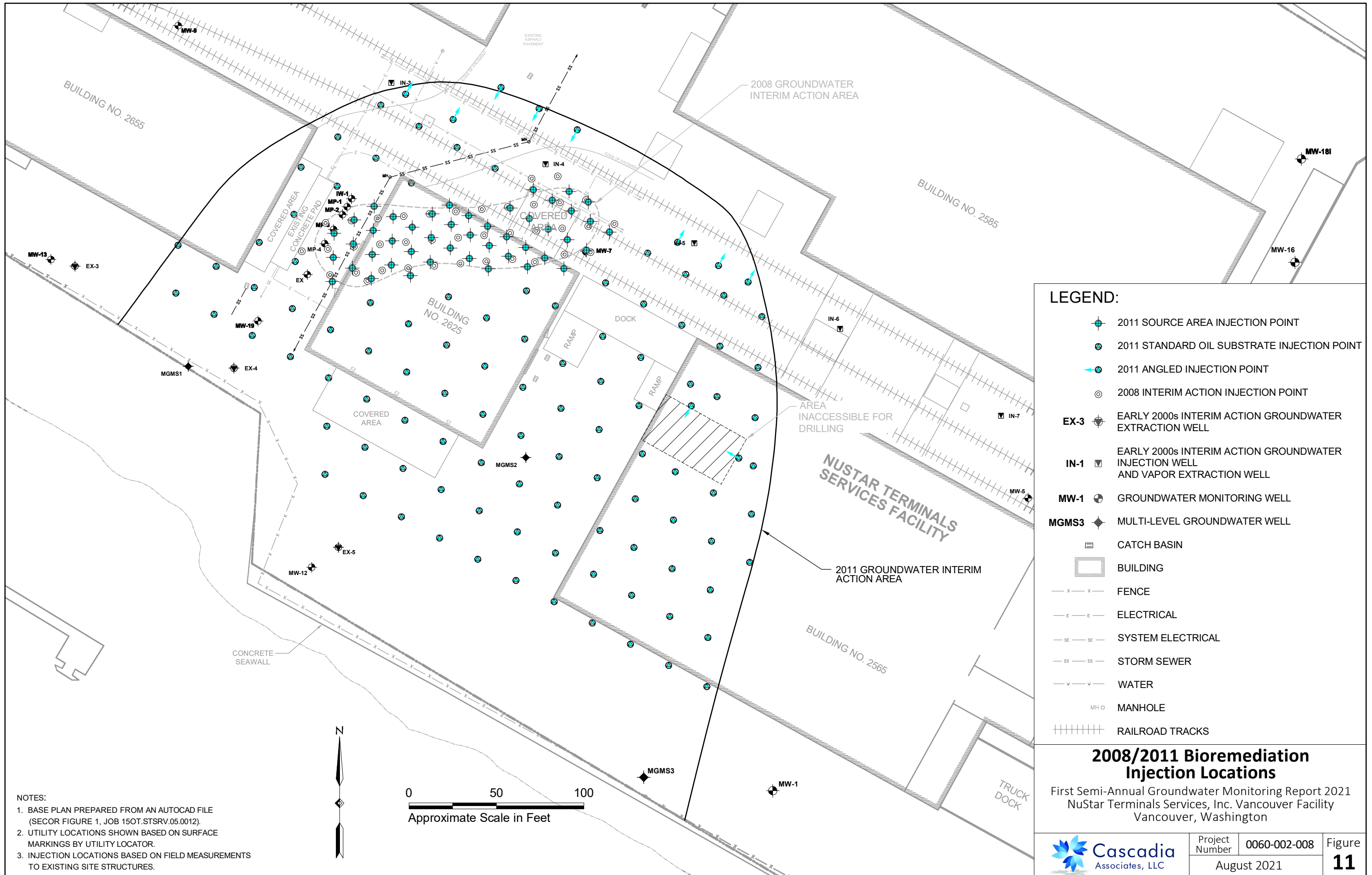
**DRAFT**

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. D = RELATIVE PERCENT DIFFERENCE (RPD) BETWEEN SAMPLE AND DUPLICATE IS OUTSIDE THE ACCEPTABLE RANGE OF +/- 30%.

### Nitrate and Ammonia Concentrations in Groundwater (June 2021)

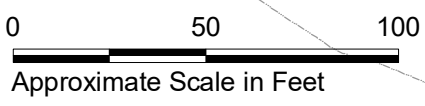
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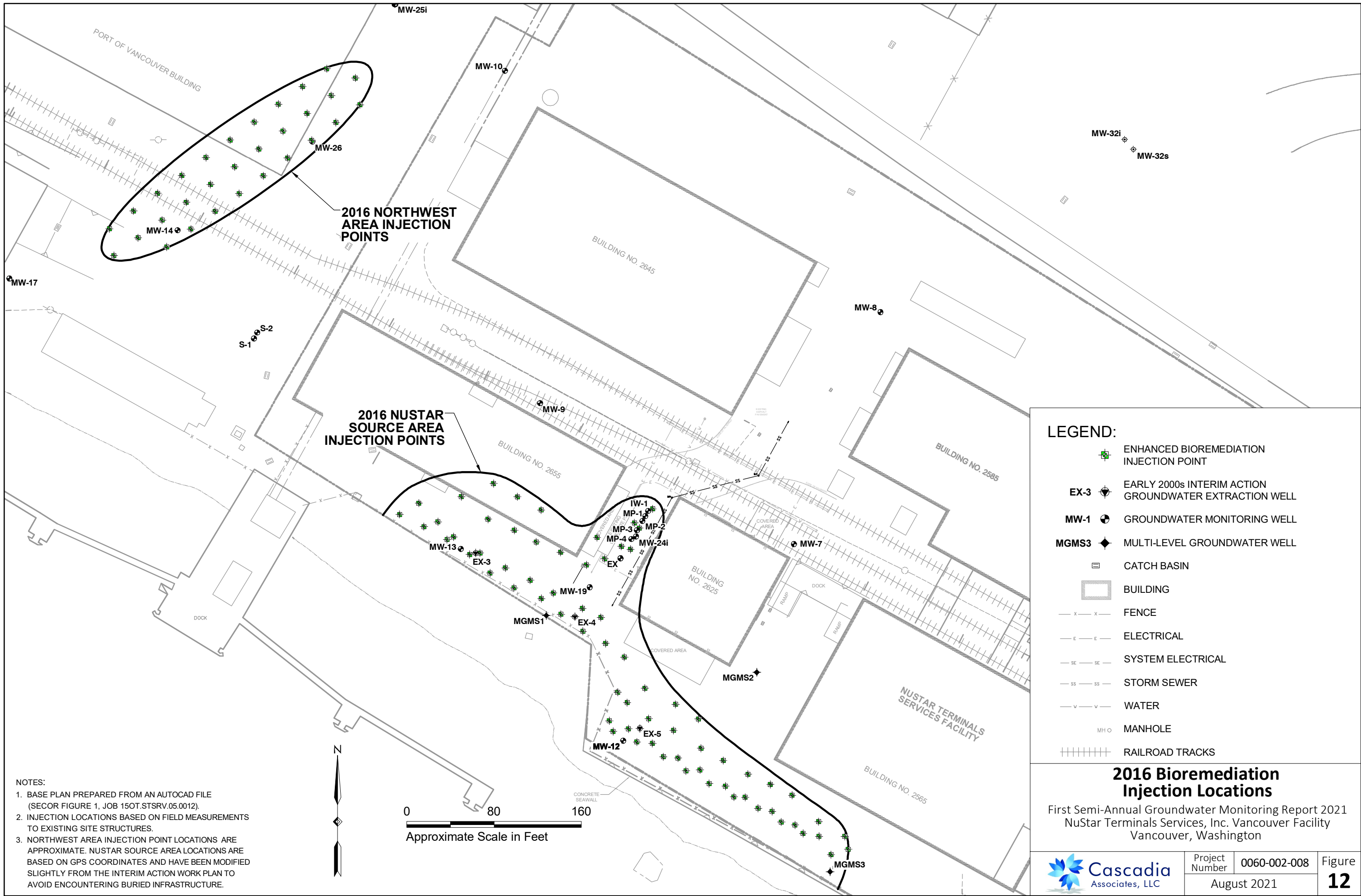




**NOTES:**

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.





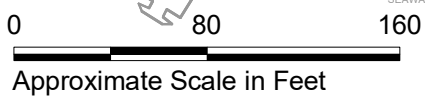
**LEGEND:**

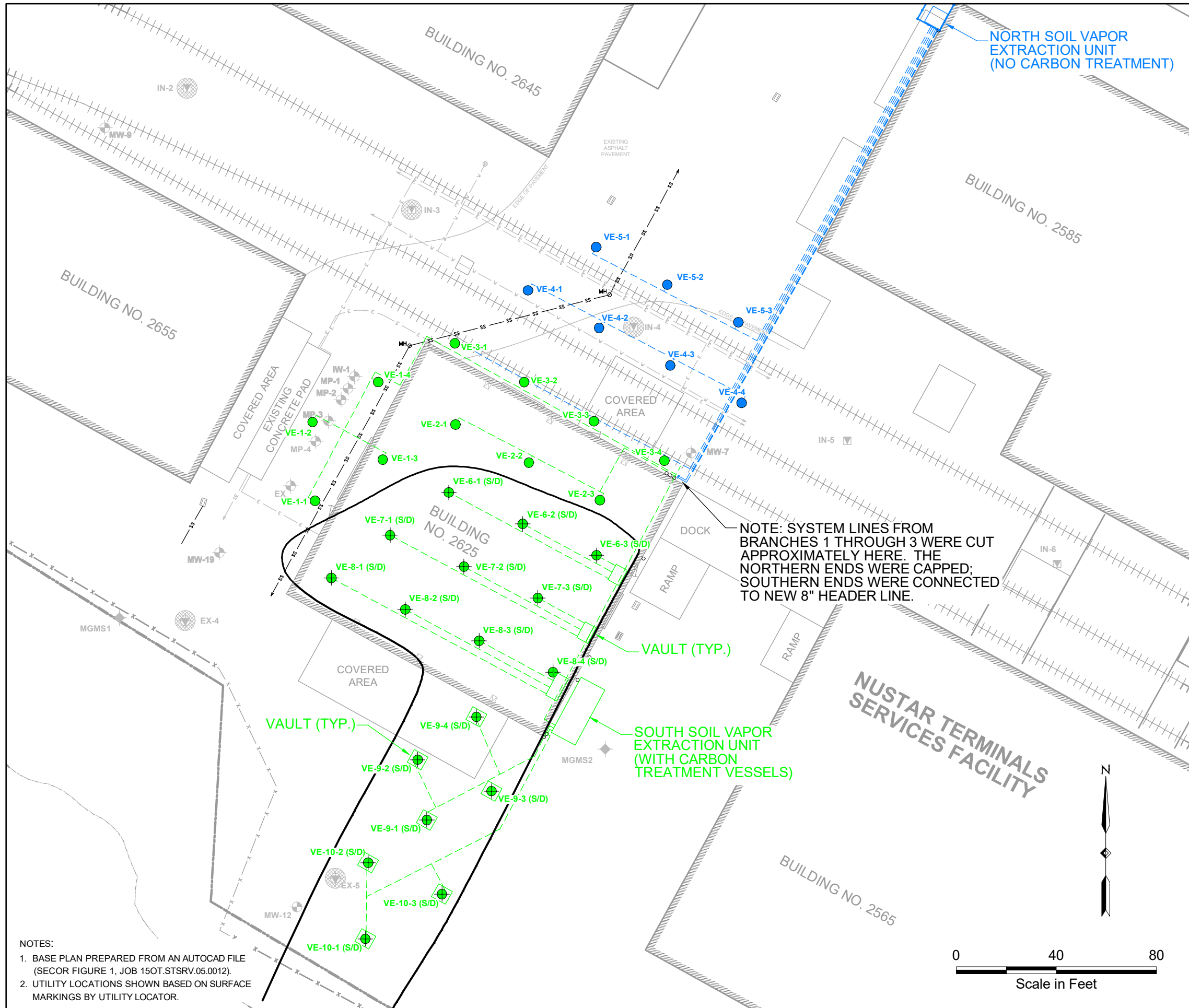
- ENHANCED BIOREMEDIATION INJECTION POINT
- EARLY 2000s INTERIM ACTION GROUNDWATER EXTRACTION WELL
- GROUNDWATER MONITORING WELL
- MULTI-LEVEL GROUNDWATER WELL
- CATCH BASIN
- BUILDING
- FENCE
- ELECTRICAL
- SYSTEM ELECTRICAL
- STORM SEWER
- WATER
- MANHOLE
- RAILROAD TRACKS

**2016 Bioremediation Injection Locations**  
 First Semi-Annual Groundwater Monitoring Report 2021  
 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

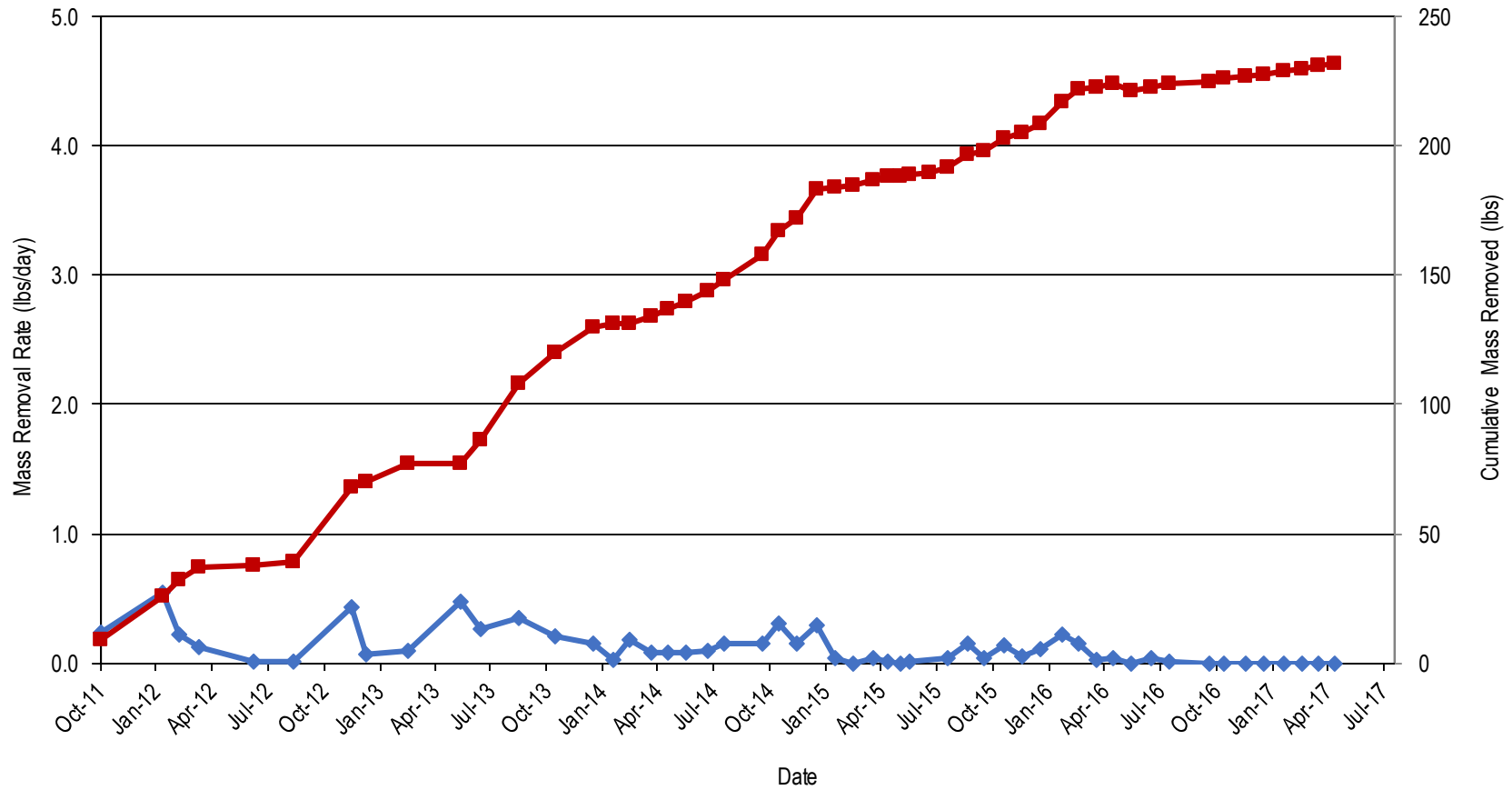
NOTE: SYSTEM LINES FROM BRANCHES 1 THROUGH 3 WERE CUT APPROXIMATELY HERE. THE NORTHERN ENDS WERE CAPPED; SOUTHERN ENDS WERE CONNECTED TO NEW 8" HEADER LINE.

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**

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	Project Number	0060-002-008	Figure
		August 2021	<b>13</b>



**Legend:**

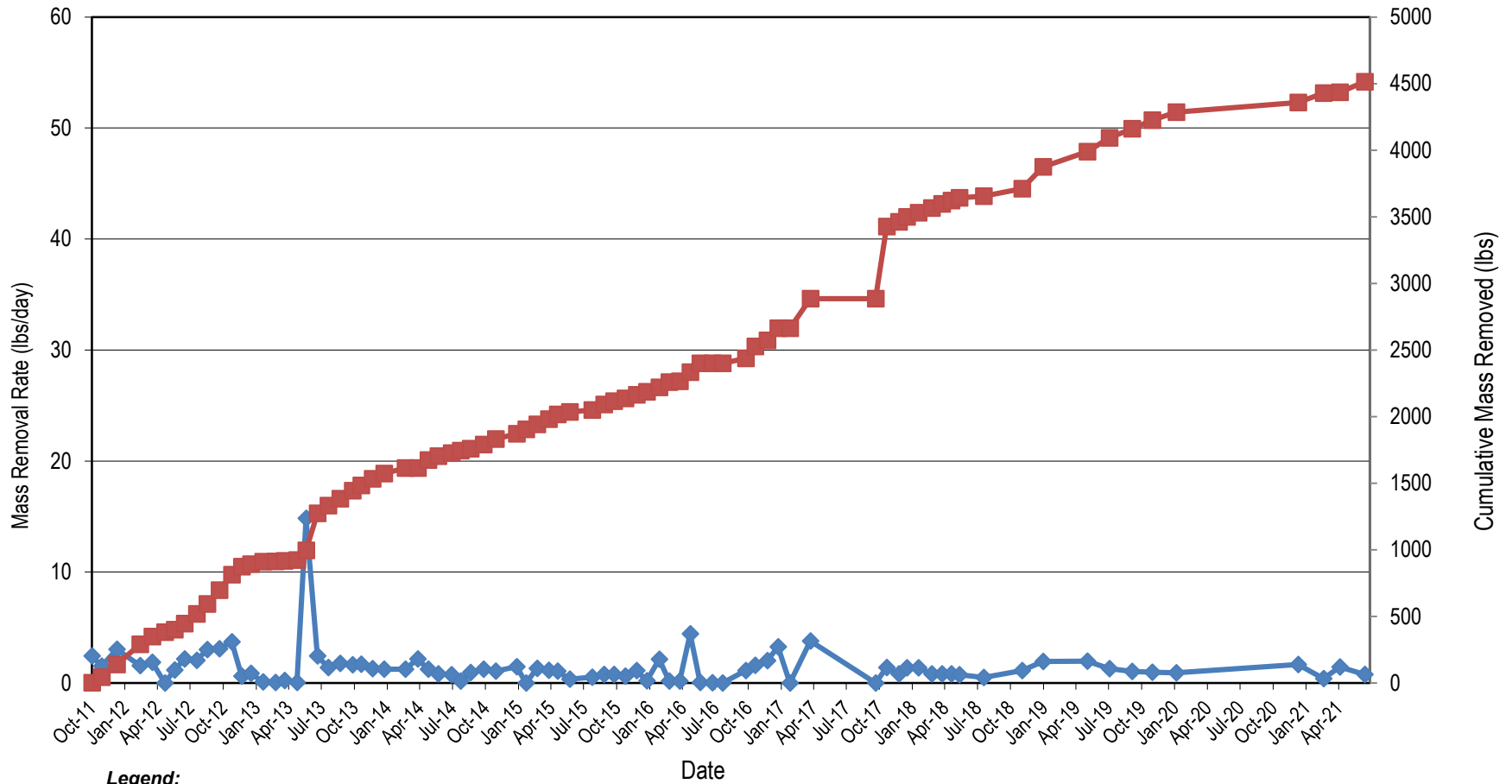
- ◆ Volatile Organic Compound (VOC) Removal Rate (lbs/day)
- Approximate Cumulative VOCs Removed (lbs)

**North SVE System – VOC Mass Removal**

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Figure  
**14**



**Legend:**

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

**South SVE System – VOC Mass Removal**

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 Vancouver, Washington



Figure  
**15**

**APPENDIX A**  
**FIELD SAMPLING DATA SHEETS**



WELL GAGING DATA SHEET



Cascadia  
Associates, LLC

3/1/21		Job Number:
Client:	Nustar - Vancouver	Date:
Project:	2019 GWM	Sampler:
Weather:		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	1257		25.52		35	2	
MW-2	Shallow	1230		26.91		40	2	
MW-3	Shallow	1150		26.32		35	2	
MW-5	Shallow	1247		25.74		38	2	
MW-6	Shallow	1236		25.03		35	2	
MW-7	Shallow	1206		25.74		40	4	
MW-8	Shallow	1203		25.78		40	4	
MW-9	Shallow	1226		25.91		40	4	
MW-10	Shallow	1158		26.24		40	4	
MW-12	Shallow	1135		24.31		40	4	
MW-13	Shallow	1050		25.68		40	4	
MW-14	Shallow	1010		26.03		40	4	
MW-15	Shallow	1218		31.47		40	4	
MW-16	Shallow	1211		26.15		40	4	
MW-17	Shallow	1147		25.34		40	4	
MW-18i	Lower Intermediate					79	2	
MW-19	Shallow	1126		26.63		45	2	
MW-19i	Upper Intermediate	1116		26.74		60.5	2	Bolt extract
MW-20i	Upper Intermediate	827		25.87		55.5	2	
MW-21i-40	Upper Intermediate	811		26.82		50	2	
MW-21i-105	Lower Intermediate	814		26.69		115.5	2	
MW-22i	Upper Intermediate	832		27.13		55.5	2	
MW-23i	Upper Intermediate	758		26.42		65.5	2	
MW-24i	Intermediate	839		26.16		64.5	2	
MW-24d	Deep Zone (Troutdale)	832		26.61		230	2	
MW-25i	Intermediate	810		26.29		60	2	
MW-26	Shallow	1154		25.87		42	2	
EW-1	Shallow	1240		23.97		32	2	
S-1	Upper Intermediate	820		25.45		74	2	
S-2	Shallow	1135		26.43		50	2	
MW-18i	Lower Intermediate	822		26.10		79	2	
MW-30i	Lower Intermediate					85	2	

WELL GAGING DATA SHEET

MW-31i	Lower Intermediate	<del>819</del>	NM	<del>27.24</del>		85	2	
MW-32s	Shallow	NM		NM		33	2	parked truck
MW-32i	Upper Intermediate	819		27.24		70	2	
MW-E	Shallow			NM		35	2	
MW-F	Shallow	1246		27.27		36.59	2	
MW-G	Shallow			NM		37	2	
MGMS1-43	Shallow	918		25.43		116	2	
MGMS1-60	Upper Intermediate	919		25.78		116	2	
MGMS1-110	Deep	921		25.79		116	2	
MGMS2-40	Shallow	908		24.89		140	2	
MGMS2-60	Upper Intermediate	909		25.35		140	2	
MGMS2-110	Deep	910		25.43		140	2	
MGMS2-132	Deep	912		25.09		140	2	
MGMS3-40	Shallow	928		24.19		140	2	
MGMS3-60	Upper Intermediate	930		24.46		140	2	
MGMS3-101	Deep	932		24.17		140	2	
MGMS3-132	Deep	934		24.47		140	2	

MP-1

1119

26.05

Project: 1021 GWM  
 Client: MASTER Van Main  
 Sampler: LW

Date: 3/1/21  
 Permit:

Intermediate  
 Shallow

Well ID:	Time:	DTP:	DTW:	Product Thickness:	Notes:
MW-21i-40	811	-	26.82	-	
MW-21i-105	814	-	26.69	-	DET
MW-32i	819	-	27.24	-	
MW-18i	822	-	26.10	-	
MW-20i	827	-	25.87	-	
MW-22i	832	-	27.13	-	
MGMS2-40	908	-	24.89	-	
MGMS2-60	909	-	<del>25.05</del> 25.51	-	
MGMS2-110	910	-	25.43	-	
MGMS2-132	912	-	25.09	-	
MGMS1-48	918	-	25.43	-	
MGMS1-60	919	-	25.78	-	
MGMS1-110	921	-	25.79	-	
MGMS3-40	928	-	24.19	-	
MGMS3-60	930	-	24.46	-	
MGMS3-110	932	-	24.17	-	
MGMS3-132	934	-	24.47	-	
MW-14	1010	-	26.03	-	
MW-13	1050	-	25.68	-	
MP-1	1119	-	26.05	-	
MW-19	1126	-	26.63	-	
MW-12	1135	-	24.31	-	
MW-17	1147	-	25.34	-	
MW-26	1154	-	25.87	-	
MW-10	1158	-	26.24	-	
MW-8	1203	-	25.78	-	



WELL MONITORING DATA SHEET



Well ID:	MW-17	Job Number:	
Client:	Nustar Van Mai	Date:	3/3/21
Project:	1621	Time In/Out:	800/855
Weather:	fog 32°F		

WELL DATA

Monument Type:	Flush mount/Stick-up	Well Diameter:	4"	Depth to Free Product:	-
Monument Condition:	Other: good	Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	Yes No	Depth to Water:	2.41	Purge Volume:	-
Comments:		Screened Interval:			

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 Mate:		id screen		REDI	
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
810			25.41	0.2	7.15	7.78	69	9.8	77		NR
813			↓	0.3	6.11	10.47	800	1	1		↓
816			↓	0.25	6.40	11.52	905	36.8	2		↓
819			↓	0.2	6.42	11.26	908	18.1	44		↓
822			↓	↓	6.41	11.56	919	14.84	38.9		↓
825			↓	↓	6.42	11.92	930	12.1	4.1		↓
828			↓	↓	6.42	11.95	92	1	46.6		↓
831			↓	↓	6.41	12.03	928	8.39	49.8		↓
834			↓	↓	6.42	12.1	931	8.1	50.8		↓
837			↓	↓	6.42	12.19	936	8.07	2		↓
840			↓	↓	6.42	12.06	9	2	5.1		↓

PURGING DATA

Sample ID:	MW-17	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex
Sample Time:	840	Final Depth to Water:	25.41	Did Well Dewater:	0
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x40	HCl	VOCs			
1x250	H2SO4	NH3			
1x250	-	<del>NH2</del> <del>NH3</del> NO2/NO3			

NOTES/ADDITIONAL COMMENTS

Antea Sample # 842-845

**WELL MONITORING DATA SHEET**



Well ID: S-1	Job Number:
Client: Mustang VAN	Date: 3/3/21
Project: 1021	Sampler: LW
Weather: togs 35°F	Time In/Out: 905 / 955

**WELL DATA**

Monument Type:	Flugh-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	OK	Depth to Water:	25.27	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 = 0.653    1 gal = 3.785 liters

**PURGING DATA**

Purge Method: Bp lf				Pump Intake Depth: 11.5				NEW / DEDICATED		
Sampling Method: lf				Tubing Material & Type: SIS						
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	
909			25.27	0.2	7.52	5.79	147	53.42	45.7	clear
912			25.27		6.61	7.42	137	24.09	127.0	
915					6.61	8.82	127	18.80	46.2	
918					6.84	9.69	120	14.87	45.5	
921					6.78	9.94	119	13.33	46.9	
924					6.72	10.20	119	12.73	48.6	
927					6.71	10.39	119	12.35	50.2	
930					6.71	10.56	120	11.37	57.7	
933					6.71	10.58	130	11.17	53.8	
936					6.73	10.66	146	10.83	55.3	
939					6.74	10.63	162	10.69	56.9	

**PURGING DATA**

Sample ID: S-1	Sampling Flow Rate: 0.2	Analytical Laboratory: Apex				
Sample Time: 940	Final Depth to Water: 25.27	Did Well Dewater: NO				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	HV ULS				
1x250	H2SO4	NH3				
1x250	—	NO2 / NO3				

**NOTES/ADDITIONAL COMMENTS**

Antea sample 943-947

**WELL MONITORING DATA SHEET**



Well ID:	S-2	Job Number:	
Client:	Nustar VAN	Date:	3/3/21
Project:	1021	Sampler:	1W
Weather:	Avn 350F	Time In/Out:	955 / 1050

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	
	Other:	Well Depth:	-	Free Product Thickness:	6
Monument Condition:	Good	Depth to Water:	25.94	Water Column Length:	6
Well Cap Lock Present:	Yes No	Screened Interval:		Purge Volume:	1

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
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	
959			25.94	0.28	6.62	8.08	378	44.60	68.2	STF. red
1002			25.96		6.69	8.30	999	18.34	85.3	↓ SH. red
1005			25.98		6.36	9.10	1335	14.88	64.2	
1008			26.00		6.47	10.13	1430	11.80	48.6	
1011			26.02		6.49	10.02	1435	11.38	25.2	
1014			26.04		6.49	10.50	1452	11.34	21.3	
1017			26.06		6.50	11.10	1476	10.80	16.7	
1020			26.06		6.51	11.24	1481	10.12	13.4	
1023			26.07		6.52	11.32	1484	10.04	10.5	
1026			26.09		6.52	11.51	1489	9.28	5.6	
1029			26.11		6.52	11.58	1489	9.19	3.8	
1032			26.12		6.52	11.69	1493	8.84	1.7	

**PURGING DATA**

Sample ID:	S-2	Sampling Flow Rate:	0.28	Analytical Laboratory:	Apix
Sample Time:	1030	Final Depth to Water:	24.16	Did Well Dewater:	NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x40	H2O	JULS			
1x250	-	NO2/NO3			
1x250	H2SO4	NH3			

**NOTES/ADDITIONAL COMMENTS**

Antec Sample = 1034 - 1037

WELL MONITORING DATA SHEET



Well ID:	MW-19	Job Number:	
Client:	Nustar JV	Date:	3/3/21
Project:	1Q21	Sampler:	LW
Weather:	SUN	Time In/Out:	1055 / 1140

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:	26.17	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:		BSP		Pump Intake Depth:		MS		NEW / DEDICATED		Clarity/Color Other Remarks
Sampling Method:		LF		Tubing Material & Type:		ES				
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	
1102			26.17	0.28	6.81	9.77	1703	521	7.1	clear
1105			26.27	↓	6.79	12.56	1820	15.75	8.3	↓
1108			26.36	↓	6.82	13.48	1935	9.71	11.6	
1111			26.36	0.25	6.81	13.67	2018	8.05	16.4	
1114				↓	6.81	13.71	2046	7.54	18.4	
1117				↓	6.81	13.81	2076	7.23	20.5	
1120				↓	6.81	13.88	2099	6.80	22.2	
1123				↓	6.81	13.96	2116	4.45	23.3	
1126				↓	6.81	13.96	2129	6.47	24.6	

PURGING DATA

Sample ID:	MW-19	Sampling Flow Rate:	26.36	Analytical Laboratory:	Apex
Sample Time:	1130	Final Depth to Water:	0.25	Did Well Dewater:	NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD
3x40	HCl	VOL			
1x250		NO2/NO3			
1x250	H2SO4	NH3			
2x40	HCl	RSK/TOL			
MW-19 DUP					

NOTES/ADDITIONAL COMMENTS

Anten 1132 - 1136



WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MP-1	Job Number:	
Client:	Nustar VAN	Date:	3/3/21
Project:	1021	Sampler:	LW
Weather:	Sunny	Time In/Out:	1140/1230

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	24	Depth to Free Product:	-
	Other:	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	Seal	Depth to Water:	26.28	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		
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	
1149			26.28	0.25	6.89	10.53	1412	15.33	34.6	clear
1152			26.31	0.24	6.90	12.39	1130	9.52	27.0	↓
1155			26.33	0.2	6.97	12.67	1142	8.97	23.1	
1158					6.94	12.82	1194	7.99	23.2	
1201					6.93	13.06	1233	7.23	23.8	
1204					6.92	13.12	1245	7.15	22.2	
1207					6.92	13.03	1249	7.07	20.9	
1210					6.92	13.13	1257	6.85	19.3	

PURGING DATA

Sample ID:	MP-1	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex	
Sample Time:	1210	Final Depth to Water:	26.33	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	H2O	VULS				
1x750	H2SO4	NH3				
1x250	-	NO2/NO3				
2x40	H2O	TOC/RSK				

NOTES/ADDITIONAL COMMENTS

Anten Sampling 1215-1219



**WELL MONITORING DATA SHEET**



Well ID:	MW-9	Job Number:	
Client:	Nustar UAN	Date:	3/3/21
Project:	1021	Sampler:	WJ
Weather:	Sun	Time In/Out:	1230 / 1330

**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:	26.01	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
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	
1237			26.01	0.2	8.55	12.02	1779	8.78	55.8	clear
1240			↓	↓	5.22	12.16	1794	8.65	73.6	↓
1243			↓	↓	4.96	12.60	1825	5.64	84.4	↓
1246			↓	↓	4.88	12.61	1831	5.54	90.4	↓
1249			↓	↓	4.79	12.80	1839	5.42	93.1	↓
1251			↓	↓	4.75	12.58	1838	5.29	98.7	↓
1254			↓	↓	4.71	12.50	1839	5.16	100.9	↓
1257										

**PURGING DATA**

Sample ID:	MW-9	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex
Sample Time:	1300	Final Depth to Water:	26.01	Did Well Dewater:	NSD
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD
3x40	HCl	VOCs			
1x250	H2SO4	NH3			
1x250	-	NO2/NO3			

**NOTES/ADDITIONAL COMMENTS**

Antea Sampling 1300 - 1304

**WELL MONITORING DATA SHEET**



Well ID: MW-7	Job Number:
Client: Nuster van	Date: 3/3/21
Project: 1021	Sampler: LW
Weather: Sunny	Time In/Out: 1335/1435

**WELL DATA**

Monument Type: Flush-mount/Stick-up	Well Diameter: 4"	Depth to Free Product: -
Other:	Well Depth: -	Free Product Thickness: -
Monument Condition: OK	Depth to Water: 25.88	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		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		
1346			25.88	0.25	6.32	13.00	656	196	102.3	cloudy	
1349			25.99	0.25	6.30	12.83	497	9.16	104.2	slt. cloudy	
1352			26.09	0.2	6.25	12.76	425	5.62	104.4	clear	
1355			26.09	0.2	6.25	12.73	430	4.30	104.4		
1358			↓	↓	6.22	12.66	426	3.58	104.5	↓	
1401			↓	↓	6.22	12.73	425	2.99	104.3	↓	
1404			↓	↓	6.22	12.75	425	2.84	104.1	↓	
1407					6.22	12.75	425	2.79	103.9		

**PURGING DATA**

Sample ID: MW-7	Sampling Flow Rate: 0.2	Analytical Laboratory:	Apex
Sample Time: 1405	Final Depth to Water: 26.09	Did Well Dewater:	NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered
3x40	HCl	HNO3	Filter Size
1x250	H2SO4	NH3	MS/MSD
1x250	-	NO2/NO3	Duplicate ID
2x40	HCl	Fe/TOL	MW-7 DUP

**NOTES/ADDITIONAL COMMENTS**

Antea 1413-1418

**WELL MONITORING DATA SHEET**



Well ID:	MW-14	Job Number:	
Client:	Nustar O&G Converter	Date:	1/4
Project:	ISO 21		
Weather:	Sunny, 40°F	Time In/Out:	7:30/8:20

**WELL DATA**

Monument Type:	Flesh mount/Stick-up	Well Diameter:	4"	
	Other:	Well Depth:	-	Free Product Thickness:
Monument Condition:	Good	Depth to Water:	26.28	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

**PURGING DATA**

Purge Method:		BP			Pump Intake Depth:		MS			
Sampling Method:		LP			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)		Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
737			26.28	0.3	7.20	8.64	1787	109.52	30.4	cloudy
740			26.40	0.3	6.39	11.26	2250	59.49	45.4	1 dy
743			26.36	0.22	6.38	11.81	2419	24.28	75.4	slt c dy
746			↓	↓	6.37	11.85	2432	15.30	79.7	sl dy
749			↓	↓	6.37	11.89	2411	11.54	81.3	sl
752			↓	↓	6.37	11.86	2375	9.89	82.5	↓
755			↓	↓	6.36	11.93	2330	8.81	83.3	↓
758			↓	↓	6.37	11.95	2297	8.68	83.7	↓
801			↓	↓	6.34	11.85	2244	8.52	84.7	

**PURGING DATA**

Sample ID:	MW-14	Sampling Flow Rate:	0.22	Analytical Laboratory:	Apex
Sample Time:	800	Final Depth to Water:	26.36	Did Well Dewater:	6
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x40	H2O	VOCs			
1x250	H2SO4	NH3			
1x250	-	NO2/NO3			
2x40	H2O	PSK 175 / Tol			

**NOTES/ADDITIONAL COMMENTS**

Ante Sampling 804 - 809

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-10	Job Num:	
Client:	Nature VANCOUVER	Date:	3/4/21
Project:	1021	Sampler:	
Weather:	Pt. Cloudy, 40°F	Time In/Out:	8:20 / 9:15

**WELL DATA**

Monument Type:	Flush mount/Stick-up	Well Diameter:	4"	Depth to	
	Other:	Well Depth:	-	Free Pro	-
Monument Condition:	Just	Depth to Water:	26.36	Water Column Length:	-
Well Cap Lock Present:	Yes No	Screened Interval:	-	Purge V	-

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				
Sampling Method:					Tubing Material & Type:	DE CAT				
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%		+/-20 mV	
827			26.42	0.25	6.21	9.08	2228	17.9	102.3	6
830			26.54	0.2	5.56	10.17	2548	13.05	115.7	
833			26.65		5.46	11.32	2716	10.72	118.5	
836			26.74		5.44	11.52	2758	9.77	120.1	
839			26.85		5.42	11.58	2774	9.07	121.4	
842			26.93		5.40	11.69	2782	8.53	122.6	
845			26.98		5.40	11.70	2788	8.15	122.8	
848			27.05	↓	5.40	11.80	2791	7.63	123.2	↓
851			27.15	↓	5.40	11.95	2794	5.81	123.5	↓
854			27.19	↓	5.40	11.98	2803	6.21	123.7	↓
857			27.23	↓	5.39	12.02	2806	6.18	123.9	↓

**PURGING DATA**

Sample ID:	MW-10	Sampling Flow Rate:	0.2	Analytical Laboratory	APLX	
Sample Time:	850	Final Depth to Water:	27.25	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	Hv025				
1x250	H2504	NH3				
1x250	-	N02/N03				

**NOTES/ADDITIONAL COMMENTS**

Antea Sampling 900-905

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-221	Job Number:	
Client:	MUSTAR JRM	Date:	3/4/21
Project:	1021	Sampler:	LM
Weather:	Sun 143°F	Time In/Out:	9:57/10:20

**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:	26.99	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 LF			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)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
921			26.99	0.4	5.58	9.18	2176	15.04	114.2	Clear
924			27.00	0.22	5.95	9.59	931	14.73	107.0	↓
927					10.40	6.09	596	12.24	93.0	
930					6.48	11.33	356	7.73	42.8	
933					6.50	11.21	324	6.20	26.4	
937					6.51	10.75	313	6.00	17.0	
940					6.47	9.72	303	5.46	6.9	
943					6.39	9.70	301	5.32	7.1	
946					6.37	9.68	299	5.02	8.3	

**PURGING DATA**

Sample ID:	MW-221	Sampling Flow Rate:	0.22	Analytical Laboratory:	Apex	
Sample Time:	940	Final Depth to Water:	27.0	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	H21	HVOLS				
PK250	H2SO4	NH4				
1x20	-	NO2/NH3				

**NOTES/ADDITIONAL COMMENTS**

Antea sampling 946-950

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID: MW-21-105	Job Number:
Client: Nustar JAN	Date: 3/4/21
Project: 1021	Sampler: JJJ
Weather: Sun, 40°F	Time In/Out: 1030 / 1150

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter: 2" <input checked="" type="checkbox"/>	Depth to Free Product: —
	Other: <u>Ground</u>	Well Depth: —	Free Product Thickness: —
Monument Condition:		Depth to Water: 26.70	Water Column Length: —
Well Cap Lock Present:	Yes <input checked="" 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: <u>BLE</u>	Pump Intake Depth: <u>MS</u>									
Sampling Method: <u>SB</u>	Tubing Material & Type: <u>NEW / 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	
1040			26.71	0.10	5.58	10.45	1166	26.46	81.2	clear
1043			26.71	0.10	4.64	11.01	320	16.36	117.6	↓
1046			↓	0.1	4.28	11.22	328	14.61	141.6	
1049			↓	↓	4.23	11.54	328	12.16	155.7	
1052			↓	↓	4.50	11.78	326	11.73	155.0	
1055			↓	↓	6.24	12.80	325	9.45	112.1	
1058			↓	↓	6.48	12.86	329	8.34	101.7	
1101			↓	↓	6.75	12.96	332	7.13	95.8	
1104			↓	↓	6.85	12.94	335	6.85	91.9	
1107			↓	↓	6.86	12.82	337	6.99	92.5	


**PURGING DATA**

Sample ID: MW-21-105	Sampling Flow Rate: 0.1	Analytical Laboratory: <u>Accy</u>				
Sample Time: 1100	Final Depth to Water: 26.71	Did Well Dewater: <u>NO</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	H2O	(VOC)				
1x250	H2SO4	NH3				
1x250	—	NO2/NO3				

**NOTES/ADDITIONAL COMMENTS**

Anten sampling 1103-1100

WELL MONITORING DATA SHEET

	Well ID:	MW-2	Job Number:	
	Client:	Cas/Nature VAN	Date:	3/4/21
	Project:	1021	Sampler:	
	Weather:	overcast	Time In/Out:	1150/

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:	26.21	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		
1203			26.21	0.2	6.93	12.45	587	95.96	-70.1	clear	
1206					6.88	12.57	637	10.35	-92.9		
1209					6.87	12.58	642	8.46	-97.4		
1212					6.82	13.22	665	5.55	-110.6		
1215					6.79	13.16	673	5.00	-115.7		
1218					6.78	13.09	675	4.51	-120.1		
1221					6.76	13.14	675	4.33	-122.4		
1224					6.73	13.25	677	4.16	-125.3		

PURGING DATA

Sample ID:	MW-2	Sampling Flow Rate:	26.21	Analytical Laboratory:	Apey	
Sample Time:	1230	Final Depth to Water:	0.2	Did Well Dewater:		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	H2O	VOCs				
1x750		NO2/NO3				
1x750	H2SO4	NH3				

NOTES/ADDITIONAL COMMENTS

Antea sampling 1236-1240



**WELL MONITORING DATA SHEET**



Well ID:	MW-6	Job Number:	
Client:	Nustar VAN	Date:	3/4/21
Project:	1A21	Sampler:	LW
Weather:	sun	Time In/Out:	1300 / 1340

**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:	25.16	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 LP		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)	DO (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1310			25.16	0.25	6.45	13.78	569	18.40	-102.2	clear
1313			↓	↓	6.31	14.04	479	3.55	-93.5	↓
1316			↓	↓	6.32	14.07	453	3.19	-91.2	↓
1319			↓	↓	6.31	13.84	414	2.97	-89.9	↓
1322			↓	↓	6.31	13.81	401	2.94	-89.9	↓
1325										

**PURGING DATA**

Sample ID:	MW-6	Sampling Flow Rate:	0.25	Analytical Laboratory:	Apex	
Sample Time:	1325	Final Depth to Water:	25.16	Did Well Dewater:	NB	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	H21	JCS				
1x250	H2504	NO2/NO3				
1x250	—	NT3				

**NOTES/ADDITIONAL COMMENTS**

Antea Sampling 1328-1333

WELL MONITORING DATA SHEET



Well ID:	MW-13	Job Number:	
Client:	Nustar JANUWEE	Date:	3/4/21
Project:	1021	Sampler:	LW
Weather:	overcast	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount Stick-up	Well Diameter:	4"	Depth to Free Product:	—
	Other:	Well Depth:	28.35	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	28.35	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		KF		Pump Intake Depth:		MS		NEW / <u>DEDICATED</u>	
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		
1355			25.35	0.1	6.50	13.96	523	164.0	-80.3	clear	
1358			25.91	0.15	6.57	14.33	868	7.56	-75.0	↓	
1401				0.2	6.57	14.41	919	6.11	-89.3		
1404					6.62	14.56	1138	4.03	-105.2		
1407					6.62	14.49	1148	3.68	-111.7		
1410					6.62	14.38	1168	3.34	-114.5		
1413					6.63	14.37	1179	3.08	-119.0		
1416					6.64	14.39	1171	3.06	-120.8		


PURGING DATA

Sample ID:	MW-13	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apey	
Sample Time:	1413	Final Depth to Water:	25.91	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	HVCL				✓ MW-12 Dup
1x250	H2SO4	NH3				
1x250		NO2/NO3				
2x40	HCl	RSK/TOL				

NOTES/ADDITIONAL COMMENTS

Antea sampling 1418-1422

**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-12</u>	Job Number: _____
	Client: <u>Mustard JANITORER</u>	Date: <u>3/5/21</u>
	Project: <u>1021</u>	Sampler: <u>LWJ</u>
	Weather: <u>Rain</u>	Time In/Out: <u>730</u>

**WELL DATA**

Monument Type:	Flush-mount/Stick-up <u>(circled)</u>	Well Diameter: <u>4"</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>25.65</u>	Water Column Length: <u>—</u>
Well Cap Lock Present:	<u>Yes</u> <u>No</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>								
Sampling Method: <u>LF</u>		Tubing Material & Type: <u>SB</u>								
		NEW / <del>DEDICATED</del>								
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	
734		25.05	25.05	0.28	5.23	13.60	691	18.64	690	cloudy
737		25.95	25.95	0.3	5.28	14.36	665	3.09	85.3	slt. cloudy
740		26.52	26.52	↓	5.69	14.55	638	1.18	62.0	clear
743		26.72	26.72	↓	5.98	14.53	628	0.97	36.5	↓
746		27.03	27.03	↓	6.11	14.54	632	0.89	25.7	↓
749		27.34	27.34	↓	6.22	14.43	656	0.77	7.4	↓
752		27.65	27.65	↓	6.24	14.48	670	0.70	1.3	↓
755		27.80	27.80	↓	6.28	14.48	673	0.68	-4.2	↓

**PURGING DATA**

Sample ID: <u>MW-12</u>	Sampling Flow Rate: <u>0.3</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>750</u>	Final Depth to Water: <u>27.99</u>	Did Well Dewater: <u>NO</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	HVOCs	—	—	—	√ MW-12 DUP
1x250	—	NO2/NO3	—	—	—	↓
1x250	H2SO4	NH3	—	—	—	—
2x40	HCl	Res / TOC	—	—	—	—

**NOTES/ADDITIONAL COMMENTS**

Antea Sampling 759-804

**WELL MONITORING DATA SHEET**



Well ID:	MW-32i	Job Number:	
Client:	NuStar Van	Date:	3/2
Project:	GUM 1021	Sampler:	4W
Weather:	Cloudy 40°	Time In/Out:	730-810

**WELL DATA**

Monument Type:	Flush-mount/Stick-up Other: <u>good</u>	Well Diameter:	2"	Depth to Free Product:	-
Monument Condition:		Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	Yes No	Depth to Water:	NM	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:	<u>Dedicated long flow</u>				Pump Intake Depth:	<u>Midscreen</u>				
Sampling Method:					Tubing Material & Type:	<u>LDPE</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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
740			NM	.15	6.60	14.05	247	11.26	86.8	clear
743					6.29	13.90	246	5.86	91.8	
746					6.24	13.83	244	4.17	96.7	
749					6.37	13.69	246	3.97	127.2	
752					6.44	13.67	247	3.90	129.1	
755					6.42	13.62	244	3.06	130.1	

**PURGING DATA**

Sample ID:	MW-32i	Sampling Flow Rate:	.15	Analytical Laboratory:	Apex	
Sample Time:	755	Final Depth to Water:	NM	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
1x 250	-	NH3	-	-	-	-
1x 250	H2SO4	NO2/3	-	-	-	-
3x 40	HCl	VOC	-	-	-	-

**NOTES/ADDITIONAL COMMENTS**

Dedicated pump blocking H2O probe?

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-32s	Job Number:	
Client:	NuStar Van	Date:	3/2
Project:	GWM 1021	Sampler:	gwb
Weather:	cloudy 50°	Time In/Out:	8:15 - 9:00

**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:	28.09	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:	dedicated low flow			Pump Intake Depth:						
Sampling Method:				Tubing Material & Type:	LDPE dedicated	MS	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	
8:26			28.09	2	6.03	14.23	394	3.18	223.6	clear
8:29					6.20	14.62	411	3.14	176.1	
8:32					6.30	14.90	433	3.32	159.1	
8:35					6.31	15.10	436	4.44	153.4	
8:38					6.32	15.16	441	4.54	153.6	
8:41					6.32	15.20	440	4.77	152.5	

**PURGING DATA**

Sample ID:	MW-32s	Sampling Flow Rate:	2	Analytical Laboratory:	Apex	
Sample Time:	8:41	Final Depth to Water:	28.09	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-25i	Job Number:	
Client:	Nix Star Van	Date:	3/2
Project:	GWSM 1021	Sampler:	4w
Weather:	PT Sun	Time In/Out:	1000-1120

**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:	25.95	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:	55'
Sampling Method:	lowflow	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	
1057			25.95	.25	6.34	14.79	271	12.66	175.6	clear
1100					6.10	14.56	247	9.36	186.7	
1103					6.20	13.96	220	6.01	179.1	
1106					6.25	13.90	215	5.90	178.5	
1109					6.28	13.81	211	5.62	174.6	

**PURGING DATA**

Sample ID:	MW-25i	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	1109	Final Depth to Water:	25.95	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-23i	Job Number:	
Client:	NuStar Perm	Date:	3/2
Project:	GWM 1021	Sampler:	AW
Weather:	Sun 55°	Time In/Out:	1130-1215

**WELL DATA**

Monument Type:	Flush-mount / Stick-up Other:	Well Diameter:	2"	Depth to Free Product:	—
Monument Condition:	ok	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	26.24	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:	60'
Sampling Method:	lowflow	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	
1137			26.24	.25	5.30	14.02	184	16.09	260.9	clear
1140			↓	.2	5.75	13.74	158	10.58	201.0	↓
1143			↓	↓	6.06	13.95	141	8.93	196.9	↓
1146			↓	↓	6.14	13.75	132	7.90	195.4	↓
1149			↓	↓	6.19	13.74	134	7.71	191.1	↓
1152			↓	↓	6.21	13.70	130	7.67	190.2	↓

**PURGING DATA**

Sample ID:	MW-23i	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1152	Final Depth to Water:	26.24	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-21i-40	Job Number:	
Client:	Nu Star Van	Date:	3/2
Project:	GWM 1021	Sampler:	fw
Weather:	Sun 60°	Time In/Out:	1220-1300

**WELL DATA**

Monument Type:	Flush-mount/Stick-up Other:	Well Diameter:	2"	Depth to Free Product:	—
Monument Condition:	ok	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	26.95	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 low flow			Pump Intake Depth:	45'					
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	
1228			26.95	.25	6.21	14.95	93	17.46	194.5	clear
1231			↓	↓	6.63	14.80	56	8.58	157.4	↓
1234			↓	↓	6.50	15.04	87	7.20	154.8	↓
1237			↓	↓	6.44	15.17	81	7.04	164.3	↓
1240			↓	↓	6.43	15.25	83	6.95	167.3	↓


**PURGING DATA**

Sample ID:	MW-21i-40	Sampling Flow Rate:	.25	Analytical Laboratory:	Aplex	
Sample Time:	1240	Final Depth to Water:	26.95	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**

 <b>Cascadia</b> Associates, LLC	Well ID: <b>MW-20i</b>	Job Number:	
	Client: <b>Nu Star Num</b>	Date: <b>3/2</b>	
	Project: <b>GWM 1Q21</b>	Sampler: <b>AW</b>	
	Weather: <b>Sun</b>	Time In/Out: <b>1300-1340</b>	

**WELL DATA**

Monument Type: <b>Flush-mount/Stick-up</b> Other: <b>ok</b>	Well Diameter: <b>2"</b>	Depth to Free Product: <b>—</b>	
Monument Condition: <b>ok</b>	Well Depth: <b>—</b>	Free Product Thickness: <b>—</b>	
Well Cap Lock Present: <b>Yes</b> No	Depth to Water: <b>26.48</b>	Water Column Length: <b>—</b>	
	Screened Interval: <b>—</b>	Purge Volume: <b>—</b>	

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: <b>BP</b>		Pump Intake Depth: <b>50'</b>		NEW <b>DEDICATED</b>						
Sampling Method: <b>lowflow</b>		Tubing Material & Type: <b>5B</b>								
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	
<b>1310</b>			<b>26.48</b>	<b>.25</b>	<b>6.41</b>	<b>16.19</b>	<b>141</b>	<b>8.49</b>	<b>180.8</b>	<b>clear</b>
<b>1313</b>			↓	↓	<b>6.33</b>	<b>15.29</b>	<b>179</b>	<b>5.14</b>	<b>176.1</b>	↓
<b>1316</b>			↓	↓	<b>6.47</b>	<b>15.16</b>	<b>189</b>	<b>5.31</b>	<b>172.8</b>	↓
<b>1319</b>			↓	↓	<b>6.55</b>	<b>15.07</b>	<b>191</b>	<b>4.10</b>	<b>170.0</b>	↓
<b>1322</b>			↓	↓	<b>6.56</b>	<b>15.05</b>	<b>191</b>	<b>4.06</b>	<b>170.2</b>	↓
<b>1325</b>			↓	↓	<b>6.59</b>	<b>15.05</b>	<b>190</b>	<b>3.91</b>	<b>170.5</b>	↓

**PURGING DATA**

Sample ID: <b>MW-20i</b>	Sampling Flow Rate: <b>.25</b>	Analytical Laboratory: <b>Apex</b>				
Sample Time: <b>1325</b>	Final Depth to Water: <b>26.48</b>	Did Well Dewater: <b>No</b>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<b>3x40</b>	<b>HCl</b>	<b>VOC</b>	—	—	—	—
<b>1x250</b>	<b>H2SO4</b>	<b>NO2/3</b>	—	—	—	—
<b>1x250</b>	—	<b>NH3</b>	—	—	—	—

**NOTES/ADDITIONAL COMMENTS**

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	EW-1	Job Number:	
Client:	Nustar Van	Date:	3/2
Project:	GWOM 1Q21	Sampler:	4W
Weather:	Sun	Time In/Out:	1345-1430

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	ok	Depth to Water:	24.08	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:	BP	Pump Intake Depth:	30'
Sampling Method:	low flow	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)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1349			24.08	.25	6.39	15.31	236	9.73	222.7	clear
1352			24.10		6.07	14.80	375	8.49	186.8	
1355					6.22	15.11	412	8.67	177.5	
1358					6.21	15.11	416	8.63	174.0	
1401					6.22	15.10	415	8.61	173.1	

**PURGING DATA**

Sample ID:	EW-1	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex
Sample Time:	1401	Final Depth to Water:	24.10	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-5	Job Number:	
Client:	Nu Star Van	Date:	3/3
Project:	GWM 1Q21	Sampler:	4W
Weather:	Foggy	Time In/Out:	745-830

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	ok	Depth to Water:	25.95	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:	34'
Sampling Method:	low flow	Tubing Material & Type:	3B

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
755			25.95	.2	6.36	11.36	251	19.67	206.8	clear
758					5.86	14.61	324	4.60	164.7	
801					5.64	26.81	347	2.01	155.1	
804					5.70	27.12	379	1.88	143.6	
807					5.71	27.18	386	1.80	139.4	

**PURGING DATA**

Sample ID:	MW-5	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	807	Final Depth to Water:	25.95	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**

Water was sensibly warm w/ glove (steam?)

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-8	Job Number:	
Client:	NuStar Veen	Date:	3/3
Project:	GLM 1Q21	Sampler:	925
Weather:	Foggy	Time In/Out:	8:40 - 9:2

**WELL DATA**

Monument Type:	Flush-mount / Stick-up	Well Diameter:	4"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	ok	Depth to Water:	25.93	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:	35'					
Sampling Method:	low flow			Tubing Material & Type:	SIS					
										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			25.93	.25	6.01	16.64	1926	14.04	174.1	clear
853			25.94	↓	6.09	15.22	2135	8.07	168.2	↓
854			↓	↓	6.13	14.54	2187	8.25	166.5	↓
859			↓	↓	6.20	13.91	2234	8.92	169.6	↓
902			↓	↓	6.23	13.75	2259	9.05	168.6	↓
905			↓	↓	6.24	13.70	2265	9.18	167.3	↓

**PURGING DATA**

Sample ID:	MW-8	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex No	
Sample Time:	905	Final Depth to Water:	25.94	Did Well Dewater:		
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: <u>MW-16</u>	Job Number:
	Client: <u>N/A Stew Vann</u>	Date: <u>3/3</u>
	Project: <u>GOM 1921</u>	Sampler: <u>12</u>
	Weather: <u>Pt Sun</u>	Time In/Out: <u>9:25 - 10:05</u>

**WELL DATA**

Monument Type:	Flush-mount/Stick-up <u>Other:</u>	Well Diameter:	4"	Depth to Free Product:	—
Monument Condition:	<u>ok</u>	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth to Water:	25.72	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:		<u>BP Low flow</u>		Pump Intake Depth:		<u>35'</u>		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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
933			25.72	.2	6.34	10.55	1584	13.19	176.4	clear
936			↓	↓	6.61	11.85	782	4.50	169.1	
939			↓	↓	6.50	12.06	604	5.55	165.3	
942			↓	↓	6.43	12.15	561	5.09	166.0	
945			↓	↓	6.39	12.15	540	5.01	166.5	
948			↓	↓	6.37	12.17	533	4.92	166.5	

**PURGING DATA**

Sample ID:	MW-16	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	948	Final Depth to Water:	25.72	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**

 <b>Cascadia</b> Associates, LLC	Well ID: <u>MW-18i</u>	Job Number: _____
	Client: <u>Nu Steer Van</u>	Date: <u>3/3</u>
	Project: <u>GMM 1821</u>	Sampler: <u>AW</u>
	Weather: <u>Sun 55°</u>	Time In/Out: <u>1010 - 1055</u>

**WELL DATA**

Monument Type: <u>Flush-mount/Stick-up</u>	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>26.10</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>74'</u>		NEW / <u>DEDICATED</u>		
Sampling Method: _____		<u>low flow</u>		Tubing Material & Type: _____		<u>8B</u>				
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	
<u>1015</u>			<u>26.10</u>	<u>.2</u>	<u>6.58</u>	<u>11.73</u>	<u>296</u>	<u>22.31</u>	<u>165.2</u>	<u>clear</u>
<u>1018</u>			↓	↓	<u>6.66</u>	<u>12.26</u>	<u>233</u>	<u>9.20</u>	<u>163.6</u>	↓
<u>1021</u>			↓	↓	<u>6.20</u>	<u>13.19</u>	<u>181</u>	<u>6.61</u>	<u>160.9</u>	↓
<u>1024</u>			↓	↓	<u>6.16</u>	<u>13.32</u>	<u>163</u>	<u>6.31</u>	<u>159.8</u>	↓
<u>1027</u>			↓	↓	<u>6.15</u>	<u>13.42</u>	<u>153</u>	<u>6.16</u>	<u>159.5</u>	↓

**PURGING DATA**

Sample ID: <u>MW-18i</u>	Sampling Flow Rate: <u>.2</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1027</u>	Final Depth to Water: <u>26.10</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**

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**WELL MONITORING DATA SHEET**

<b>Cascadia</b> Associates, LLC	Well ID:	MW-19i	Job Number:	3/3
	Client:	Nu Star Van	Date:	3/3
	Project:	GWM 1Q21	Sampler:	qu
	Weather:	Sun	Time In/Out:	1100-1150

WELL DATA					
Monument Type:	Flush-mount/Stick-up <u>Other:</u>	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 <input type="checkbox"/>	Depth to Water:	25.33	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:		55'		
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)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
1106			25.33	.2	7.08	12.55	167	22.03	157.9	clear
1109					7.10	13.17	162	10.78	153.3	
1112					6.94	13.77	181	8.79	144.1	
1115					6.90	13.96	199	2.76	81.9	
1118					6.86	14.02	206	2.50	73.6	
1121			↓	↓	6.85	14.04	210	2.41	70.1	↓

PURGING DATA							
Sample ID:	MW-19i	Sampling Flow Rate:	.2	Analytical Laboratory:		Apex	
Sample Time:	1121	Final Depth to Water:	25.33	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-24D	Job Number:	
Client:	Nu Star Van	Date:	3/3
Project:	GWSM 1Q21	Sampler:	AW
Weather:	Sunny	Time In/Out:	1100 - 1305

**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:	27.25	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:	BP low flow			Pump Intake Depth:	225'					
Sampling Method:				Tubing Material & Type:	LDPE/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	
1236			27.25	.25	7.35	14.40	257	15.86	54.9	clear
1239			27.40		6.70	13.85	276	3.91	68.4	
1242			27.51		6.24	13.34	288	1.80	25.4	cloudy
1245			27.50		6.02	13.15	287	1.60	-3.5	
1248					6.06	13.03	289	1.15	-106.6	
1251					6.10	12.99	287	1.10	-113.4	
1254					6.12	12.97	287	1.07	-119.7	

**PURGING DATA**


Sample ID:	MW-24D	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	1254	Final Depth to Water:	27.51	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**

New sampling extension cut. Check base of well  
Sediment visible → purge approx 4 gallons H<sub>2</sub>O



**WELL MONITORING DATA SHEET**

	Well ID:	MW-24i	Job Number:	
	Client:	NuStar Van	Date:	3/3
	Project:	GLM 1021	Sampler:	AW
	Weather:	Sun	Time In/Out:	1345-1440

WELL DATA						
Monument Type:	Flush-mount/Stick-up <i>Other:</i>	Well Diameter:	2"	Depth to Free Product:	—	
Monument Condition:	ok	Well Depth:	—	Free Product Thickness:	—	
Well Cap Lock Present:	Yes No	Depth to Water:	26.91	Water Column Length:	—	
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:		ISF low flow			Pump Intake Depth:		60'			
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	
1356			26.91	.2	7.93	14.22	293	6.72	-158.1	clear
1359			↓	↓	7.65	13.74	288	10.87	-85.0	↓
1402			↓	↓	7.37	13.62	192	7.36	-49.5	↓
1405			↓	↓	7.23	13.56	170	7.09	-28.6	↓
1408			↓	↓	6.99	13.52	141	6.80	-1.1	↓
1411			↓	↓	6.93	13.50	136	6.51	10.0	↓
1414			↓	↓	6.90	13.50	133	6.41	22.2	↓

PURGING DATA							
Sample ID:	MW-24i	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex No		
Sample Time:	1414	Final Depth to Water:	26.91	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	Rsh/TOC	—	—	—	—	—
1x 250	H2SO4	NO2/3	—	—	—	—	—
1x 250	—	NH3	—	—	—	—	—

**NOTES/ADDITIONAL COMMENTS**

**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-26</u>	Job Number:
	Client: <u>NuStar Van</u>	Date: <u>3/4/10</u>
	Project: <u>Gwm 1921</u>	Sampler:
	Weather: <u>Pt cloud</u>	Time In/Out: <u>730-820</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>26.04</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>37'</u>								
Sampling Method: <u>lowflow</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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
742			26.04	.2	6.32	10.09	1690	21.11	108.0	clear
745			↓	↓	6.13	11.13	3593	8.23	119.3	
748			↓	↓	6.12	11.77	3925	6.65	118.2	
751			↓	↓	6.07	12.08	4129	5.73	120.9	
754			↓	↓	5.94	12.75	4193	2.20	131.6	
757			↓	↓	5.87	12.96	4200	2.06	138.3	
800			↓	↓	5.85	13.03	4219	1.97	141.5	

**PURGING DATA**

Sample ID: <u>MW-26</u>	Sampling Flow Rate: <u>.2</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>800</u>	Final Depth to Water: <u>26.04</u>	Did Well Dewater: <u>No</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<u>3x 40</u>	<u>HCl</u>	<u>VOC</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
<u>2x 40</u>	<u>HCl</u>	<u>Rsh</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
<u>1x 250</u>	<u>H<sub>2</sub>SO<sub>4</sub></u>	<u>Nb2/3</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
<u>1x 250</u>	<u>—</u>	<u>NH<sub>3</sub></u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**

 <b>Cascadia</b> Associates, LLC	Well ID: <u>M6MS1-60</u>	Job Number:	
	Client: <u>Nu Star Van</u>	Date: <u>3/4</u>	
	Project: <u>GWTM 1021</u>	Sampler: <u>AW</u>	
	Weather: <u>Pt Sun</u>	Time In/Out: <u>825 - 900</u>	

**WELL DATA**

Monument Type: <u>Flush-mount/Slick-up</u> <small>Other: _____</small>	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 <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth to Water: <u>25.90</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>Perv</u>		Pump Intake Depth: _____		Tubing Material & Type: <u>MJ LDPE</u>		NEW <input type="checkbox"/> <b>DEDICATED</b> <input checked="" type="checkbox"/>				
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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
<u>835</u>			<u>25.90</u>	<u>.2</u>	<u>6.11</u>	<u>11.12</u>	<u>3123</u>	<u>6.69</u>	<u>127.6</u>	<u>clear</u>
<u>838</u>					<u>6.25</u>	<u>12.06</u>	<u>1520</u>	<u>2.00</u>	<u>109.8</u>	
<u>841</u>					<u>6.40</u>	<u>12.38</u>	<u>880</u>	<u>1.42</u>	<u>104.8</u>	
<u>844</u>					<u>6.69</u>	<u>12.61</u>	<u>271</u>	<u>1.19</u>	<u>101.7</u>	
<u>847</u>					<u>6.76</u>	<u>12.70</u>	<u>252</u>	<u>1.10</u>	<u>101.0</u>	
<u>850</u>					<u>6.78</u>	<u>12.76</u>	<u>246</u>	<u>1.01</u>	<u>99.7</u>	

**PURGING DATA**

Sample ID: <u>M6MS1-60</u>	Sampling Flow Rate: <u>.2</u>	Analytical Laboratory: <u>Aper</u>				
Sample Time: <u>850</u>	Final Depth to Water: <u>25.90</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**

 <b>Cascadia</b> Associates, LLC	Well ID:	MGMS1-40	Job Number:	
	Client:	Nu Star over Veum	Date:	3/4/15
	Project:	GWM 1A21	Sampler:	AW
	Weather:	P+Sun	Time In/Out:	900-940

**WELL DATA**

Monument Type:	Flush-mount/Stick-up <i>MGMS Vault</i>	Well Diameter:	-	Depth to Free Product:	-
Monument Condition:		Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	Yes No	Depth to Water:	26.19	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:		<i>Peri low flow</i>			Pump Intake Depth:		<i>M5</i>		NEW / <u>DEDICATED</u>	
Sampling Method:					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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
907			26.19	.15	5.86	12.24	1225	4.89	37.6	clear
910					6.70	12.67	1621	2.63	-3.6	
913					6.69	12.85	1732	1.78	-11.1	
916					6.66	13.06	1902	1.50	-17.9	
919					6.66	13.11	1983	1.46	-22.8	

**PURGING DATA**

Sample ID:	<i>MGMS1-40</i>	Sampling Flow Rate:	<i>.15</i>	Analytical Laboratory:	<i>Apex No</i>	
Sample Time:	<i>919</i>	Final Depth to Water:	<i>26.19</i>	Did Well Dewater:		
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>2x 40</i>	<i>HCl</i>	<i>RSK</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

 <b>Cascadia</b> Associates, LLC	Well ID:	MGMS2-60	Job Number:	
	Client:	Nu Star Van	Date:	3/4
	Project:	GWM 1Q21	Sampler:	9W
	Weather:	P+Sun	Time In/Out:	9:40 - 10:10

WELL DATA

Monument Type:	Flush-mount/Stick-up Other: MGMS Vault	Well Diameter:	—	Depth to Free Product:	—
Monument Condition:		Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	25.61	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:		Peri low flow		Pump Intake Depth:		MS 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	
946			25.61	.2	6.66	13.20	1345	10.78	-15.3	clear
949			↓	↓	6.68	13.56	879	7.79	-7.0	↓
952			↓	↓	6.71	13.81	409	7.23	5.3	↓
955			↓	↓	6.71	13.92	187	6.74	30.1	↓
958			↓	↓	6.71	14.00	171	6.53	39.5	↓
1001			↓	↓	6.71	14.00	166	6.41	42.5	↓

PURGING DATA

Sample ID:	MGMS2-60	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex No
Sample Time:	1001	Final Depth to Water:	25.61	Did Well Dewater:	
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:	MGMS2-40	Job Number:	
Client:	Nuster Van	Date:	3/4
Project:	GWM 1021	Sampler:	405
Weather:	Pt Sun	Time In/Out:	1015 - 1050

**WELL DATA**

Monument Type:	Flush-mount/Stick-up Other: MGMS Van H	Well Diameter:	-	Depth to Free Product:	-
Monument Condition:		Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	Yes No	Depth to Water:	26.42	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 low flow			Pump Intake Depth:	MS		NEW / DEDICATED			
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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1015			26.42	.2	6.85	11.02	773	9.45	70.8	clear
1018					6.85	14.27	1160	3.60	29.7	
1021					6.84	14.30	1290	2.70	2.0	
1024					6.84	14.37	1339	2.32	-10.7	
1027					6.85	14.41	1351	2.10	-14.9	
1030					6.85	14.43	1360	1.97	-19.5	

**PURGING DATA**

Sample ID:	MGMS2-40	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1030	Final Depth to Water:	26.42	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				

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MGMS3-60	Job Number:	
Client:	Nu Star Van	Date:	3/4
Project:	GLSM 1021	Sampler:	AW
Weather:	P + Sun Windy	Time In/Out:	1110 - 1145

**WELL DATA**

Monument Type:	Flush-mount/Stick-up Other: <u>MGMS Vault</u>	Well Diameter:	—	Depth to Free Product:	—
Monument Condition:		Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	24.73	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:	<u>Peri low flow</u>	Pump Intake Depth:	<u>MS</u>
Sampling Method:		Tubing Material & Type:	<u>LDPE</u>

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
1118			24.73	.2	6.87	14.63	945	18.23	-18.0	clear
1121					6.84	14.37	365	8.85	1.2	
1124					6.78	14.12	178	8.14	27.9	
1127					6.78	14.14	185	7.64	48.6	
1130					6.80	14.07	144	7.57	52.4	
1133					6.79	14.05	143	7.40	59.2	

**PURGING DATA**

Sample ID:	MGMS3-60	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1133	Final Depth to Water:	24.73	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:	MGMS3-40	Job Number:	—
Client:	Nu Star Van	Date:	—
Project:	GWM 1921	Sampler:	—
Weather:	Pt Sun - Wind	Time In/Out:	—

**WELL DATA**

Monument Type:	Flush-mount/Stick-up Other: <i>MGMS Van H</i>	Well Diameter:	—	Depth to Free Product:	—
Monument Condition:		Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	24.67	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:	<i>Peri low flow</i>				Pump Intake Depth:	<i>M/S</i>				
Sampling Method:					Tubing Material & Type:	<i>LDPE</i>			NEW / <b>DEDICATED</b>	
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	
1149			24.67	.2	6.78	14.98	234	13.50	-50.7	clear
1152			↓	↓	6.72	14.94	429	5.48	-125.7	↓
1155					6.71	15.02	463	3.93	-134.4	
1158					6.70	15.07	462	3.30	-136.0	
1201					6.68	15.10	463	3.19	-136.6	
1204					6.68	15.06	460	2.96	-137.2	

**PURGING DATA**

Sample ID:	MGMS3-40	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1204	Final Depth to Water:	24.67	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2x 40	HCl	ROK	—	—	—	—
3x 40	HCl	VOC	—	—	—	—
1x 250	—	NH3	—	—	—	—
1x 250	H2SO4	NO2/3	—	—	—	—
3x 40	HCl	VOC	—	—	—	MGMS3-40 Dup

**NOTES/ADDITIONAL COMMENTS**

1x 250	—	NH3	—	—	—	MGMS3-40 Dup
1x 250	H2SO4	NO2/3	—	—	—	MGMS3-40 Dup



**WELL MONITORING DATA SHEET**



Well ID:	MW-1	Job Number:	
Client:	Nix Star Van	Date:	3/4
Project:	GWM 1821	Sampler:	dw
Weather:	cloudy	Time In/Out:	1300

**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:	25.80	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:	GP	Pump Intake Depth:	32'
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	
1329			25.80	.25	8.70	16.34	4346	3.30	-157.1	cloudy
1328					8.51	16.02	4561	2.03	-133.1	
1331					8.44	15.92	4284	1.34	-109.0	
1334					8.43	15.76	3654	.75	-77.5	
1337					8.44	15.76	3360	.72	-64.1	
1340					8.47	15.76	3281	.69	-56.3	
1343					8.46	15.78	3214	.66	-51.7	

**PURGING DATA**

Sample ID:	MW-1	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	1343	Final Depth to Water:	25.80	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**

 <b>Cascadia</b> Associates, LLC	Well ID: <u>MW-3</u>	Job Number:	
	Client: <u>New Star Veen</u>	Date: <u>3/4</u>	
	Project: <u>GW M 1Q21</u>	Sampler: <u>4L3</u>	
	Weather: <u>Cloudy</u>	Time In/Out: <u>1400</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>ok</u>	Well Depth: <u>—</u>	Free Product Thickness: <u>—</u>	
Well Cap Lock Present: <u>Yes</u> No	Depth to Water: <u>26.71</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>32'</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 (ppm)	ORP (mV)	Clarity/Color	Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV		
1412			26.71	.2	8.42	15.25	1201	6.50	-11.7	clear	
1415			↓	↓	6.91	13.92	577	4.14	26.4		
1418			↓	↓	6.64	13.73	480	4.62	38.7		
1421			↓	↓	6.46	13.72	395	5.36	56.2		
1424			↓	↓	6.39	13.76	379	5.88	66.5		
1427			↓	↓	6.37	13.77	376	5.69	71.1		

**PURGING DATA**

Sample ID: <u>MW-3</u>	Sampling Flow Rate: <u>.2</u>	Analytical Laboratory: <u>Apex</u>	
Sample Time: <u>1427</u>	Final Depth to Water: <u>26.71</u>	Did Well Dewater: <u>No</u>	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered   Filter Size   MS/MSD   Duplicate ID
<u>3x 40</u>	<u>HCl</u>	<u>VOL</u>	<u>—</u>
<u>1x 250</u>	<u>H2SO4</u>	<u>NO2/3</u>	<u>—</u>
<u>1x 250</u>	<u>—</u>	<u>NH3</u>	<u>—</u>

**NOTES/ADDITIONAL COMMENTS**

Vanc Main


Date: 6/14/21  
Permit:

Rain, 57°F

	DTP:	DTW:	Product Thickness:	Notes:
1016		25.36		
1048		26.34		
1011		24.24		
19 1006		26.29		
MP-1 1001		26.55		
MW-7 1054		26.30		
MW-9 1103		26.52		
MW-13 1114		25.89		
S-2 1000	-	26.02	-	
MW-17 1015	-	25.00	-	
MW-14 1012	-	26.56	-	
MW-26 1027	-	26.48	-	
MW-10 907		27.02		
MW-8 1059		26.33		
MW-32s 845		26.93		
MW-16 932		25.75		
MW-15 1052	-	31.76	-	
MW-F 1049	-	27.00	-	
MW-2 1032	-	26.88	-	
MW-6 1036	-	25.44	-	
EW-1 1027		23.92		
MW-3 1021		<del>26.51</del> 26.51		← 26.51
MGMS3-40 NM	-	NM	-	Not good - didn't have skinny probe
MGMS3-60	↓	↓	↓	↓
MGMS3-101	↓	↓	↓	↓
MGMS3-132	↓	↓	↓	↓



**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-8</u>	Job Number:
	Client: <u>Mustee Water Main</u>	Date: <u>2/16/21</u>
	Project: <u>2021</u>	Sampler:
	Weather: <u>Sunny</u>	Time In/Out:

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	<u>4"</u>	Depth to Free Product:	—
	Other: <u>New</u>	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	<u>good</u>	Depth to Water:	<u>20.66</u>	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:		<u>per low flow</u>			Pump Intake Depth:		<u>mid screen</u>				
Sampling Method:					Tubing Material & Type:		<u>SR</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>1034</u>			<u>20.66</u>	<u>0.2</u>	<u>6.22</u>	<u>18.72</u>	<u>1812</u>	<u>12.28</u>	<u>27.8</u>		<u>clear</u>
<u>1037</u>			↓	↓	<u>6.20</u>	<u>17.11</u>	<u>1860</u>	<u>7.61</u>	<u>52.3</u>		↓
<u>1040</u>			↓	↓	<u>6.08</u>	<u>16.84</u>	<u>1888</u>	<u>2.33</u>	<u>74.7</u>		↓
<u>1043</u>			↓	↓	<u>6.19</u>	<u>16.84</u>	<u>1890</u>	<u>2.15</u>	<u>81.2</u>		↓
<u>1046</u>			↓	↓	<u>6.19</u>	<u>16.83</u>	<u>1892</u>	<u>2.18</u>	<u>85.2</u>		↓
<u>1049</u>											

**PURGING DATA**

Sample ID: <u>MW-8</u>	Sampling Flow Rate: <u>0.2</u>	Analytical Laboratory: <u>APex</u>				
Sample Time: <u>1050</u>	Final Depth to Water:	Did Well Dewater:				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
<u>3x40</u>	<u>H2O</u>	<u>UCL</u>				
<u>1x20</u>	—	<u>DOZINS</u>				
<u>1x20</u>	<u>H2SO4</u>	<u>NDS</u>				

**NOTES/ADDITIONAL COMMENTS**

**WELL MONITORING DATA SHEET**



Well ID:	MW-21i-40	Job Number:	
Client:	Nustae JAT	Date:	6/16/21
Project:	2621	Sampler:	WJ
Weather:	Sunny	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	24	Depth to Free Product:	-
	Other: <u>New</u>	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	<u>good</u>	Depth to Water:	27.52	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:		Pump Intake Depth:		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	
1109			27.52	0.2	6.50	18.85	1462	2.811	88.3	clear
1112			↓	↓	6.50	18.72	712	13.11	86.5	↓
1115			↓	↓	6.48	18.35	368	4.60	91.0	↓
1118			↓	↓	6.52	18.33	321	3.93	92.1	↓
1121			↓	↓	6.60	18.31	303	3.27	90.4	↓
1124			↓	↓	6.63	18.34	303	2.15	88.9	↓
1127			↓	↓	6.62	18.36	304	1.96	88.6	↓
1130			↓	↓	6.63	18.40	317	1.74	88.1	↓

**PURGING DATA**

Sample ID:	MW-21i-40	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apey	
Sample Time:	1130	Final Depth to Water:	27.52	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x16	HCl	VOCs				
1x258	-	NBZINB3				
1x250	H2SO4	NH3				

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**

	Well ID:	MGM3-40	Job Number:	
	Client:	NW State VNW	Date:	6/16/21
	Project:	2021	Sampler:	LW
	Weather:	Sunny	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:	quad	Depth to Water:	25.08	Water Column Length:	—
Well Cap Lock Present:	Yes No <u>N/A</u>	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:		Peri Pump low flow			Pump Intake Depth:		Mid Screen			
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 (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1205			25.08	0.2	6.99	20.89	2	18.11	32.2	clear
1208			↓	↓	6.71	18.39	448	3.16	-152.7	↓
1211			↓	↓	6.73	18.30	447	2.11	-153.2	
1214			↓	↓	6.74	18.28	447	0.97	-153.9	
1217			↓	↓	6.74	17.76	444	0.85	-151.4	
1220			↓	↓	6.75	17.81	444	0.77	-154.1	
1223			↓	↓	6.75	17.67	443	0.74	-152.3	

**PURGING DATA**

Sample ID:	MGM3-40	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex	
Sample Time:	1920	Final Depth to Water:	25.08	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOCs	—	—	—	✓ MGM3-40
1x250	H2SO4	NH3	—	—	—	↓
1x250	—	NO2/NO3	—	—	—	↓
2x40	HCl	RSK/TOC	—	—	—	—

**NOTES/ADDITIONAL COMMENTS**

**WELL MONITORING DATA SHEET**



Well ID:	MCM53-60	Job Number:	
Client:	N-Star (AN)	Date:	6/16/21
Project:	2021	Sampler:	LV
Weather:	Sunny	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	-	Depth to Free Product:	-
	Other: <u>FLUSH MOUNT</u>	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	<u>good</u>	Depth to Water:	25.22	Water Column Length:	-
Well Cap Lock Present:	Yes <u>No</u> <u>N/A</u>	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>Dee</u>			Pump Intake Depth:		<u>Mid Screen</u>			
Sampling Method:		<u>Low flow</u>			Tubing Material & Type:		<u>LDPE</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	
1235			25.22	0.2	6.77	18.97	367	2.44	-141.6	clear
1238			↓	↓	6.95	17.74	213	3.84	-70.9	↓
1241		6.96			17.75	184	4.47	-74.6		
1244		7.00			17.72	173	4.65	-35.1		
1247		7.04			17.70	162	4.90	-26.0		
1250		7.06			17.99	157	5.27	-20.7		
1253					7.10	17.90	156	5.36	-10.5	
1256					7.12	17.93	154	5.61	-10.9	

**PURGING DATA**

Sample ID:	MCM53-60	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex
Sample Time:	1250	Final Depth to Water:	25.22	Did Well Dewater:	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD    Duplicate ID
3x40	HCl	HVCL5			
1x250	H2SM	NH3			
1x250	-	NO2/NO3			

**NOTES/ADDITIONAL COMMENTS**




**WELL MONITORING DATA SHEET**



Well ID:	MGM53-101	Job Number:	
Client:	NWSTEE VAN	Date:	6/16/21
Project:	2Q21	Sampler:	LW
Weather:	Sunny	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:	25.32	Water Column Length:	-
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	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:		Peri pump			Pump Intake Depth:		Mid Screen			
Sampling Method:		Low flow			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	
1304			25.32	0.2	6.88	19.12	236	4.24	-81.0	clear
1307			↓	↓	7.00	18.24	201	3.01	-71.9	↓
1310			↓	↓	7.25	17.32	186	1.73	-64.2	↓
1313			↓	↓	7.27	17.16	185	1.80	-57.2	↓
1316			↓	↓	7.27	17.21	184	1.75	-51.0	↓
1319										

**PURGING DATA**

Sample ID:	MGM53-101	Sampling Flow Rate:		Analytical Laboratory:	Apex	
Sample Time:	1320	Final Depth to Water:		Did Well Dewater:		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	H21	VOCs				
1x250	-	NO2/NO3				
1x200	H2SO4	NH3				

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MGM51-43	Job Number:	
Client:	NHSTAR (AK)	Date:	6/16/21
Project:	2021	Sampler:	LW
Weather:	Sunny	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:	26.14	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:		Pump Intake Depth:		NEW / DEDICATED						
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 (mg/L)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1330			26.14	0.2	7.22	20.72	301	11.12	-65.6	clear
1333			↓	↓	6.70	21.69	2560	1.86	-62.2	↓
1336			↓	↓	6.70	22.07	2660	1.23	-65.7	↓
1339			↓	↓	6.68	22.19	2700	0.76	-69.3	↓
1342			↓	↓	6.68	22.20	2864	0.62	-70.4	↓
1345			↓	↓	6.68	22.22	2814	0.58	-71.8	↓

**PURGING DATA**

Sample ID:	MGM51-43	Sampling Flow Rate:	0.2	Analytical Laboratory:	APEX	
Sample Time:	1345	Final Depth to Water:	26.14	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				
2x40	HCl	AsK/TOC				

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**

	Well ID:	MGMS1-60	Job Number:	
	Client:	Nustar Udy	Date:	6/16/24
	Project:	2021	Sampler:	CS
	Weather:	Sunny	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:	Good	Depth to Water:	26.75	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:		Pump Intake Depth:			Tubing Material & Type:					
Sampling Method:		Mid screen			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	
1401			26.75	0.2	6.74	19.87	1521	1.36	-500	clear
1404					6.78	18.52	758	2.03	-43.6	
1407					6.96	18.18	267	2.49	-20.7	
1410					6.96	18.01	222	2.82	-7.4	
1413					9.02	17.89	174	2.74	520	
1416					7.01	17.93	172	2.81	6.1	
1419										

**PURGING DATA**

Sample ID:	MGMS1-60	Sampling Flow Rate:	0.2	Analytical Laboratory:	APLX	
Sample Time:	1420	Final Depth to Water:	26.75	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	HVOLS				
1x250	H2SO4	NH3				
1x250		NO2/NO3				

**NOTES/ADDITIONAL COMMENTS**

**WELL MONITORING DATA SHEET**



**Cascadia  
Associates, LLC**

Well ID:	MGMS1-110	Job Number:	
Client:	Mustar JAN	Date:	6/16/21
Project:	2021	Sampler:	LD
Weather:	Sunny	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:	good	Depth to Water:	26.81	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
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		
1440			26.81	0.2	6.83	20.73	718	9.67	-41.3	clear	
1443					6.84	19.57	450	9.58	-11.2		
1446			↓	↓	6.93	18.92	228	0.79	6.5	↓	
1449					6.99	18.81	215	0.59	8.1		
1452			↓	↓	7.00	18.79	213	0.53	10.1	↓	
1455			↓	↓	7.01	18.74	212	0.49	12.8	↓	

**PURGING DATA**

Sample ID:	MGMS1-110	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex	
Sample Time:	1700	Final Depth to Water:	26.81	Did Well Dewater:		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOCs				
1x250	H2SO4	NH3				
1x250	—	NH2/NH3				

**NOTES/ADDITIONAL COMMENTS**

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	EW-1	Job Number:	
Client:	NSTAR VAN MAAN	Date:	6/16/21
Project:	2Q21 GWM	Sampler:	LW
Weather:	overcast	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	-
	Other: <i>New Monument Lid.</i>	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	<i>Good</i>	Depth to Water:	24.68	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>Bladder Pump peri</i>			Pump Intake Depth:	<i>Mid Screen</i>					
Sampling Method:	<i>Low Flow</i>			Tubing Material & Type:	<i>SKIP Ganded</i>				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	
841			24.64	0.2	6.50	15.92	443	12.11	43.4	slt cloudy
844			↓	↓	6.48	15.18	433	8.91	89.6	clear
847			↓	↓	6.46	15.18	429	8.47	98.8	" "
850			↓	↓	6.46	15.12	424	8.16	101.7	↓
853			↓	↓	6.47	15.20	417	8.24	108.5	↓
856			↓	↓	6.46	15.20	417	8.29	109.6	

**PURGING DATA**

Sample ID:	EW-1	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex
Sample Time:	900	Final Depth to Water:	24.64	Did Well Dewater:	NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
1x250	-	NO2/NO3			
1x250	H2SO4	HA3			
3x40	H24	VALS			

**NOTES/ADDITIONAL COMMENTS**

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-5	Job Number:	
Client:	Mustard Hill Marina	Date:	6/16/21
Project:	2021	Sampler:	LM
Weather:	Sunny	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	0
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	26.58	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:	Pec. Well Flow			Pump Intake Depth:	mid screen					
Sampling Method:				Tubing Material & Type:	Skip bonded		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	
925			26.58	0.2	6.19	29.73	418	18.80	-22.1	clear
928			↓	↓	6.18	24.92	446	3.13	-50.0	↓
931			↓	↓	6.17	28.82	486	0.97	-76.0	↓
934			↓	↓	6.15	29.07	488	6.71	-76.7	↓
937			↓	↓	6.15	29.28	491	0.60	-70.7	↓
940					6.14	29.27	491	0.61	-70.6	

**PURGING DATA**

Sample ID:	MW-5	Sampling Flow Rate:	0.2	Analytical Laboratory:	APOL	
Sample Time:	940	Final Depth to Water:	26.58	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x10	H2O	VOCs				
1x250	H2SO4	MH3				
1x250	—	NO2/NO3				

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**



Well ID: <del>MW-8</del> MW-16	Job Number:
Client: <del>Nistar Jan</del>	Date: 6/16/21
Project: 2021	Sampler: LW
Weather: Sunny	Time In/Out:

**WELL DATA**

Monument Type:	Flush mount/Stick-up	Well Diameter:	44	Depth to Free Product:	—
	Other: <del>Stick-up</del> <b>New Monument</b>	Well Depth:	—	Free Product Thickness:	—
Monument Condition:		Depth to Water:	26.50	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:	<b>Peri pump monitoring</b>			Pump Intake Depth:	<b>Mid Screen</b>					
Sampling Method:				Tubing Material & Type:	<b>SB</b>		NEW <b>DEDICATED</b>			
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	
957			26.50	0.2	6.37	17.07	672	10.18	-30.7	clear
1000			↓	↓	6.42	15.79	561	3.20	-7.7	↓
1003			↓	↓	6.46	15.55	542	2.46	17.8	↓
1006			↓	↓	6.46	15.54	525	2.20	23.8	↓
1009			↓	↓	6.46	15.47	520	1.99	32.8	↓
1012			↓	↓	6.46	15.46	519	1.90	35.9	↓
1015			↓	↓	6.46	15.55	522	1.68	42.4	↓
1018			↓	↓	6.46	15.54	523	1.64	43.1	↓

**PURGING DATA**

Sample ID: <del>MW-8</del> MW-16	Sampling Flow Rate:	0.2	Analytical Laboratory:	APL		
Sample Time: 1020	Final Depth to Water:	26.50	Did Well Dewater:	NO		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	H2O	DOC				
1x250	H2SO4	NH3				
1x250	—	NH2/NH3				

**NOTES/ADDITIONAL COMMENTS**


WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-17	Job Number:	
Client:	NuStar Van	Date:	6/15
Project:	GWSM 2021	Sampler:	
Weather:	Cloudy 50°	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:	25.27	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments: Vault - dry

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: Mid Screen 35'

Sampling Method: NEW / DEDICATED

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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
834			25.27	.3	8.67	15.15	761	29.19	-51.5	clear
837			↓	↓	7.45	14.68	742	19.35	-4.9	↓
840			↓	↓	6.59	13.99	720	12.11	4.6	↓
843			↓	↓	6.40	13.86	719	15.62	11.5	↓
846			↓	↓	6.37	13.85	717	12.51	10.1	↓
849			↓	↓	6.35	13.83	714	12.40	7.4	↓

PURGING DATA

Sample ID:	MW-17	Sampling Flow Rate:	.3	Analytical Laboratory:	Apex	
Sample Time:	849	Final Depth to Water:	25.27	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

VOAs inverted no headspace @ 855



**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-14	Job Number:	
Client:	Nu Star	Date:	6/15
Project:	62M2021	Sampler:	gaw
Weather:	PT Sun	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up Other: <u>good</u>	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:	26.63	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 low flow	Pump Intake Depth:	Midscreen 35"
Sampling Method:		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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
915			26.63	.25	5.74	16.90	2130	26.37	-9.1	clear
918					6.02	17.80	2394	13.32	-9.8	
921					6.07	17.39	2387	9.60	-13.0	
924					6.10	16.01	2308	7.71	-17.7	
927					6.11	15.64	2894	7.57	-20.2	
930					6.13	15.57	2285	7.40	-21.8	
933					6.13	15.52	2279	7.35	-23.0	

**PURGING DATA**

Sample ID:	MW-14	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	93	Final Depth to Water:	26.63	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				
2x40	HCl	Rsk				

**NOTES/ADDITIONAL COMMENTS**

VOAs no headspace @ 940

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	S-2	Job Number:	
Client:	Nu Star Van	Date:	10/15
Project:	GWM 202	Sampler:	JW
Weather:	PT Sun 60°	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:	26.29	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	Pump Intake Depth:	Mid Screen 45'
Sampling Method:	constant	Tubing Material & Type:	8B 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	
956			26.29	.25	6.16	16.95	2037	35.10	-17.1	cloudy
959			↓	↓	6.11	15.95	1971	9.75	-19.9	↓
1002			↓	↓	6.08	15.27	1915	6.80	-23.6	↓
1005			↓	↓	6.10	14.34	1879	6.55	-31.4	↓
1008			↓	↓	6.09	14.32	1851	6.49	-32.8	↓
1011			↓	↓	6.08	14.24	184	6.59	-35.7	↓

**PURGING DATA**

Sample ID:	S-2	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	1011	Final Depth to Water:	26.29	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/S				
1x250	-	NH3				

**NOTES/ADDITIONAL COMMENTS**

VIA checked no headspace 1020

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	S-1	Job Number:	
Client:	Nustar	Date:	6/15
Project:	GWSM 202	Sampler:	AW
Weather:	Partly sun	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/stick-up Other:	Well Diameter:	2"	Depth to Free Product:	—
Monument Condition:	good - vault	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	25.89	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 Low Flow				Pump Intake Depth:	Midscreen 69'				
Sampling Method:					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)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1035			25.89	.2	8.20	17.22	1343	30.09	-67.0	clear
1038			↓	↓	6.21	16.81	1103	17.84	-39.4	↓
1041			↓	↓	6.20	16.05	392	8.42	-42.2	↓
1044			↓	↓	6.20	15.17	326	7.32	-58.6	↓
1048			↓	↓	6.18	14.83	199	7.04	-65.3	↓
1051			↓	↓	6.21	14.72	185	7.40	-67.0	↓
1054			↓	↓	6.22	14.59	180	7.31	-67.1	↓

**PURGING DATA**

Sample ID:	S-1	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1054	Final Depth to Water:	25.89	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**

VOA no headspace 1100

**WELL MONITORING DATA SHEET**



Well ID:	MW-10	Job Number:	
Client:	Nu Star Van	Date:	6/15
Project:	GWM 2021	Sampler:	TLW
Weather:	PT Sun 65	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 vault	Depth to Water:	27.40	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 low flow	Pump Intake Depth:	Mid Screen 35'
Sampling Method:		Tubing Material & Type:	8B 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	
1117			27.40	.35	5.57	17.20	2632	20.15	16.9	decon
1120				.2	6.52	16.42	3478	4.72	13.0	
1131					6.40	16.00	3402	4.41	23.1	
1134					6.16	14.48	3381	4.65	29.3	
1137					6.10	14.30	3314	4.52	31.3	
1140					6.09	14.28	3302	4.45	32.0	


**PURGING DATA**

Sample ID:	MW-10	Sampling Flow Rate:	2	Analytical Laboratory:	Apex
Sample Time:	1140	Final Depth to Water:	27.40	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**

VOL no head space @ 1145

**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-9</u>	Job Number:	Date: <u>6/15</u>
	Client: <u>New Star Van</u>	Date:	Sampler: <u>AL</u>
	Project: <u>QSM 2021</u>	Weather: <u>Sun 75°</u>	Time In/Out:

**WELL DATA**

Monument Type:	Flush-mount/Stick-up <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:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth to Water: <u>26.62</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>Midscreen 35'</u>								
Sampling Method: <u>low flow</u>		Tubing Material & Type: <u>30</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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
<u>1210</u>			<u>26.62</u>	<u>.3</u>	<u>6.42</u>	<u>16.79</u>	<u>2410</u>	<u>20.14</u>	<u>165.1</u>	<u>clear</u>
<u>1213</u>			↓	↓	<u>6.31</u>	<u>14.61</u>	<u>1574</u>	<u>7.06</u>	<u>202.0</u>	↓
<u>1216</u>			↓	↓	<u>6.20</u>	<u>13.63</u>	<u>1292</u>	<u>6.50</u>	<u>200.3</u>	↓
<u>1219</u>			↓	↓	<u>6.19</u>	<u>13.28</u>	<u>1281</u>	<u>6.30</u>	<u>220.9</u>	↓
<u>1222</u>			↓	↓	<u>6.20</u>	<u>13.17</u>	<u>1277</u>	<u>6.25</u>	<u>218.1</u>	↓
<u>1225</u>			↓	↓	<u>6.21</u>	<u>13.07</u>	<u>1265</u>	<u>6.21</u>	<u>217.0</u>	↓

**PURGING DATA**

Sample ID: <u>MW-9</u>	Sampling Flow Rate: <u>.3</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1225</u>	Final Depth to Water: <u>26.62</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:	<i>MW-22i</i>	Job Number:	
Client:	<i>NuStar Van</i>	Date:	<i>6/15</i>
Project:	<i>GWM 2021</i>	Sampler:	
Weather:	<i>Sun 75°</i>	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	<i>2"</i>	Depth to Free Product:	<i>—</i>
	Other:	Well Depth:	<i>—</i>	Free Product Thickness:	<i>—</i>
Monument Condition:	<i>Good</i>	Depth to Water:	<i>27.81</i>	Water Column Length:	<i>—</i>
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	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>BP low flow</i>	Pump Intake Depth:	<i>Midscreen 50'</i>
Sampling Method:		Tubing Material & Type:	<i>SB</i> 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	
<i>1250</i>			<i>27.81</i>	<i>.3</i>	<i>5.61</i>	<i>19.26</i>	<i>812</i>	<i>8.36</i>	<i>-37.4</i>	<i>clear</i>
<i>1253</i>					<i>6.10</i>	<i>17.35</i>	<i>524</i>	<i>5.06</i>	<i>-38.6</i>	
<i>1256</i>					<i>6.14</i>	<i>16.97</i>	<i>462</i>	<i>4.34</i>	<i>-57.1</i>	
<i>1259</i>					<i>6.29</i>	<i>16.68</i>	<i>394</i>	<i>3.88</i>	<i>-107.2</i>	
<i>1302</i>					<i>6.27</i>	<i>16.85</i>	<i>370</i>	<i>3.79</i>	<i>-101.3</i>	
<i>1305</i>					<i>6.27</i>	<i>16.90</i>	<i>390</i>	<i>3.72</i>	<i>-96.5</i>	

**PURGING DATA**

Sample ID:	<i>MW-22i</i>	Sampling Flow Rate:	<i>.3</i>	Analytical Laboratory:	<i>Apex</i>
Sample Time:	<i>1305</i>	Final Depth to Water:	<i>27.81</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>1x 250</i>	<i>H2SO4</i>	<i>NO2/3</i>	<i>—</i>	<i>—</i>	<i>—</i>
<i>1x 250</i>	<i>—</i>	<i>NH3</i>	<i>—</i>	<i>—</i>	<i>—</i>

**NOTES/ADDITIONAL COMMENTS**

*VOA no headspace @ 1315*

WELL MONITORING DATA SHEET



Well ID:	MW-21-105	Job Number:	
Client:	Nu Star Van	Date:	6/15
Project:	GWSM 202	Sampler:	
Weather:	Sun 80°	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:	27.47	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:	Mid screen - 102
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 (ppm)	ORP (mV)	NEW / DEDICATED	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV		
1330			27.47	.3	4.90	21.04	414	24.94	66.4		Clear
1340				.2	7.95	19.70	392	15.45	52.2		
1343					6.85	19.07	380	7.30	35.5		
1346					6.14	18.10	337	4.77	38.8		
1349					5.92	18.37	362	6.04	8.2		
1352					5.89	18.25	364	5.98	5.0		
1355					5.91	18.34	367	5.74	3.5		

PURGING DATA

Sample ID:	MW-21-105	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1355	Final Depth to Water:	27.47	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	—	NA3	—	—	—	—

NOTES/ADDITIONAL COMMENTS

3-point pH calibration  
VOA no headspace @ 1400

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-13	Job Number:	
Client:	NuStar Van	Date:	6/15
Project:	GWM 2021	Sampler:	AW
Weather:	lt rain	Time In/Out:	

**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:	27.23	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:	Midscreen 35'
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	
1424			26.09	3	6.44	15.78	1142	9.41	-78.3	clear
1427			26.45		6.29	15.57	1141	6.41	-85.2	
1430			26.70		6.24	15.39	1139	5.63	-93.2	
1433			26.90		5.90	15.21	1127	4.77	-1.1	
1436			27.05		5.85	15.22	1110	4.29	7.8	
1439			27.23		5.82	15.25	1104	4.70	10.0	

**PURGING DATA**


Sample ID:	MW-13	Sampling Flow Rate:	5	Analytical Laboratory:	Apex	
Sample Time:	1439	Final Depth to Water:	27.35	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**

VOA no headspace @ 1445



**WELL MONITORING DATA SHEET**

 <b>Cascadia</b> Associates, LLC	Well ID: <u>MW-1</u>	Job Number: <u>6/16</u>
	Client: <u>Nu Star Var</u>	Date: <u>6/16</u>
	Project: <u>GWSM 2021</u>	Sampler: <u>AW</u>
	Weather: <u>PT Cloudy</u>	Time In/Out: <u>          </u>

**WELL DATA**

Monument Type: <u>Flush-mount/Stick-up</u>	Well Diameter: <u>2"</u>	Depth to Free Product: <u>—</u>
Other: <u>          </u>	Well Depth: <u>—</u>	Free Product Thickness: <u>—</u>
Monument Condition: <u>good</u>	Depth to Water: <u>26.08</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:		Sampling Method:		Pump Intake Depth:		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
<u>756</u>			<u>26.08</u>	<u>.25</u>	<u>5.22</u>	<u>15.02</u>	<u>3700</u>	<u>26.09</u>	<u>307.0</u>	<u>cloudy</u>
<u>759</u>			↓	↓	<u>5.37</u>	<u>14.89</u>	<u>3539</u>	<u>11.31</u>	<u>266.1</u>	↓
<u>802</u>			↓	↓	<u>5.79</u>	<u>14.91</u>	<u>3294</u>	<u>9.75</u>	<u>235.9</u>	<u>clear</u>
<u>805</u>			↓	↓	<u>6.19</u>	<u>14.95</u>	<u>3023</u>	<u>8.25</u>	<u>205.4</u>	↓
<u>808</u>			↓	↓	<u>6.16</u>	<u>14.90</u>	<u>3000</u>	<u>7.91</u>	<u>213.1</u>	↓
<u>811</u>			↓	↓	<u>6.12</u>	<u>14.92</u>	<u>2984</u>	<u>7.81</u>	<u>212.0</u>	↓


**PURGING DATA**

Sample ID: <u>MW-1</u>	Sampling Flow Rate: <u>.25</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>811</u>	Final Depth to Water: <u>26.08</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**

VOA no headspace @ 810

**WELL MONITORING DATA SHEET**

	Well ID: <b>MW-3</b>	Job Number:	Date: <b>6/16</b>	
	Client: <b>Nu Star Vanc</b>	Sampler:	<b>gws</b>	
	Project: <b>GWSM 2021</b>	Weather: <b>Pt Sun 70°</b>	Time In/Out:	

**WELL DATA**

Monument Type: <b>Flush-mount/Stick-up</b> <small>Other:</small>	Well Diameter: <b>2"</b>	Depth to Free Product: <b>—</b>
Monument Condition: <b>gws</b>	Well Depth: <b>—</b>	Free Product Thickness: <b>—</b>
Well Cap Lock Present: <b>Yes</b> No	Depth to Water: <b>26.79</b>	Water Column Length: <b>—</b>
	Screened Interval:	Purge Volume: <b>—</b>

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: <b>BP</b>		Pump Intake Depth: <b>Midscreen</b>		NEW <input type="checkbox"/> DEDICATED <input checked="" type="checkbox"/>						
Sampling Method: <b>low flow</b>		Tubing Material & Type: <b>SB</b>								
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	
840			26.79	2	8.26	14.70	2154	23.08	41.1	clear
843					6.90	13.79	1310	14.20	32.6	↓
846					6.97	13.19	886	8.75	30.2	
849					6.94	12.69	480	6.82	31.6	
852					6.90	12.53	416	4.19	55.1	
855					6.84	12.51	398	3.72	59.7	
858					6.83	12.49	389	3.96	60.5	
901					6.80	12.47	387	3.88	59.6	

**PURGING DATA**

Sample ID: <b>MW-3</b>	Sampling Flow Rate: <b>2</b>	Analytical Laboratory: <b>Apex</b>				
Sample Time: <b>901</b>	Final Depth to Water:	Did Well Dewater: <b>No</b>				
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**

**VOA No headspace @ 910**

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-6	Job Number:	
Client:	Nix Star Vane	Date:	6/16
Project:	GLSM 2021	Sampler:	940
Weather:	Sun 75	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/ Other: <u>stick-up</u>	Well Diameter:	2"	Depth to Free Product:	-
Monument Condition:	<u>good</u>	Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth to Water:	25.85	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 <u>low flow</u>	Pump Intake Depth:	Mid Screen 32'
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	
925			25.85	.25	5.92	13.64	390	1.82	312.3	clear
928			↓	↓	5.86	13.67	430	1.10	339.0	↓
931			↓	↓	5.80	13.49	421	1.25	387.1	↓
934			↓	↓	5.77	13.40	402	1.27	401.0	↓
937			↓	↓	5.79	13.42	410	1.22	403.6	↓
940			↓	↓	5.82	13.46	401	1.14	408.4	↓

**PURGING DATA**

Sample ID:	MW-6	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	940	Final Depth to Water:	25.85	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC				
1x200	H2SO4	NO2/NO3				
1x250	-	NH3				

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-2</u>	Job Number:	Date: <u>6/16</u>
	Client: <u>Nu Star Vanc</u>	Sampler: <u>fw</u>	
	Project: <u>GWSM 2021</u>	Time In/Out:	
	Weather: <u>Sun 80°</u>		

**WELL DATA**

Monument Type: <u>Flush-mount/Stick-up</u> <u>Other:</u>	Well Diameter: <u>2"</u>	Depth to Free Product: <u>-</u>	Free Product Thickness: <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>27.43</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>Mid Screen 35'</u>						
Sampling Method: <u>BP low flow</u>				Tubing Material & Type: <u>SB</u> NEW <input checked="" type="checkbox"/> <u>DEDICATED</u>						
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	
1000			27.43	.25	7.32	15.60	502	28.56	32.1	clear
1003				↓	5.72	15.42	668	7.50	80.2	↓
1006				↓	5.84	14.90	741	6.45	67.4	↓
1009				↓	5.90	14.10	773	5.79	45.4	↓
1012				↓	5.93	13.97	780	5.55	41.0	↓
1015				↓	5.94	13.95	787	5.46	40.7	↓


**PURGING DATA**

Sample ID: <u>MW-2</u>	Sampling Flow Rate: <u>.25</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1015</u>	Final Depth to Water: <u>-</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**

VOL no headspace @ 1020

**WELL MONITORING DATA SHEET**

 <b>Cascadia</b> Associates, LLC	Well ID:	MW-12	Job Number:	
	Client:	New Star Van	Date:	6/10
	Project:	GLSM 2021	Sampler:	70
	Weather:	Sun 80°	Time In/Out:	

WELL DATA					
Monument Type:	Push-mount/Stick-up	Well Diameter:	4"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	Good	Depth to Water:	24.79	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:	Mid Screen 3'	
Sampling Method:	low flow	Tubing Material & Type:	8B	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	
1040			24.79	.25	6.32	15.36	997	17.50	247.1	cloudy
1043			25.02	↓	6.57	16.57	1365	7.83	260.6	clear
1046			25.22	↓	6.61	15.18	1652	4.41	253.8	
1049			25.36	↓	6.64	15.06	1713	2.17	279.7	
1052			25.40	↓	6.65	15.01	1741	2.01	278.1	
1055			25.40	↓	6.67	15.09	1760	3.15	275.0	
1058			↓	↓	6.64	15.05	1765	2.99	274.0	
1101			↓	↓	6.64	15.03	1769	2.90	272.2	

PURGING DATA					
Sample ID:	MW-12	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex
Sample Time:	1101	Final Depth to Water:	25.40	Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD    Duplicate ID

3x 40	HCl	VOL	—			
2x 40	HCl	RSk	—			
1x 250	H2SO4	NO2/3	—			
1x 250	—	NH3	—			
3x 40	HCl	VOL				MW-12 Dup
1x 250	H2SO4	NO2/3				

NOTES/ADDITIONAL COMMENTS

1x 250    —    NH3    ↓

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-19	Job Number:	
Client:	Nustar Van	Date:	6/16
Project:		Sampler:	HW
Weather:		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:	26.50	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 conflow				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	
1126			26.50			21.85				clear
1140			26.50	.3	6.74	22.00	2261	12.51	354.3	clear
1143			↓	↓	6.15	17.81	2370	4.78	373.5	↓
1146			↓	↓	5.89	16.42	2395	3.47	391.5	↓
1149			↓	↓	5.90	15.96	2354	3.16	392.6	↓
1152			↓	↓	5.90	15.90	2360	3.01	390.1	↓
1155			↓	↓	5.99	15.82	2369	2.95	391.7	↓

**PURGING DATA**

Sample ID:	MW-19	Sampling Flow Rate:	.3	Analytical Laboratory:	Apex	
Sample Time:	1155	Final Depth to Water:	26.50	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	—	—	—	—
2x40	HCl	PSI	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x250	—	NH3	—	—	—	—
3x40	HCl	VOC				MW-19 Dup
1x250	H2SO4	NO2/3				↓

**NOTES/ADDITIONAL COMMENTS**

1x250	NH3					
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WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MP-1	Job Number:	
Client:	Nu Star Van	Date:	6/16
Project:	GWM 2021	Sampler:	4w
Weather:	Sun 80°	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:	26.65	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 downflow	Pump Intake Depth:	Mid Screen
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	
1232			26.65	.25	4.75	21.25	2120	19.64	285.4	clay
1235					6.10	16.85	1477	4.09	281.6	
1238					5.90	15.51	990	3.11	275.1	
1241					5.99	15.42	761	2.48	272.3	
1244					6.07	15.35	615	2.02	270.0	
1247					6.11	15.28	599	1.92	269.5	
1250					6.09	15.24	585	1.88	266.0	

PURGING DATA

Sample ID:	MP-1	Sampling Flow Rate:	25	Analytical Laboratory:	Apex
Sample Time:	1250	Final Depth to Water:	26.65	Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3 x 40	HCl	VOC			
2 x 40	HCl	RSK			
1 x 250	H2SO4	NO2/3			
1 x 250	-	NH3			

NOTES/ADDITIONAL COMMENTS

VOA - no headspace @ 1350

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-7	Job Number:	
Client:	Nu Star Van	Date:	6/14
Project:	GWSM 2021	Sampler:	765
Weather:	Sun 80°	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Stick up Other:	Well Diameter:	4"	Depth to Free Product:	-
Monument Condition:	good vault	Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	Yes No	Depth to Water:	26.48	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:	Mid Screen 35'							
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	
1318			26.48	.25	7.40	20.94	908	30.74	58.3	clear
1321			26.60	.2	5.85	18.80	1942	6.07	201.8	
1324			27.70		6.18	16.71	2383	4.65	207.7	
1327			27.81		6.14	16.05	2074	2.73	203.5	
1330			27.85		6.10	15.96	2017	2.60	196.4	
1333			27.85		6.11	15.90	2035	2.55	195.0	

PURGING DATA

Sample ID:	MW-7	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1333	Final Depth to Water:	27.85	Did Well Dewater:	INS	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x 40	HCl	VOC				
2x 40	HCl	P5h				
1x 250	H2SO4	NO2/3				
1x 250		NH3				
3x 40	HCl	VOC				MW-7 Dup
1x 250	H2SO4	NO2/3				


NOTES/ADDITIONAL COMMENTS

1x 250 → NH3 →

\* Handle East VOA no headspace @ 1340



**WELL MONITORING DATA SHEET**

	Well ID:	MW-19i	Job Number:	
	Client:	Nustar VAN	Date:	6/17/21
	Project:	2921	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:	80%	Depth to Water:	26.94	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:		Bladder Pump			Pump Intake Depth:		Mid Screen		NEW / DEDICATED	
Sampling Method:		Low Flow			Tubing Material & Type:		Skip bonded			
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	
754			26.94	0.35	7.61	17.93	224	448	29.7	clear
757			↓	↓	7.58	17.96	224	13.04	38.7	↓
800					7.54	17.86	207	12.18	42.1	
803					7.04	17.24	213	10.01	48.6	
806					6.99	17.13	225	8.02	56.0	
809					6.97	17.10	228	7.36	14.8	
812					6.95	17.13	241	6.34	4.3	
815					6.94	17.17	244	6.09	2.7	
818					6.94	17.18	245	5.98	1.3	

**PURGING DATA**

Sample ID:	MW-19i	Sampling Flow Rate:	0.25	Analytical Laboratory:	ATEX
Sample Time:	8:10	Final Depth to Water:	26.94	Did Well Dewater:	NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x40	H21	VOCs			
1x250	H2SO4	NH3			
1x250		NO2/NO3			

**NOTES/ADDITIONAL COMMENTS**

**WELL MONITORING DATA SHEET**

	Well ID: <b>MW-15</b>	Job Number:
	Client: <b>Mustar VAN</b>	Date: <b>6/17/21</b>
	Project: <b>2021</b>	Sampler: <b>LW</b>
	Weather: <b>Sunny</b>	Time In/Out:

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	<b>4"</b>	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	<b>good</b>	Depth to Water:	<b>32.04</b>	Water Column Length:	—
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	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:	<b>BP</b>	Pump Intake Depth:	<b>MS</b>
Sampling Method:	<b>LF</b>	Tubing Material & Type:	<b>SB</b>


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
<b>837</b>			<b>32.04</b>	<b>0.3</b>	<b>6.43</b>	<b>20.35</b>	<b>632</b>	<b>7.90</b>	<b>61.2</b>	<b>clear</b>
<b>840</b>			↓	↓	<b>6.40</b>	<b>18.30</b>	<b>635</b>	<b>6.86</b>	<b>71.0</b>	↓
<b>843</b>			↓	↓	<b>6.39</b>	<b>17.12</b>	<b>621</b>	<b>6.54</b>	<b>76.3</b>	↓
<b>846</b>			↓	↓	<b>6.38</b>	<b>16.95</b>	<b>617</b>	<b>6.30</b>	<b>80.2</b>	↓
<b>849</b>			↓	↓	<b>6.38</b>	<b>17.05</b>	<b>618</b>	<b>6.04</b>	<b>82.4</b>	↓
<b>852</b>			↓	↓						↓

**PURGING DATA**

Sample ID:	<b>MW-15</b>	Sampling Flow Rate:	<b>0.3</b>	Analytical Laboratory:	<b>Apex</b>
Sample Time:	<b>900</b>	Final Depth to Water:	<b>32.04</b>	Did Well Dewater:	<b>NO</b>
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD
<b>3x40</b>	<b>H21</b>	<b>VOCS</b>			
<b>1x250</b>	—	<b>NO2/NO3</b>			
<b>1x250</b>	<b>H2SO4</b>	<b>NO+3</b>			

**NOTES/ADDITIONAL COMMENTS**

**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-18i</u>	Job Number:
	Client: <u>Nuster VAN MAN</u>	Date: <u>6/17/21</u>
	Project: <u>2021</u>	Sampler: <u>LW</u>
	Weather: <u>Sunny</u>	Time In/Out:

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	<u>2"</u>	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:		Depth to Water:	<u>27.21</u>	Water Column Length:	—
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	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 / <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>919</u>			<u>27.21</u>	<u>0.2</u>	<u>7.12</u>	<u>21.60</u>	<u>238</u>	<u>3338</u>	<u>50.7</u>	<u>clear</u>
<u>922</u>			↓	↓	<u>7.09</u>	<u>18.97</u>	<u>187</u>	<u>11.67</u>	<u>57.5</u>	↓
<u>925</u>			↓	↓	<u>7.03</u>	<u>17.21</u>	<u>165</u>	<u>7.01</u>	<u>62.6</u>	↓
<u>928</u>			↓	↓	<u>7.01</u>	<u>16.55</u>	<u>161</u>	<u>5.74</u>	<u>65.6</u>	↓
<u>931</u>			↓	↓	<u>7.02</u>	<u>16.50</u>	<u>160</u>	<u>5.55</u>	<u>65.9</u>	↓
<u>934</u>			↓	↓	<u>7.02</u>	<u>16.40</u>	<u>160</u>	<u>5.42</u>	<u>66.9</u>	↓
<u>937</u>			↓	↓						↓

**PURGING DATA**

Sample ID:	<u>MW-18i</u>	Sampling Flow Rate:	<u>0.2</u>	Analytical Laboratory:	<u>Apex</u>
Sample Time:	<u>940</u>	Final Depth to Water:	<u>27.21</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>HVOCs</u>			
<u>1x250</u>	<u>H2SO4</u>	<u>NH3</u>			
<u>1x20</u>	—	<u>NO2/NO3</u>			

**NOTES/ADDITIONAL COMMENTS**

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-20i	Job Number:	
Client:	Nustar VAN	Date:	6/17/21
Project:	2021	Sampler:	LU
Weather:	Sunny	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up Other: <u>Vault</u>	Well Diameter:	2"	Depth to Free Product:	—
Monument Condition:		Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Depth to Water:	26.89	Water Column Length:	—
Comments:					
Well Cap Lock Present:	<input checked="" type="radio"/> Yes <input type="radio"/> No	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:	M)				
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	
952			26.89	0.3	7.05	15.75	231	9.33	67.5	Clear
955			↓	↓	6.81	16.12	229	4.17	80.6	↓
958			↓	↓	6.82	15.59	238	1.61	81.8	↓
1001			↓	↓	6.78	15.58	241	1.42	82.7	↓
1004			↓	↓	6.78	15.53	241	1.81	81.9	↓

**PURGING DATA**

Sample ID:	MW-20i	Sampling Flow Rate:	0.3	Analytical Laboratory:	Apex	
Sample Time:	1010	Final Depth to Water:	26.89	Did Well Dewater:	no	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	H2O	VOCs				
1x250	—	NH2/NH3				
1x250	H2SO4	NH3				

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-23i	Job Number:	
Client:	Nustee Jan	Date:	6/13/21
Project:	2021	Sampler:	1.2
Weather:	Sunny	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	24	Depth to Free Product:	-
	Other: Vault	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	good - new	Depth to Water:	27.41	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 <input checked="" type="checkbox"/> DEDICATED	
Sampling Method:		4			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	
1105			27.41	0.2	7.05	21.78	243	40.89	68.9	clear
1108			↓	↓	7.09	19.75	203	7.87	66.3	↓
1111			↓	↓	7.08	19.01	201	6.99	65.1	↓
1114			↓	↓	7.07	18.81	200	6.31	62.1	↓
1117			↓	↓	7.07	18.69	200	5.99	60.1	↓
1120					7.06	18.70	200	5.61	56.4	
1123					7.07	18.68	200	5.48	54.4	

**PURGING DATA**

Sample ID:	MW-23i	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex	
Sample Time:	1120	Final Depth to Water:	27.41	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	H21	HVOCs				
1x250	-	NO2/NO3				
1x250	H2SM	NH3				

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-25i</u>	Job Number:
	Client: <u>Nwsta UAN</u>	Date: <u>6/17/21</u>
	Project: <u>2021</u>	Sampler: <u>WJ</u>
	Weather: <u>Sunny</u>	Time In/Out:

**WELL DATA**

Monument Type:	Flush mount/Stick-up <u>P</u>	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>27.29</u>	Water Column Length: <u>—</u>
Well Cap Lock Present:	Yes <u>0</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>MJ</u>								
Sampling Method: <u>UP</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	
1031			27.29	0.28	7.23	22.05	124	13.78	68.4	clear
1034			↓	↓	7.05	20.88	248	16.05	68.5	↓
1037			↓	↓	6.85	20.21	262	6.22	76.5	↓
1046			↓	↓	6.82	20.18	266	3.31	76.1	↓
1043			↓	↓	6.81	20.17	268	2.80	75.4	↓
1046			↓	↓	6.81	20.21	269	2.69	75.2	↓
1049			↓	↓	6.80	20.25	270	2.53	74.9	↓

**PURGING DATA**

Sample ID: <u>MW-25i</u>	Sampling Flow Rate: <u>0.2</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1050</u>	Final Depth to Water: <u>27.29</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>H21</u>	<u>HVOCs</u>				
<u>1x250</u>	<u>H2504</u>	<u>NH3</u>				
<u>1x250</u>	<u>—</u>	<u>NH2/NH3</u>				

**NOTES/ADDITIONAL COMMENTS**

WELL MONITORING DATA SHEET



Well ID:	MW-26	Job Number:	
Client:	New York	Date:	6/13
Project:	GSIM 2024	Sampler:	AW
Weather:	Sun 60°	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Stick up Other: <u>Gas</u>	Well Diameter:	2" <sup>IN</sup>	Depth to Free Product:	—
Monument Condition:	<u>Gas</u>	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	26.62	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:	<u>SP Peristaltic low flow</u>	Pump Intake Depth:	<u>Mid screen</u>
Sampling Method:		Tubing Material & Type:	<u>LDPE</u> <u>NEW</u> 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
758			26.62	.25	8.53	18.24	2332	6.79	54.3	clean
801			↓	↓	6.88	14.99	4812	6.32	234.5	↓
804			↓	↓	6.35	14.93	4810	6.20	230.6	↓
807			↓	↓	6.29	14.90	4815	6.18	228.3	↓
810			↓	↓	6.31	14.99	4807	6.13	226.5	↓

PURGING DATA

Sample ID:	MW-26	Sampling Flow Rate:	.25	Analytical Laboratory:	Apo	
Sample Time:	810	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
3x40	HCl	VOC	—	—	—	—
2x40	HCl	RSR	—	—	—	—
1x250	H <sub>2</sub> SO <sub>4</sub>	NO <sub>2</sub> /3	—	—	—	—
1x280	—	NH <sub>3</sub>	—	—	—	—

NOTES/ADDITIONAL COMMENTS

**WELL MONITORING DATA SHEET**

	Well ID:	MGMS2-132	Job Number:	6/17
	Client:	New Street Vein	Date:	6/17
	Project:	GUSM 2021	Sampler:	AW
	Weather:	Sun 70°	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up Other: <u>Nault</u>	Well Diameter:	—	Depth to Free Product:	—
Monument Condition:	<u>good</u>	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	(Yes) No <u>MGMS</u>	Depth to Water:	<u>27.00</u>	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    1 gal = 3.785 liters

**PURGING DATA**

Purge Method:		Sampling Method:			Pump Intake Depth:		Tubing Material & Type:			
<u>peri</u>		<u>low flow</u>			<u>Mid Screen</u>		<u>LDPE</u> NEW <u>(30')</u> 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	
840			<u>27.00</u>	<u>.2</u>	<u>7.69</u>	<u>17.71</u>	<u>3675</u>	<u>34.50</u>	<u>64.9</u>	<u>clear</u>
843			<u>26.90</u>		<u>5.90</u>	<u>17.77</u>	<u>2013</u>	<u>21.42</u>	<u>67.5</u>	
846					<u>6.04</u>	<u>17.48</u>	<u>1020</u>	<u>9.60</u>	<u>583</u>	
849					<u>6.10</u>	<u>17.16</u>	<u>492</u>	<u>3.43</u>	<u>45.3</u>	
852					<u>6.11</u>	<u>17.05</u>	<u>485</u>	<u>3.24</u>	<u>40.1</u>	
855					<u>6.11</u>	<u>16.99</u>	<u>479</u>	<u>3.17</u>	<u>38.8</u>	

**PURGING DATA**

Sample ID:	MGMS2-132	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	855	Final Depth to Water:	26.90	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:	MGMS 2-80	Job Number:	
Client:	Nu Star Van	Date:	6/15
Project:	GWSM 2021	Sampler:	AK
Weather:	Sun 75°	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up Other:	Well Diameter:	MGMS	Depth to Free Product:	—
Monument Condition:	good - vault	Well Depth:		Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	26.82	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 low flow	Pump Intake Depth:	Midscreen (in)
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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
904			26.82	.2	8.62	18.33	396	24.97	35.2	clean
907					6.02	17.80	345	10.36	54.0	
910					6.25	16.72	275	10.94	61.9	
913					6.27	16.57	264	7.35	61.3	
916					6.24	16.49	234	3.37	58.2	
919					6.24	16.40	229	3.26	55.0	
921					6.24	16.37	226	3.20	54.2	

**PURGING DATA**

Sample ID:	MGMS 2-80	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	921	Final Depth to Water:	26.82	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:	MGMS2-60	Job Number:	
Client:	Nu Star Vein	Date:	6/17
Project:	GWM 2021	Sampler:	9/15
Weather:	sun 75°	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	MGMS	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good - vault	Depth to Water:	26.73	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:	Peri circulation				Pump Intake Depth:	Midscreen (set)				
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	
932			26.73	.2	8.65	17.20	231	9.78	67.5	clear
935			↓	↓	6.93	15.94	221	7.46	120.0	↓
938			↓	↓	6.51	15.70	216	3.55	129.3	↓
941			↓	↓	6.48	15.67	219	3.40	126.0	↓
944			↓	↓	6.44	15.61	221	3.36	124.2	↓

**PURGING DATA**

Sample ID:	MGMS2-60	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	944	Final Depth to Water:	26.73	Did Well Dewater:	WJ	
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:	MGMS2-40	Job Number:	
Client:	NuStar Van	Date:	6/17
Project:	GUM 2021	Sampler:	920
Weather:	sun 75°	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Stick-up Other: <u>Vertical</u>	Well Diameter:	MGMS	Depth to Free Product:	—
Monument Condition:	<u>GOOD</u>	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth to Water:	26.42	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:	<u>Peri low flow</u>	Pump Intake Depth:	<u>Midscreen (see)</u>
Sampling Method:		Tubing Material & Type:	<u>LDPE</u> NEW / <input checked="" type="checkbox"/> 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	
959			26.41	.2	8.64	17.64	591	22.52	57.8	clear
1002			↓	↓	6.30	16.90	1497	14.65	98.6	↓
1005			↓	↓	6.45	17.16	1574	4.29	88.5	↓
1009			↓	↓	6.58	17.04	1586	2.90	85.0	↓
1011			↓	↓	6.61	16.95	1590	2.79	83.9	↓
1014			↓	↓	6.59	16.89	1600	2.75	82.2	↓

PURGING DATA

Sample ID:	MGMS2-40	Sampling Flow Rate:	2.2	Analytical Laboratory:	Apex	
Sample Time:	1014	Final Depth to Water:	26.41	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**



Well ID:	EX	Job Number:	
Client:	Nustar Vane	Date:	6/17
Project:	GUSM 2021	Sampler:	AW
Weather:	Sun 75°	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:	26.25	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:	Peri lowflow	Pump Intake Depth:	Midseren 35							
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	
1104			26.25	.25	8.79	16.71	1835	30.38	45.5	clear
1107			26.38		6.29	15.79	1852	19.41	66.2	
1110			26.41		5.85	15.74	1864	7.77	71.1	
1113			26.41		5.93	15.40	1869	4.24	70.2	
1116			↓		5.97	15.31	1878	3.19	69.3	
1119			↓		5.98	15.25	1880	3.10	69.0	
1122			↓		5.97	15.22	1875	3.02	67.5	

**PURGING DATA**

Sample ID:	EX	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex
Sample Time:		Final Depth to Water:	26.41	Did Well Dewater:	
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			

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-24</u>	Job Number: _____
	Client: <u>Nu Star Valve</u>	Date: <u>6/17</u>
	Project: <u>GLMM 2021</u>	Sampler: <u>[Signature]</u>
	Weather: <u>Sun 80°</u>	Time In/Out: _____

**WELL DATA**

Monument Type: <u>Flush-mount Stick-up</u> Other: _____	Well Diameter: <u>2"</u>	Depth to Free Product: _____
Monument Condition: <u>new vault</u>	Well Depth: _____	Free Product Thickness: _____
Well Cap Lock Present: <u>Yes</u> No	Depth to Water: <u>27.24</u>	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: <u>BP</u>		Pump Intake Depth: <u>Mid Screen 60'</u>								
Sampling Method: <u>down flow</u>		Tubing Material & Type: <u>315</u>								
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
1320			27.24	.3	8.15	18.41	226	27.50	67.1	<u>new</u>
1323			↓	↓	6.90	16.52	233	15.73	110.2	↓
1324			↓	↓	6.58	15.00	230	6.61	125.7	
1329			↓	↓	6.43	14.62	242	5.91	122.1	
1332			↓	↓	6.40	14.70	239	4.90	128.0	
1335			↓	↓	6.37	14.68	235	3.14	129.3	
1338			↓	↓	6.35	14.64	236	3.04	131.5	
1341			↓	↓	6.36	14.64	239	2.99	132.0	

**PURGING DATA**

Sample ID: <u>MW-24</u>	Sampling Flow Rate: <u>3</u>	Analytical Laboratory: <u>[Signature]</u>				
Sample Time: <u>1345</u>	Final Depth to Water: <u>27.24</u>	Did Well Dewater: <u>[Signature]</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	_____	_____	_____	_____
2x40	HCl	ROH	_____	_____	_____	_____
1x250	H <sub>2</sub> SO <sub>4</sub>	NO <sub>2</sub> /3	_____	_____	_____	_____
1x250	—	NH <sub>3</sub>	_____	_____	_____	_____

**NOTES/ADDITIONAL COMMENTS**

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-17	Job Number:	
Client:	NuStar Van	Date:	6/15
Project:	GWSM 2021	Sampler:	
Weather:	Cloudy 50°	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:	25.27	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—

Comments: Vault - dry

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: Mid Screen 35'

Sampling Method: NEW / DEDICATED

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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
834			25.27	.3	8.67	15.15	761	29.19	-51.5	clear
837			↓	↓	7.45	14.68	742	19.35	-4.9	↓
840			↓	↓	6.59	13.99	720	12.11	4.6	↓
843			↓	↓	6.40	13.86	719	15.62	11.5	↓
846			↓	↓	6.37	13.85	717	12.51	10.1	↓
849			↓	↓	6.35	13.83	714	12.40	7.4	↓

PURGING DATA

Sample ID:	MW-17	Sampling Flow Rate:	.3	Analytical Laboratory:	Apex	
Sample Time:	849	Final Depth to Water:	25.27	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

VOAs inverted no headspace @ 855

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-14	Job Number:	
Client:	Nu Star	Date:	6/15
Project:	62M2021	Sampler:	gaw
Weather:	PT Sun	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up Other: <u>good</u>	Well Diameter:	4"	Depth to Free Product:	-
Monument Condition:		Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth to Water:	26.63	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 low flow	Pump Intake Depth:	Midscreen 35"
Sampling Method:		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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
915			26.63	.25	5.74	16.90	2130	26.37	-9.1	clear
918					6.02	17.80	2394	13.32	-9.8	
921					6.07	17.39	2387	9.60	-13.0	
924					6.10	16.01	2308	7.71	-17.7	
927					6.11	15.64	2294	7.57	-20.2	
930					6.13	15.57	2285	7.40	-21.8	
933					6.13	15.52	2279	7.35	-23.0	

**PURGING DATA**

Sample ID:	MW-14	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	93	Final Depth to Water:	26.63	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				
2x40	HCl	Rsk				

**NOTES/ADDITIONAL COMMENTS**

VOAs no headspace @ 940

**WELL MONITORING DATA SHEET**



Well ID:	5-2	Job Number:	
Client:	Nu Star Van	Date:	10/15
Project:	GW 202	Sampler:	42
Weather:	PT Sun 60°	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount <input checked="" type="checkbox"/> Stick-up <input type="checkbox"/>	Well Diameter:	2"	Depth to Free Product:	-
	Other:	Well Depth:		Free Product Thickness:	-
Monument Condition:	good	Depth to Water:	26.29	Water Column Length:	-
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	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:	Mid Screen 45'
Sampling Method:	Conflow	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	
956			26.29	.25	6.16	16.95	2037	35.10	-17.1	cloudy
959			↓	↓	6.11	15.95	1971	9.75	-19.9	↓
1002			↓	↓	6.08	15.27	1915	6.80	-23.6	↓
1005			↓	↓	6.10	14.34	1879	6.55	-31.4	↓
1008			↓	↓	6.09	14.32	1851	6.49	-32.8	↓
1011			↓	↓	6.08	14.24	184	6.59	-35.7	↓

**PURGING DATA**

Sample ID:	5-2	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	1011	Final Depth to Water:	26.29	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**

VOA checked no headspace 1020



**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	S-1	Job Number:	
Client:	Nustar	Date:	6/15
Project:	GW M 202	Sampler:	AW
Weather:	Partly sun	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/stick-up Other:	Well Diameter:	2"	Depth to Free Product:	—
Monument Condition:	good - vault	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	25.89	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 Low Flow				Pump Intake Depth:	Midscreen 69'				
Sampling Method:					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)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1035			25.89	.2	8.20	17.22	1343	30.09	-67.0	clear
1038			↓	↓	6.21	16.81	1103	17.84	-39.4	↓
1041			↓	↓	6.20	16.05	392	8.42	-42.2	↓
1044			↓	↓	6.20	15.17	326	7.32	-58.6	↓
1048			↓	↓	6.18	14.83	199	7.04	-65.3	↓
1051			↓	↓	6.21	14.72	185	7.40	-67.0	↓
1054			↓	↓	6.22	14.59	180	7.31	-67.1	↓

**PURGING DATA**

Sample ID:	S-1	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1054	Final Depth to Water:	25.89	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**

VOA no headspace 1100

**WELL MONITORING DATA SHEET**



Well ID:	MW-10	Job Number:	
Client:	Nu Star Van	Date:	6/15
Project:	GWM 2021	Sampler:	TLW
Weather:	PT Sun 65	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 vault	Depth to Water:	27.40	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 low flow	Pump Intake Depth:	Mid Screen 35'	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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1117			27.40	.35	5.57	17.20	2632	20.15	16.9	decon
1120				.2	6.52	16.42	3478	4.72	13.0	
1131					6.40	16.00	3402	4.41	23.1	
1134					6.16	14.48	3381	4.65	29.3	
1137					6.10	14.30	3314	4.52	31.3	
1140					6.09	14.28	3302	4.45	32.0	


**PURGING DATA**

Sample ID:	MW-10	Sampling Flow Rate:	2	Analytical Laboratory:	Apex
Sample Time:	1140	Final Depth to Water:	27.40	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**

VOL no head space @ 1145

**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-9</u>	Job Number:	Date: <u>6/15</u>
	Client: <u>New Star Van</u>	Date:	Sampler: <u>AL</u>
	Project: <u>QSM 2021</u>	Weather: <u>Sun 75°</u>	Time In/Out:

**WELL DATA**

Monument Type:	Flush-mount/Stick-up <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:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth to Water: <u>26.62</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>Midscreen 35'</u>								
Sampling Method: <u>low flow</u>		Tubing Material & Type: <u>30</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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
<u>1210</u>			<u>26.62</u>	<u>.3</u>	<u>6.42</u>	<u>16.79</u>	<u>2410</u>	<u>20.14</u>	<u>165.1</u>	<u>clear</u>
<u>1213</u>			↓	↓	<u>6.31</u>	<u>14.61</u>	<u>1574</u>	<u>7.06</u>	<u>202.0</u>	↓
<u>1216</u>			↓	↓	<u>6.20</u>	<u>13.63</u>	<u>1292</u>	<u>6.50</u>	<u>200.3</u>	↓
<u>1219</u>			↓	↓	<u>6.19</u>	<u>13.28</u>	<u>1281</u>	<u>6.30</u>	<u>220.9</u>	↓
<u>1222</u>			↓	↓	<u>6.20</u>	<u>13.17</u>	<u>1277</u>	<u>6.25</u>	<u>218.1</u>	↓
<u>1225</u>			↓	↓	<u>6.21</u>	<u>13.07</u>	<u>1265</u>	<u>6.21</u>	<u>217.0</u>	↓

**PURGING DATA**

Sample ID: <u>MW-9</u>	Sampling Flow Rate: <u>.3</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1225</u>	Final Depth to Water: <u>26.62</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:	<i>MW-22i</i>	Job Number:	
Client:	<i>NuStar Van</i>	Date:	<i>6/15</i>
Project:	<i>GWM 2021</i>	Sampler:	
Weather:	<i>Sun 75°</i>	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	<i>2"</i>	Depth to Free Product:	<i>—</i>
	Other:	Well Depth:	<i>—</i>	Free Product Thickness:	<i>—</i>
Monument Condition:	<i>Good</i>	Depth to Water:	<i>27.81</i>	Water Column Length:	<i>—</i>
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	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>BP low flow</i>	Pump Intake Depth:	<i>Midscreen 50'</i>
Sampling Method:		Tubing Material & Type:	<i>SB</i> 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	
<i>1250</i>			<i>27.81</i>	<i>.3</i>	<i>5.61</i>	<i>19.26</i>	<i>812</i>	<i>8.36</i>	<i>-37.4</i>	<i>clear</i>
<i>1253</i>					<i>6.10</i>	<i>17.35</i>	<i>524</i>	<i>5.06</i>	<i>-38.6</i>	
<i>1256</i>					<i>6.14</i>	<i>16.97</i>	<i>462</i>	<i>4.34</i>	<i>-57.1</i>	
<i>1259</i>					<i>6.29</i>	<i>16.68</i>	<i>394</i>	<i>3.88</i>	<i>-107.2</i>	
<i>1302</i>					<i>6.27</i>	<i>16.85</i>	<i>370</i>	<i>3.79</i>	<i>-101.3</i>	
<i>1305</i>					<i>6.27</i>	<i>16.90</i>	<i>390</i>	<i>3.72</i>	<i>-96.5</i>	

**PURGING DATA**

Sample ID:	<i>MW-22i</i>	Sampling Flow Rate:	<i>.3</i>	Analytical Laboratory:	<i>Apex</i>	
Sample Time:	<i>1305</i>	Final Depth to Water:	<i>27.81</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**

*VOA no headspace @ 1315*

WELL MONITORING DATA SHEET



Well ID:	MW-21-105	Job Number:	
Client:	Nu Star Van	Date:	6/15
Project:	GWSM 202	Sampler:	
Weather:	Sun 80°	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:	27.47	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:	Mid screen - 102
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	
1330			27.47	.3	4.90	21.04	414	24.94	66.4	Clear
1340				.2	7.95	19.70	392	15.45	52.2	
1343					6.85	19.07	380	7.30	35.5	
1346					6.14	18.10	337	4.77	38.8	
1349					5.92	18.37	362	6.04	8.2	
1352					5.89	18.25	364	5.98	5.0	
1355					5.91	18.34	367	5.74	3.5	


PURGING DATA

Sample ID:	MW-21-105	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex
Sample Time:	1355	Final Depth to Water:	27.47	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	—	NA3	—	—	—

NOTES/ADDITIONAL COMMENTS

3-point pH calibration  
VOA no headspace @ 1400

**WELL MONITORING DATA SHEET**

 <b>Cascadia</b> Associates, LLC	Well ID: <u>MW-13</u>	Job Number: _____
	Client: <u>NuStar Van</u>	Date: <u>6/15</u>
	Project: <u>GWM 2021</u>	Sampler: <u>AW</u>
	Weather: <u>lt rain</u>	Time In/Out: _____

<b>WELL DATA</b>		
Monument Type: <u>Flush-mount/stick-up</u> <small>Other: _____</small>	Well Diameter: <u>4"</u>	Depth to Free Product: _____
Monument Condition: <u>good</u>	Well Depth: _____	Free Product Thickness: _____
Well Cap Lock Present: <u>Yes</u> No	Depth to Water: <u>27.23</u>	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: _____		<u>BP low flow</u>			Pump Intake Depth: _____		<u>Midscreen 35'</u>			
Sampling Method: _____		_____			Tubing Material & Type: _____		<u>SB</u>		<u>NEW DEDICATED</u>	
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	
1424			26.09	.3	6.44	15.78	1142	9.41	-78.3	clear
1427			26.45		6.29	15.57	1141	6.41	-85.2	↓
1430			26.70		6.24	15.39	1139	5.63	-93.2	
1433			26.90		5.90	15.21	1127	4.77	-1.1	
1436			27.05		5.85	15.22	1110	4.29	7.8	
1439			27.23	↓	5.82	15.25	1104	4.70	10.0	

PURGING DATA						
Sample ID: <u>MW-13</u>	Sampling Flow Rate: <u>5</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1439</u>	Final Depth to Water: <u>27.35</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	RSK	_____	_____	_____	_____
1x250	H2SO4	NO2/3	_____	_____	_____	_____
1x250	_____	NH3	_____	_____	_____	_____

**NOTES/ADDITIONAL COMMENTS**

VOA no headspace @ 1445

**WELL MONITORING DATA SHEET**

 <b>Cascadia</b> Associates, LLC	Well ID: <u>MW-1</u>	Job Number: <u>6/16</u>
	Client: <u>Nu Star Var</u>	Date: <u>6/16</u>
	Project: <u>GWSM 2021</u>	Sampler: <u>AW</u>
	Weather: <u>PT Cloudy</u>	Time In/Out: <u>        </u>

**WELL DATA**

Monument Type: <u>Flush-mount/Stick-up</u>	Well Diameter: <u>2"</u>	Depth to Free Product: <u>        </u>
Other: <u>        </u>	Well Depth: <u>        </u>	Free Product Thickness: <u>        </u>
Monument Condition: <u>good</u>	Depth to Water: <u>26.08</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:		Sampling Method:		Pump Intake Depth:		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
<u>756</u>			<u>26.08</u>	<u>.25</u>	<u>5.22</u>	<u>15.02</u>	<u>3700</u>	<u>26.09</u>	<u>307.0</u>	<u>cloudy</u>
<u>759</u>			↓	↓	<u>5.37</u>	<u>14.89</u>	<u>3539</u>	<u>11.31</u>	<u>266.1</u>	↓
<u>802</u>			↓	↓	<u>5.79</u>	<u>14.91</u>	<u>3294</u>	<u>9.75</u>	<u>235.9</u>	<u>clear</u>
<u>805</u>			↓	↓	<u>6.19</u>	<u>14.95</u>	<u>3023</u>	<u>8.25</u>	<u>205.4</u>	↓
<u>808</u>			↓	↓	<u>6.16</u>	<u>14.90</u>	<u>3000</u>	<u>7.91</u>	<u>213.1</u>	↓
<u>811</u>			↓	↓	<u>6.12</u>	<u>14.92</u>	<u>2984</u>	<u>7.81</u>	<u>212.0</u>	↓


**PURGING DATA**

Sample ID: <u>MW-1</u>	Sampling Flow Rate: <u>.25</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>811</u>	Final Depth to Water: <u>26.08</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**

VOA no headspace @ 810

**WELL MONITORING DATA SHEET**

	Well ID: <b>MW-3</b>	Job Number:	
	Client: <b>Nu Star Vanc</b>	Date: <b>6/16</b>	
	Project: <b>GWSM 2021</b>	Sampler: <b>gws</b>	
	Weather: <b>Pt Sun 70°</b>	Time In/Out:	

**WELL DATA**

Monument Type: <b>Flush-mount/Stick-up</b> <small>Other:</small>	Well Diameter: <b>2"</b>	Depth to Free Product: <b>—</b>	
Monument Condition: <b>gws</b>	Well Depth: <b>—</b>	Free Product Thickness: <b>—</b>	
Well Cap Lock Present: <b>Yes</b> No	Depth to Water: <b>26.79</b>	Water Column Length: <b>—</b>	
	Screened Interval:	Purge Volume: <b>—</b>	

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: <b>BP</b>		Pump Intake Depth: <b>Midscreen</b>		NEW <input type="checkbox"/> DEDICATED <input checked="" type="checkbox"/>						
Sampling Method: <b>low flow</b>		Tubing Material & Type: <b>SB</b>								
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	
840			26.79	2	8.26	14.70	2154	23.08	41.1	clear
843					6.90	13.79	1310	14.20	32.6	↓
846					6.97	13.19	886	8.75	30.2	
849					6.94	12.69	480	6.82	31.6	
852					6.90	12.53	416	4.19	55.1	
855					6.84	12.51	398	3.72	59.7	
858					6.83	12.49	389	3.96	60.5	
901					6.80	12.47	387	3.88	59.6	

**PURGING DATA**


Sample ID: <b>MW-3</b>	Sampling Flow Rate: <b>2</b>	Analytical Laboratory: <b>Apex</b>				
Sample Time: <b>901</b>	Final Depth to Water:	Did Well Dewater: <b>No</b>				
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**

**VOA No headspace @ 910**



**WELL MONITORING DATA SHEET**

	Well ID:	MW-6	Job Number:	
	Client:	Nix Star Vane	Date:	6/16
	Project:	GLSM 2021	Sampler:	940
	Weather:	Sun 75	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/stick-up Other: <u>good</u>	Well Diameter:	2"	Depth to Free Product:	—
Monument Condition:		Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No	Depth to Water:	25.85	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 low flow				Pump Intake Depth:	Mid Screen 32'				
Sampling Method:					Tubing Material & Type:	2B 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	
925			25.85	.25	5.92	13.64	390	1.82	312.3	clear
928			↓	↓	5.86	13.67	436	1.10	339.0	↓
931			↓	↓	5.80	13.49	421	1.25	387.1	↓
934			↓	↓	5.77	13.40	402	1.27	401.0	↓
937			↓	↓	5.79	13.42	410	1.22	403.6	↓
940			↓	↓	5.82	13.46	401	1.14	408.4	↓

**PURGING DATA**

Sample ID:	MW-6	Sampling Flow Rate:	.25	Analytical Laboratory:	Apix
Sample Time:	940	Final Depth to Water:	25.85	Did Well Dewater:	NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x40	HCL	VOC	—	—	—
1x200	H2SO4	NO2/NO3	—	—	—
1x250	—	NH3	—	—	—

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-2</u>	Job Number:	
	Client: <u>Nu Star Vanc</u>	Date: <u>6/16</u>	
	Project: <u>GWSM 2021</u>	Sampler: <u>[Signature]</u>	
	Weather: <u>Sun 80°</u>	Time In/Out:	

**WELL DATA**

Monument Type: <u>Flush-mount/Stick-up</u> <u>Other:</u>	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> <input type="checkbox"/> <u>No</u> <input checked="" type="checkbox"/>	Depth to Water: <u>27.43</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>Mid Screen 35'</u>						
Sampling Method: <u>BP low flow</u>				Tubing Material & Type: <u>SB</u> NEW <input checked="" type="checkbox"/> DEDICATED <input checked="" type="checkbox"/>						
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	
1000			27.43	.25	7.32	15.60	502	28.56	32.1	clear
1003				↓	5.72	15.42	668	7.50	80.2	↓
1006				↓	5.84	14.90	741	6.45	67.4	↓
1009				↓	5.90	14.10	773	5.79	45.4	↓
1012				↓	5.93	13.97	780	5.55	41.0	↓
1015				↓	5.94	13.95	787	5.46	40.7	↓

**PURGING DATA**

Sample ID: <u>MW-2</u>	Sampling Flow Rate: <u>.25</u>	Analytical Laboratory: <u>Apex</u>
Sample Time: <u>1015</u>	Final Depth to Water:	Did Well Dewater: <u>No</u>
No. of Containers/Type	Preservative	Analysis/Method
<u>3x40</u>	<u>HCl</u>	<u>VOC</u>
<u>1x250</u>	<u>H2SO4</u>	<u>NO2/3</u>
<u>1x250</u>	<u>-</u>	<u>NH3</u>

**NOTES/ADDITIONAL COMMENTS**

VOL no headspace @ 1020

WELL MONITORING DATA SHEET

	Well ID:	MW-12	Job Number:	
	Client:	New Star Van	Date:	6/10
	Project:	GLSM 2021	Sampler:	76
	Weather:	Sun 80°	Time In/Out:	

WELL DATA

Monument Type:	Push-mount/Stick-up	Well Diameter:	4"	Depth to Free Product:	
	Other:	Well Depth:		Free Product Thickness:	
Monument Condition:	Good	Depth to Water:	24.79	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:		Mid Screen 3'				
Sampling Method:		Low flow		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	
1040			24.79	.25	6.32	15.36	997	17.50	247.1	cloudy
1043			25.02	↓	6.57	16.57	1365	7.83	260.6	clear
1046			25.22	↓	6.61	15.18	1652	4.41	253.8	
1049			25.36	↓	6.64	15.04	1713	2.17	279.7	
1052			25.40	↓	6.65	15.01	1741	2.01	278.1	
1055			25.40	↓	6.67	15.09	1760	3.15	275.0	
1058				↓	6.64	15.05	1765	2.99	274.0	
1101				↓	6.64	15.03	1769	2.90	272.2	

PURGING DATA

Sample ID:	MW-12	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	1101	Final Depth to Water:	25.40	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x 40	HCl	VOL				
2x 40	HCl	RSK				
1x 250	H2SO4	NO2/3				
1x 250	-	NH3				
3x 40	HCl	VOL				MW-12 Dup
1x 250	H2SO4	NO2/3				

NOTES/ADDITIONAL COMMENTS

1x 250 - NH3

**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-19	Job Number:	
Client:	Nustar Van	Date:	6/16
Project:		Sampler:	HW
Weather:		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:	26.50	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 conflow				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	
1126			26.50			21.85				clear
1140			26.50	.3	6.74	22.00	2261	12.51	354.3	clear
1143			↓	↓	6.15	17.81	2370	4.78	373.5	↓
1146			↓	↓	5.89	16.42	2395	3.47	391.5	↓
1149			↓	↓	5.90	15.96	2354	3.16	392.6	↓
1152			↓	↓	5.90	15.90	2360	3.01	390.1	↓
1155			↓	↓	5.99	15.82	2369	2.95	391.7	↓

**PURGING DATA**

Sample ID:	MW-19	Sampling Flow Rate:	.3	Analytical Laboratory:	Apex	
Sample Time:	1155	Final Depth to Water:	26.50	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	—	—	—	—
2x40	HCl	PSI	—	—	—	—
1x250	H2SO4	NO2/3	—	—	—	—
1x250	—	NH3	—	—	—	—
3x40	HCl	VOC	—	—	—	MW-19 Dup
1x250	H2SO4	NO2/3	—	—	—	↓

**NOTES/ADDITIONAL COMMENTS**

1x250	NH3	
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WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MP-1	Job Number:	
Client:	Nu Star Van	Date:	6/16
Project:	GWM 2021	Sampler:	4w
Weather:	Sun 80°	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:	26.65	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	Pump Intake Depth:	Mid Screen
Sampling Method:	low flow	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	
1232			26.65	.25	4.75	21.25	2120	19.64	285.4	clay
1235					6.10	16.85	1477	4.09	281.6	
1238					5.90	15.51	990	3.11	275.1	
1241					5.99	15.42	761	2.48	272.3	
1244					6.07	15.35	615	2.02	270.0	
1247					6.11	15.28	599	1.92	269.5	
1250					6.09	15.24	585	1.88	266.0	

PURGING DATA

Sample ID:	MP-1	Sampling Flow Rate:	25	Analytical Laboratory:	Apex	
Sample Time:	1250	Final Depth to Water:	26.65	Did Well Dewater:	No	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3 x 40	HCl	VOC				
2 x 40	HCl	RSK				
1 x 250	H2SO4	NO2/3				
1 x 250	-	NH3				

NOTES/ADDITIONAL COMMENTS

VOA - no headspace @ 1350

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-7	Job Number:	
Client:	Nu Star Van	Date:	6/14
Project:	GWSM 2021	Sampler:	765
Weather:	Sun 80°	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Stick up Other:	Well Diameter:	4"	Depth to Free Product:	-
Monument Condition:	good vault	Well Depth:	-	Free Product Thickness:	-
Well Cap Lock Present:	Yes No	Depth to Water:	26.48	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:	Mid Screen 35'
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	
1318			26.48	.25	7.40	20.94	908	30.74	58.3	clear
1321			26.60	.2	5.85	18.80	1942	6.07	201.8	
1324			27.70		6.18	16.71	2383	4.65	207.7	
1327			27.81		6.14	16.05	2074	2.73	203.5	
1330			27.85		6.10	15.96	2017	2.60	196.4	
1333			27.85		6.11	15.90	2035	2.55	195.0	

PURGING DATA

Sample ID:	MW-7	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	1333	Final Depth to Water:	27.85	Did Well Dewater:	INS	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x 40	HCl	VOC				
2x 40	HCl	RSU				
1x 250	H <sub>2</sub> SO <sub>4</sub>	NO <sub>2</sub> /3				
1x 250		NH <sub>3</sub>				
3x 40	HCl	VOC				MW-7 Dup
1x 250	H <sub>2</sub> SO <sub>4</sub>	NO <sub>2</sub> /3				

NOTES/ADDITIONAL COMMENTS

1x 250 → NH<sub>3</sub> →

\* Handle East VOA no headspace @ 1340

**WELL MONITORING DATA SHEET**



Well ID:	MW-19i	Job Number:	
Client:	Nustar VAN	Date:	6/17/21
Project:	2921	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:	80%	Depth to Water:	26.94	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:		Bladder Pump			Pump Intake Depth:		Mid Screen			
Sampling Method:		Low Flow			Tubing Material & Type:		Skip bonded			
								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	
754			26.94	0.35	7.61	17.93	224	448	29.7	clear
757			↓	↓	7.58	17.96	224	13.04	38.7	↓
800					7.54	17.86	207	12.18	42.1	
803					7.04	17.24	213	10.01	48.6	
806					6.99	17.13	225	8.02	56.0	
809					6.97	17.10	228	7.36	14.8	
812					6.95	17.13	241	6.34	4.3	
815					6.94	17.17	244	6.09	2.7	
818					6.94	17.18	245	5.98	1.3	

**PURGING DATA**

Sample ID:	MW-19i	Sampling Flow Rate:	0.25	Analytical Laboratory:	ATEX
Sample Time:	8:10	Final Depth to Water:	26.94	Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x40	H21	VOCs			
1x250	H2SO4	NH3			
1x250		NO2/NO3			

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**

	Well ID: <b>MW-15</b>	Job Number:
	Client: <b>Mustar VAN</b>	Date: <b>6/17/21</b>
	Project: <b>2021</b>	Sampler: <b>LW</b>
	Weather: <b>Sunny</b>	Time In/Out:

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	<b>4"</b>	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	<b>good</b>	Depth to Water:	<b>32.04</b>	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:	<b>BP</b>	Pump Intake Depth:	<b>MS</b>
Sampling Method:	<b>LF</b>	Tubing Material & Type:	<b>SB</b>

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
<b>837</b>			<b>32.04</b>	<b>0.3</b>	<b>6.43</b>	<b>20.35</b>	<b>632</b>	<b>7.90</b>	<b>61.2</b>	<b>clear</b>
<b>840</b>			↓	↓	<b>6.40</b>	<b>18.30</b>	<b>635</b>	<b>6.86</b>	<b>71.0</b>	↓
<b>843</b>			↓	↓	<b>6.39</b>	<b>17.12</b>	<b>621</b>	<b>6.54</b>	<b>76.3</b>	↓
<b>846</b>			↓	↓	<b>6.38</b>	<b>16.95</b>	<b>617</b>	<b>6.30</b>	<b>80.2</b>	↓
<b>849</b>			↓	↓	<b>6.38</b>	<b>17.05</b>	<b>618</b>	<b>6.04</b>	<b>82.4</b>	↓
<b>852</b>			↓	↓						↓

**PURGING DATA**


Sample ID:	<b>MW-15</b>	Sampling Flow Rate:	<b>0.3</b>	Analytical Laboratory:	<b>Apex</b>
Sample Time:	<b>900</b>	Final Depth to Water:	<b>32.04</b>	Did Well Dewater:	<b>NO</b>
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD

<b>3x40</b>	<b>H21</b>	<b>VOCS</b>			
<b>1x250</b>	—	<b>NO2/NO3</b>			
<b>1x250</b>	<b>H2SO4</b>	<b>NO+3</b>			

**NOTES/ADDITIONAL COMMENTS**



**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-18i</u>	Job Number:
	Client: <u>Nuster VAN MAN</u>	Date: <u>6/17/21</u>
	Project: <u>2021</u>	Sampler: <u>LW</u>
	Weather: <u>Sunny</u>	Time In/Out:

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	<u>2"</u>	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:		Depth to Water:	<u>27.21</u>	Water Column Length:	—
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	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 / <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>919</u>			<u>27.21</u>	<u>0.2</u>	<u>7.12</u>	<u>21.60</u>	<u>238</u>	<u>3338</u>	<u>50.7</u>	<u>clear</u>
<u>922</u>			↓	↓	<u>7.09</u>	<u>18.97</u>	<u>187</u>	<u>11.67</u>	<u>57.5</u>	↓
<u>925</u>			↓	↓	<u>7.03</u>	<u>17.21</u>	<u>165</u>	<u>7.01</u>	<u>62.6</u>	↓
<u>928</u>			↓	↓	<u>7.01</u>	<u>16.55</u>	<u>161</u>	<u>5.74</u>	<u>65.6</u>	↓
<u>931</u>			↓	↓	<u>7.02</u>	<u>16.50</u>	<u>160</u>	<u>5.55</u>	<u>65.9</u>	↓
<u>934</u>			↓	↓	<u>7.02</u>	<u>16.40</u>	<u>160</u>	<u>5.42</u>	<u>66.9</u>	↓
<u>937</u>			↓	↓						↓

**PURGING DATA**

Sample ID:	<u>MW-18i</u>	Sampling Flow Rate:	<u>0.2</u>	Analytical Laboratory:	<u>Apex</u>
Sample Time:	<u>940</u>	Final Depth to Water:	<u>27.21</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>HVOCs</u>			
<u>1x250</u>	<u>H2SO4</u>	<u>NH3</u>			
<u>1x20</u>	—	<u>NO2/NO3</u>			

**NOTES/ADDITIONAL COMMENTS**

### WELL MONITORING DATA SHEET

	Well ID:	MW-20i	Job Number:	
	Client:	Nustar UAN	Date:	6/17/21
	Project:	2221	Sampler:	lw
	Weather:	Sunny	Time In/Out:	

#### WELL DATA

Monument Type:	Flush-mount/Stick-up <u>Other: Vault</u>	Well Diameter:	2"	Depth to Free Product:	—
Monument Condition:		Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	<input checked="" type="radio"/> Yes <input type="radio"/> No	Depth to Water:	26.89	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:		Sampling Method:		Pump Intake Depth:		Tubing Material & Type:		NEW		Other Remarks
BP		Lf		M)		SB		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
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
952			26.89	0.3	7.05	15.35	231	9.33	67.5	Clear
955			↓	↓	6.81	16.12	229	4.17	80.6	↓
958			↓	↓	6.82	15.59	238	1.61	81.8	↓
1001			↓	↓	6.78	15.58	241	1.42	82.7	↓
1004			↓	↓	6.78	15.53	241	1.81	81.9	↓

#### PURGING DATA

Sample ID:	MW-20i	Sampling Flow Rate:	0.3	Analytical Laboratory:	Apex
Sample Time:	1010	Final Depth to Water:	26.89	Did Well Dewater:	no
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD Duplicate ID
3x40	H21	VOCS			
1x250	—	NO2/NO3			
1x250	H2SO4	NH3			

#### NOTES/ADDITIONAL COMMENTS


**WELL MONITORING DATA SHEET**



**Cascadia**  
Associates, LLC

Well ID:	MW-23i	Job Number:	
Client:	Nustee Jan	Date:	6/13/21
Project:	2021	Sampler:	1.2
Weather:	Sunny	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	24	Depth to Free Product:	-
	Other: Vault	Well Depth:	-	Free Product Thickness:	-
Monument Condition:	good - new	Depth to Water:	27.41	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 <input checked="" type="checkbox"/> DEDICATED	
Sampling Method:		4			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	
1105			27.41	0.2	7.05	21.78	243	40.89	68.9	clear
1108			↓	↓	7.09	19.75	203	7.87	66.3	↓
1111			↓	↓	7.08	19.01	201	6.99	65.1	↓
1114			↓	↓	7.07	18.81	200	6.31	62.1	↓
1117			↓	↓	7.07	18.69	200	5.99	60.1	↓
1120					7.06	18.70	200	5.61	56.4	
1123					7.07	18.68	200	5.48	54.4	

**PURGING DATA**

Sample ID:	MW-23i	Sampling Flow Rate:	0.2	Analytical Laboratory:	Apex	
Sample Time:	1120	Final Depth to Water:	27.41	Did Well Dewater:	NO	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	H21	HVOCs				
1x250	-	NO2/NO3				
1x250	H2SM	NH3				

**NOTES/ADDITIONAL COMMENTS**

**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-25i</u>	Job Number:
	Client: <u>Nwsta UAN</u>	Date: <u>6/17/21</u>
	Project: <u>2021</u>	Sampler: <u>WJ</u>
	Weather: <u>Sunny</u>	Time In/Out:

**WELL DATA**

Monument Type:	Flush mount/Stick-up <u>P</u>	Well Diameter:	2" <u>9</u>	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	<u>Good</u>	Depth to Water:	<u>27.29</u>	Water Column Length:	—
Well Cap Lock Present:	Yes <u>0</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>BP</u>		Pump Intake Depth: <u>MJ</u>								
Sampling Method: <u>UP</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	
1031			27.29	0.28	7.23	22.05	124	13.78	68.4	clear
1034			↓	↓	7.05	20.88	248	16.05	68.5	↓
1037			↓	↓	6.85	20.21	262	6.22	76.5	↓
1046			↓	↓	6.82	20.18	266	3.31	76.1	↓
1043			↓	↓	6.81	20.17	268	2.80	75.4	↓
1046			↓	↓	6.81	20.21	269	2.69	75.2	↓
1049			↓	↓	6.80	20.25	270	2.53	74.9	↓

**PURGING DATA**

Sample ID: <u>MW-25i</u>	Sampling Flow Rate: <u>0.2</u>	Analytical Laboratory: <u>Apex</u>				
Sample Time: <u>1050</u>	Final Depth to Water: <u>27.29</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>H21</u>	<u>HVOCs</u>				
<u>1x250</u>	<u>H2504</u>	<u>NA3</u>				
<u>1x250</u>	—	<u>N02/N03</u>				

**NOTES/ADDITIONAL COMMENTS**

WELL MONITORING DATA SHEET



Cascadia Associates, LLC

Well ID:	MW-26	Job Number:	
Client:	New York	Date:	6/13
Project:	GSUM 2024	Sampler:	AW
Weather:	Sun 60°	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Stick-up Other: <u>gas</u>	Well Diameter:	2"	Depth to Free Product:	—
Monument Condition:	gas	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	26.62	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:	SP Peristaltic low flow	Pump Intake Depth:	Mid screen
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
758			26.62	.25	8.53	18.24	2332	6.79	54.3	clear
801			↓	↓	6.88	14.99	4812	6.32	234.5	↓
804			↓	↓	6.35	14.93	4810	6.20	230.6	↓
807			↓	↓	6.29	14.90	4815	6.18	228.3	↓
810			↓	↓	6.31	14.99	4807	6.13	226.5	↓

PURGING DATA

Sample ID:	MW-26	Sampling Flow Rate:	.25	Analytical Laboratory:	AW	
Sample Time:	810	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
3x40	HCl	VOC				
2x40	HCl	RSK				
1x250	H2SO4	NO2/3				
1x280	—	NH3				

NOTES/ADDITIONAL COMMENTS

**WELL MONITORING DATA SHEET**

	Well ID:	MGMS2-132	Job Number:	
	Client:	New Street Vein	Date:	6/17
	Project:	GUSM 2021	Sampler:	AW
	Weather:	Sun 70°	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up Other: <u>Nault</u>	Well Diameter:	—	Depth to Free Product:	—
Monument Condition:	<u>good</u>	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	(Yes) No <u>MGMS</u>	Depth to Water:	<u>27.00</u>	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:			
<u>peri</u>		<u>low flow</u>			<u>Mid Screen</u> (set)		<u>LDPE</u> 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	
840			<u>27.00</u>	<u>.2</u>	<u>7.69</u>	<u>17.71</u>	<u>3675</u>	<u>34.50</u>	<u>64.9</u>	<u>clear</u>
843			<u>26.90</u>		<u>5.90</u>	<u>17.77</u>	<u>2013</u>	<u>21.42</u>	<u>67.5</u>	
846					<u>6.04</u>	<u>17.43</u>	<u>1020</u>	<u>9.60</u>	<u>583</u>	
849					<u>6.10</u>	<u>17.16</u>	<u>492</u>	<u>3.43</u>	<u>45.3</u>	
852					<u>6.11</u>	<u>17.05</u>	<u>485</u>	<u>3.24</u>	<u>40.1</u>	
855					<u>6.11</u>	<u>16.99</u>	<u>479</u>	<u>3.17</u>	<u>38.8</u>	

**PURGING DATA**

Sample ID:	MGMS2-132	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	855	Final Depth to Water:	26.90	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:	MGMS 2-80	Job Number:	
Client:	Nu Star Van	Date:	6/15
Project:	GWSM 2021	Sampler:	AK
Weather:	Sun 75°	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up Other:	Well Diameter:	MGMS	Depth to Free Product:	—
Monument Condition:	good - vault	Well Depth:		Free Product Thickness:	—
Well Cap Lock Present:	Yes No	Depth to Water:	26.82	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 low flow	Pump Intake Depth:	Midscreen (in)
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	
904			26.82	.2	8.62	18.33	396	24.97	35.2	clean
907					6.02	17.80	345	10.36	54.0	
910					6.25	16.72	275	10.94	61.9	
913					6.27	16.57	264	7.35	61.3	
916					6.24	16.49	234	3.37	58.2	
919					6.24	16.40	229	3.26	55.0	
921					6.24	16.37	226	3.20	54.2	

**PURGING DATA**

Sample ID:	MGMS 2-80	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	921	Final Depth to Water:	26.82	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:	MGMS2-60	Job Number:	
Client:	Nu Star Vein	Date:	6/17
Project:	GWM 2021	Sampler:	9/15
Weather:	sun 75°	Time In/Out:	

**WELL DATA**

Monument Type:	Flush-mount/Stick-up	Well Diameter:	MGMS	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good - vault	Depth to Water:	26.73	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:	Peri circulation				Pump Intake Depth:	Midscreen (set)				
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	
932			26.73	.2	8.65	17.20	231	9.78	67.5	clear
935			↓	↓	6.93	15.94	221	7.46	120.0	↓
938			↓	↓	6.51	15.70	216	3.55	129.3	↓
941			↓	↓	6.48	15.67	219	3.40	126.0	↓
944			↓	↓	6.44	15.61	221	3.36	124.2	↓

**PURGING DATA**

Sample ID:	MGMS2-60	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex	
Sample Time:	944	Final Depth to Water:	26.73	Did Well Dewater:	WJ	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	—	—	—	—
1x250	H2SO4	NO4/3	—	—	—	—
1x250	—	NH3	—	—	—	—

**NOTES/ADDITIONAL COMMENTS**



WELL MONITORING DATA SHEET



Well ID:	MGMS2-40	Job Number:	6/17
Client:	NuStar Van	Date:	6/17
Project:	GUSM 2021	Sampler:	920
Weather:	sun 75°	Time In/Out:	

WELL DATA

Monument Type:	Flush-mount/Stick-up Other: <u>Vertical</u>	Well Diameter:	MGMS	Depth to Free Product:	—
Monument Condition:	<u>Good</u>	Well Depth:	—	Free Product Thickness:	—
Well Cap Lock Present:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth to Water:	26.42	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:	<u>Peri low flow</u>	Pump Intake Depth:	<u>Midscreen (see)</u>
Sampling Method:		Tubing Material & Type:	<u>LDPE</u> 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	
959			26.41	.2	8.64	17.64	591	22.52	57.8	clear
1002			↓	↓	6.30	16.90	1497	14.65	98.6	↓
1005			↓	↓	6.45	17.16	1574	4.29	88.5	↓
1009			↓	↓	6.58	17.04	1586	2.90	85.0	↓
1011			↓	↓	6.61	16.95	1590	2.79	83.9	↓
1014			↓	↓	6.59	16.89	1600	2.75	82.2	↓

PURGING DATA

Sample ID:	MGMS2-40	Sampling Flow Rate:	2.2	Analytical Laboratory:	Apex	
Sample Time:	1014	Final Depth to Water:	26.41	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**



Well ID:	EX	Job Number:	
Client:	Nustar Vane	Date:	6/17
Project:	GUSM 2021	Sampler:	AW
Weather:	Sun 75°	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:	26.25	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:	Peri lowflow	Pump Intake Depth:	Midserver 35							
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	
1104			26.25	.25	8.79	16.71	1835	30.38	45.5	clear
1107			26.38		6.29	15.79	1852	19.41	66.2	
1110			26.41		5.85	15.74	1864	7.77	71.1	
1113			26.41		5.93	15.40	1869	4.24	70.2	
1116			↓		5.97	15.31	1878	3.19	69.3	
1119			↓		5.98	15.25	1880	3.10	69.0	
1122			↓		5.97	15.22	1875	3.02	67.5	

**PURGING DATA**

Sample ID:	EX	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:		Final Depth to Water:	26.41	Did Well Dewater:		
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				

**NOTES/ADDITIONAL COMMENTS**


**WELL MONITORING DATA SHEET**

	Well ID: <u>MW-24</u>	Job Number: _____
	Client: <u>Nu Star Valve</u>	Date: <u>6/17</u>
	Project: <u>GLMM 2021</u>	Sampler: <u>[Signature]</u>
	Weather: <u>Sun 80°</u>	Time In/Out: _____

**WELL DATA**

Monument Type: <u>Flush-mount Stick-up</u> Other: _____	Well Diameter: <u>2"</u>	Depth to Free Product: _____
Monument Condition: <u>new vault</u>	Well Depth: _____	Free Product Thickness: _____
Well Cap Lock Present: <u>Yes</u> No	Depth to Water: <u>27.24</u>	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: <u>BP down flow</u>		Pump Intake Depth: <u>Mid Screen 60'</u>		Tubing Material & Type: <u>315</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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1320			27.24	.3	8.15	18.41	226	27.50	67.1	Down
1323					6.90	16.52	233	15.73	110.2	
1324					6.58	15.00	230	6.61	125.7	
1329					6.43	14.62	242	5.91	122.1	
1332					6.40	14.70	239	4.90	128.0	
1335					6.37	14.68	235	3.14	129.3	
1338					6.35	14.64	236	3.04	131.5	
1341					6.36	14.64	239	2.99	132.0	

**PURGING DATA**

Sample ID: <u>MW-24</u>	Sampling Flow Rate: <u>3</u>	Analytical Laboratory: <u>[Signature]</u>				
Sample Time: <u>1345</u>	Final Depth to Water: <u>27.24</u>	Did Well Dewater: <u>[Signature]</u>				
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	_____	_____	_____	_____
2x40	HCl	ROH	_____	_____	_____	_____
1x250	H <sub>2</sub> SO <sub>4</sub>	NO <sub>2</sub> /3	_____	_____	_____	_____
1x250	_____	NH <sub>3</sub>	_____	_____	_____	_____

**NOTES/ADDITIONAL COMMENTS**

NiSTAR VANCOUVER SVE O&M - Feb 23, 2021

- 0650 - Lindsay Wallis (Cascadia) onsite; sign in to terminal
- 0700 - Morning health and safety meeting. Safety topic: slips, trips, and falls; pinch points
- 0720 - Mobilize to South SVE system; system on upon arrival
- 0725 - Record system parameters

	PID	pressure
Pre blower	0.1	-21
Post blower	13.1	30
Post carbon 1	16.8	17
Post carbon 2	7.2	6

0745 - SVE sampling

SVE - South - Post Carbon - 022321  
 $P_i = -30$   $P_r = -5$   $T_i = 750$   $T_f = 755$   
canister: 1754 controller: 1910

SVE - South - Pre Carbon - 022321  
 $P_i = -30$   $P_r =$   $T_i = 802$   $T_f = 810$   
canister: 80123 controller: 1817

0815 - Empty'd KO drum + ~11 gal blue water.  
collected 10W sample

10: Blue water 830 2/23/21 6 cont.

0830 - Brought blue water 10W to Waste Disposal Area.  
Started new 20 gal drum (1/2 full), Total blue water 10W  
drums: 2 x 20 gal.

0850 - Turned in work permit; signed out

0900 - LW offsite.

4/9/21 Nustar VAN SVE OMA

South SVE system parameters:

	PID (ppm)	pressure
preblower	30 <sup>W</sup> 20	-17
post blower	303.4	30
post carbon-1	281.1	18
post carbon-2	278.6	7

MiniRAE 3000 (FEI rental)

SVE Sampling

SVE-South-Post Carbon-040921

$P_i = -28$   $P_f = -5$   $T_i = 1410$   $T_f = 1415$

Canister: 660978

Controller: 1946

SVE-South-Pre Carbon-040921

$P_i = -29$   $P_f =$   $T_i = 1420$   $T_f = 1425$

Canister: 661323

Controller: 2005

No Blue water in KO drum

SVE ADM event. 06/17/21

Sunny, 70°F  
LW

1150 - system on upon arrival.

1155

	Pressure	PID
Pre blower	-16	0.2
Post blower - Pre C	30	26.7
Post Carbon 1	18	32.4
Post carbon 2	7	25.3

SVE - South - Pre Carbon - 06/17/21 # C6L008 Flow controller: 2005

$P_i = -28$   $P_f = -5$   $T_i = 1233$   $T_f = 1240$

Potential issues w/ flow controller.

SVE - South - Post Carbon - 06/17/21 # C6L2525 - 1922

$P_i = -30$   $P_f = -5$   $T_i = 1223$   $T_f = 1230$

Checked KO drum. NO blue water or any deterioration / perforations noted.

left system on upon departure

## **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
	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
	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

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	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
(continued)	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
	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

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)	3/21/2019	<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
	3/4/2021	<1.00	<5.00	<1.00	<1.00	3.38	<0.400	<0.400	37.2	0.608	<0.500	6.44	<0.400	<0.500	6.6	1.76
	6/16/2021	<1.00	<5.00	<1.00	<1.00	4.76	<0.400	0.624	75.8	0.892	<0.500	9.95	<0.400	<0.500	14.2	2.05
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	<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
	3/4/2021	<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
6/16/2021	<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-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	

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)	3/19/2002	<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
	11/16/2004	<10	<5	<5	<10	15	<5	<5	440	5.9	<5	270	<5	--	72	<5
	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	
3/4/2021	<1.00	<5.00	<1.00	<1.00	1.13	<0.400	<0.400	41.8	1.65	1.06	182	2.65	<0.500	46.7	<0.400	
6/16/2021	<2.50	<12.5	<2.50	<2.50	<1.00	<1.00	<1.00	31.5	1.44	<1.25	145	1.86	<1.25	36.3	<1.00	
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	

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Appendix B  
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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-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	
10/6/2020	<1.00	8.79	<1.00	<1.00	<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	<2.00	<5.00	<1.00	<1.00	0.499	<0.400	<0.400	38.4	<0.400	<0.500	<0.400	<0.400	<0.500	3.67	4.77	

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)	3/3/2021	<1.00	6.41	<1.00	<1.00	0.664	<0.400	<0.400	10.4	<0.400	<0.500	7.5	<0.400	<0.500	5.55	20.5
	6/16/2021	<1.00	<5.00	<1.00	<1.00	6.51	<0.400	0.963	697	4.67	0.684	20.5	<0.400	<0.500	26.5	72.3
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	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400
	3/22/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400
	6/5/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400
	9/27/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400
	12/5/2019	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400
	3/12/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400
	6/17/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400
	10/8/2020	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400
	12/9/2020	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400
3/4/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	
6/16/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	<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	386	<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	

Please refer to notes at end of table.

Appendix B  
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
MW-7 (continued)	11/11/2003	<20	<20	<20	<20	40.2	<20	<20	246	<20	<20	2,460	62	--	599	<20
	1/27/2004	<20	<10	<10	<20	17	<10	<10	105	<10	<10	3,510	33	--	380	<10
	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 <sup>7</sup>	<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	

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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
MW-7 (continued)	9/23/2010	<3	<3	<3	<3	3.3	<3	<3	690	<3	<3	750	3.5	<3	110	4.8
	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

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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
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	<2.00	<5.00	<1.00	<1.00	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	<2.00	<5.00	<1.00	<1.00	6.83	<0.400	1.38	55.6	0.519	<0.500	106	<0.400	<0.500	44.5	<0.400
	3/3/2021	<1.00	<5.00	<1.00	<1.00	1.28	<0.400	<0.400	20	<0.400	<0.500	56.4	<0.400	<0.500	22.4	<0.400
3/3/2021 DUP	<1.00	<5.00	<1.00	<1.00	1.24	<0.400	<0.400	19.2	<0.400	<0.500	54.3	<0.400	<0.500	22.2	<0.400	
6/16/2021	<1.00	<5.00	<1.00	<1.00	4.3	<0.400	0.927	35.5	<0.400	<0.500	78	<0.400	<0.500	39.6	0.45	
6/16/2021 DUP	<1.00	<5.00	<1.00	<1.00	4.12	<0.400	0.825	32.6	<0.400	<0.500	72.8	<0.400	<0.500	37.3	0.426	
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

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)	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 <sup>7</sup>	<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
	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
	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

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)	3/18/2015	<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
	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	
10/6/2020	<1.00	<5.00	<1.00	<1.00	<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	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	3.97	<0.400	<0.500	<0.400	<0.400	
3/3/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.575	<0.400	<0.500	2.71	<0.400	<0.500	<0.400	<0.400	
6/16/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.24	<0.400	<0.500	6.32	<0.400	<0.500	<0.400	<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

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)	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
	1/27/2004	<2	<1	<1	<2	<1	<1	<1	2.58	<1	<1	179	2.54	--	58.1	<1
	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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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)	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
	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

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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-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	<2.00	<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
	3/3/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.56	<0.400	<0.500	73.5	1.38	<0.500	26.4	<0.400
	6/15/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.35	<0.400	<0.500	87.7	1.83	<0.500	32.4	<0.400
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

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)	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
	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	<2.00	<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
	3/4/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	1.66	<0.400	<0.500	1.84	<0.400
6/15/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	3.19	<0.400	<0.500	2.6	<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

Please refer to notes at end of table.

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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
MW-11 (continued)	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														
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	

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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
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

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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-12 (continued)	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
	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
	3/5/2021	<1.00	<5.00	<1.00	<1.00	1.55	<0.400	<0.400	8.6	<0.400	<0.500	6.73	<0.400	<0.500	4.92	0.436
	3/5/2021 DUP	<1.00	<5.00	<1.00	<1.00	1.48	<0.400	<0.400	8.21	<0.400	<0.500	5.81	<0.400	<0.500	4.39	0.446
6/16/2021	<1.00	<5.00	<1.00	<1.00	6.90	<0.400	<0.400	34.0	0.426	<0.500	8.85	<0.400	<0.500	9.62	35.7	
6/16/2021 DUP	<1.00	<5.00	<1.00	<1.00	6.53	<0.400	<0.400	32.4	<0.400	<0.500	8.21	<0.400	<0.500	8.87	33.4	
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	

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)	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
	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
	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

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)	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
	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
	3/4/2021	<1.00	<5.00	<1.00	<1.00	11.9	<0.400	<0.400	3.48	0.494	<0.500	<0.400	<0.400	<0.500	0.996	27.4
6/15/2021	<1.00	<5.00	<1.00	<1.00	1.12	<0.400	<0.400	13.4	0.673	<0.500	1.01	<0.400	<0.500	2.56	12.9	
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	

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)	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
	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	0.57	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	

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)	3/20/2018	<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	<10.0	<25.0	<5.00	<5.00	7.77	<2.00	3.04	180	2.520	<2.50	109	<2.00	<2.50	339	<2.00
	3/4/2021	<1.00	<5.00	<1.00	<1.00	9.39	<0.400	3.76	161	2.51	<0.500	128	1.24	<0.500	410	<0.400
	6/15/2021	<1.00	<5.00	<1.00	<1.00	0.87	<0.400	0.485	23.8	<0.400	<0.500	28.3	<0.400	<0.500	80.6	<0.400
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	

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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
MW-15 (continued)	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
	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
	12/10/2020	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	0.599	<0.400	<0.500	<0.400	<0.400
6/17/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	0.431	<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 (continued)	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
	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	<2.00	<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
	3/3/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	13.2	<0.400	<0.500	71.1	0.457	<0.500	12.2	<0.400
	6/16/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	11.6	<0.400	<0.500	75	0.444	<0.500	12.2	<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	<0.50	1	<0.50	<0.50	0.69	<0.50	<0.50	3

Please refer to notes at end of table.

MW-17	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
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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
(continued)	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
	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
	3/3/2021	<1.00	<5.00	<1.00	<1.00	0.684	<0.400	<0.400	22.8	<0.400	<0.500	4.19	<0.400	<0.500	11.00	<0.400
	6/15/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	5.99	<0.400	<0.500	1.9	<0.400	<0.500	3.62	<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

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	3/29/2002	<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
(continued)	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
	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

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	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
(continued)	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
	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
	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

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)	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
	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	<2.00	<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
	3/3/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.664	<0.400	<0.500	0.808	<0.400	<0.500	<0.400	<0.400
	6/17/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	0.698	<0.400	<0.500	0.45	<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 <sup>7</sup>	<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	<0.50	6.7	<0.50	<0.50	67	<0.50	<0.50	25	<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 (continued)	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
	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
	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	

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	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
	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

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 (continued)	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
	3/3/2021	<1.00	<5.00	<1.00	<1.00	41.4	<0.400	51.00	1,120	11.4	<0.500	4,470	27.8	<0.500	1,880	53.6
	3/3/2021 DUP	<50.0	<250	<50.0	<50.0	35.8	<20.0	48.5	1,140	<20.0	<25.0	4,620	26.4	<25.0	1,920	50
	6/16/2021	<25.0	<125	<25.0	<25.0	58	<10.0	28.2	1,260	15.1	<12.5	4,770	22.5	<12.5	1,190	80.8
6/16/2021 DUP	<25.0	<125	<25.0	<25.0	54.1	<10.0	26.8	1,160	<10.0	<12.5	4,430	19.9	<12.5	1,090	76.1	
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

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	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
(continued)	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
	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
	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

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 (continued)	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
	12/10/2020	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.489	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	3/3/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.566	<0.400	<0.500	<0.400	<0.400	<0.500	<0.400	<0.400
	6/17/2021	<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-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	

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)	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.														
	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	<2.00	<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	
3/2/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	8.68	<0.400	<0.500	1.16	<0.400	<0.500	0.902	<0.400	
6/17/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	9.16	<0.400	<0.500	1.66	<0.400	<0.500	1.12	<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

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 (continued)	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
	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
	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	

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 (continued)	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	<2.00	<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
	3/4/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.23	<0.400	<0.500	3.32	<0.400	<0.500	1.74	<0.400
	6/15/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	1.37	<0.400	<0.500	1.7	<0.400	<0.500	1.01	<0.400
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	

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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-21i-40 (continued)	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
	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	<2.00	<5.00	<1.00	<1.00	2.46	<0.400	0.558	53.3	0.486	<0.500	30.0	<0.400	<0.500	15.8	<0.400	
3/2/2021	<1.00	<5.00	<1.00	<1.00	1.73	<0.400	0.403	38.1	<0.400	<0.500	19.6	<0.400	<0.500	12.7	<0.400	
6/16/2021	<1.00	<5.00	<1.00	<1.00	1.62	<0.400	<0.400	35.1	<0.400	<0.500	19.0	<0.400	<0.500	13.2	<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

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	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
(continued)	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
	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	0.5	<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	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	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	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	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	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	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	<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	<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	9.7	<0.50	<0.50	1.20	<0.50	<0.50	6.4	<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
MW-22i (continued)	3/22/2018	<0.500	<2.50	<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	0.52	<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	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	0.47	<0.400	<0.400	11.7	<0.400	<0.500	3.34	<0.400	<0.500	8.2	<0.400
	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	<2.00	<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
	3/4/2021	<1.00	<5.00	<1.00	<1.00	0.51	<0.400	<0.400	13.3	<0.400	<0.500	2.12	<0.400	<0.500	6.62	<0.400
	6/15/2021	<1.00	<5.00	<1.00	<1.00	0.643	<0.400	<0.400	16.5	<0.400	<0.500	4.47	<0.400	<0.500	8.86	<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	

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	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
(continued)	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
	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	<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
	3/2/2021	<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
	6/17/2021	<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-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
	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

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)	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	<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	<2.00	<5.00	<1.00	<1.00	1.73	<0.400	<0.400	20	<0.400	<0.500	29.7	<0.400	<0.500	13	<0.400
	3/3/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.505	<0.400	<0.500	0.955	<0.400	<0.500	<0.400	<0.400
	6/17/2021	<1.00	<5.00	<1.00	<1.00	0.989	<0.400	<0.400	9.31	<0.400	<0.500	15.7	<0.400	<0.500	8	<0.400
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
	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
	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	

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 (continued)	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
	3/3/2021	<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-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	

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)	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	
	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	
	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	
	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	
	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	
	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	
	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	
	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	
	9/27/2018	<1.00	<5.00	<1.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	
	12/6/2018	<1.00	<5.00	<1.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	
	3/22/2019	<1.00	<5.00	<1.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	
	6/4/2019	<4.00	<5.00	<1.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	
	9/25/2019	<1.00	<5.00	<1.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	
	12/3/2019	<1.00	<5.00	<1.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.54	<0.400	<0.500	<0.400	<0.400	<0.500	
	3/12/2020	<1.00	<5.00	<1.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	
	6/18/2020	<1.00	<5.00	<1.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.44	<0.400	<0.500	<0.400	<0.400	<0.500	
	10/7/2020	<1.00	<5.00	<1.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	
	12/9/2020	<1.00	<5.00	<1.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	
	3/2/2021	<1.00	<5.00	<1.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500	
6/17/2021	<1.00	<5.00	<1.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	<0.400	<0.400	<0.500		
MW-26	9/16/2011	<2	<2	<2	<2	7	<2	2.2	120	2.6	<2	250	5.7	<2	490	
	12/8/2011	<2	<2	<2	<2	7.1	<2	2.5	110	2.2	<2	300	5.8	<2	500	
	3/6/2012	<2	<2	<2	<2	8.2	<2	2.2	99	<2	<2	210	4.6	<2	450	
	6/19/2012	<2	<2	<2	<2	14	<2	3	90	<2	<2	160	5.2	<2	460	
	9/11/2012	<2	<2	<2	<2	6.3	<2	2.3	110	3	<2	280	4.3	<2	460	
	12/12/2012	<2	<2	<2	<2	5.6	<2	<2	120	3.7	<2	300	3.8	<2	470	
	3/13/2013	<2	<2	<2	<2	4.9	<2	<2	83	<2	<2	210	2.9	<2	390	
	6/12/2013	<2	<2	<2	<2	8.2	<2	<2	80	<2	<2	170	4.5	<2	360	
	9/18/2013	<2	<2	<2	<2	5.7	<2	<2	96	2.4	<2	210	3.2	<2	410	
	12/11/2013	<2	<2	<2	<2	7.8	<2	<2	75	<2	<2	150	3.9	<2	370	
	3/19/2014	<2	<2	<2	<2	4.9	<2	<2	95	2.1	<2	220	2.9	<2	350	
	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	
	9/24/2014	<2	<2	<2	<2	3.9	<2	<2	68	<2	<2	220	3.1	<2	340	

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)	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
	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	<5.00	<25.0	<5.00	<5.00	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	<10.0	<25.0	<5.00	<5.00	3.34	<2.00	<2.00	64.3	<2.00	<2.50	147	<2.00	<2.50	218	<2.00	
3/4/2021	<1.00	<5.00	<1.00	<1.00	5.92	<0.400	1.89	89.4	2.39	<0.500	151	2.04	<0.500	320	<0.400	
6/17/2021	<2.50	<12.5	<2.50	<2.50	4.35	<1.00	1.43	72.3	1.92	<1.25	132	2.06	<1.25	366	<1.00	
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

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	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
(continued)	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
	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
	3/2/2021	<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-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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	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

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)	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
	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	

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)	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
	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	<1.00	<5.00	<1.00	<1.00	<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	<2.00	<5.00	1.16	<1.00	<0.400	<0.400	<0.400	1.61	<0.400	<0.500	32.2	0.766	<0.500	8.64	<0.400
3/2/2021	<1.00	<5.00	3.05	<1.00	<0.400	<0.400	<0.400	0.609	<0.400	<0.500	37.8	0.938	<0.500	15	<0.400	
6/16/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	21.6	0.711	<0.500	8.39	<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	

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)	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	<0.500
	6/25/2008	<1	<1	<1	<1	<1	<1	<1	1.67	<1	<1	<1	1.37	<1	<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	<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	<0.50
	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	<0.50
	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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<0.50	
9/21/2015	<0.50	<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	<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)	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	<0.50	0.6	<0.50
	3/9/2016	<0.50	<2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<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	<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	<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	<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	<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	<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	<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		
3/3/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.2	<0.400	<0.500	0.852	<0.400	<0.500	1.60	<0.400		
6/15/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.849	<0.400	<0.500	0.571	<0.400	<0.500	0.881	<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	

Please refer to notes at end of table.

Appendix B  
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
S-2 (continued)	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
	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	
3/3/2021	<1.00	<5.00	<1.00	<1.00	8	<0.400	<0.400	37.2	0.578	<0.500	<0.400	<0.400	<0.500	1.44	<0.400	
6/15/2021	<1.00	<5.00	<1.00	<1.00	6.15	<0.400	<0.400	29.9	<0.400	<0.500	<0.400	<0.400	<0.500	1.17	<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

Please refer to notes at end of table.

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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
MGMS1-3(43) (continued)	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
	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	
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	

Please refer to notes at end of table.

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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
MGMS1-3(43) (continued)	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	124	<10.0	26.0	2980	45.5	<12.5	219	<10.0	<12.5	507	48.2	
12/10/2020	<100	<250	<50	<50	131	<20	<20	2620	34.300	<25	151	<20	<25	294	40.6	
3/4/2021	<10.0	<50.0	<10.0	<10.0	128	<0.400	29.00	2840	38.500	<0.500	135	<0.400	<0.500	388	161	
6/16/2021	<25.0	<125	<25.0	<25.0	103	<10.0	20.80	2690	34.900	<12.5	90.5	<10.0	<12.5	297	153	
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

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)	11/29/2000	<2	<10	<1	<1	1.58	<1	1.09	57.7	<1	<1	121	4.58	--	40.3	<1
	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	<0.5
	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	1.16	<0.400	<0.400	16.5	<0.400	<0.500	24	<0.400	<0.500	15.3	<0.400
	12/10/2020	<2.00	<5.00	<1.00	<1.00	1.54	<0.400	<0.400	13.1	<0.400	<0.500	20.3	<0.400	<0.500	10	0.64
	3/4/2021	<1.00	<5.00	<1.00	<1.00	1.19	<0.400	<0.400	18.4	<0.400	<0.500	20.3	<0.400	<0.500	14.9	<0.400
	6/16/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	6.28	<0.400	<0.500	13	<0.400	<0.500	7.17	<0.400
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	

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)	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
	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	
6/16/2021	<1.00	<5.00	<1.00	<1.00	4.87	<0.400	0.408	166	0.464	<0.500	14.1	<0.400	<0.500	34.6	<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

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)	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
	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 <sup>7</sup>	<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	
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	

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)	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
(continued)	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
	3/4/2021	<1.00	<5.00	<1.00	<1.00	25.1	<0.400	3.83	159	1.120	<0.500	115.0	<0.400	<0.500	59.9	72.5
	6/17/2021	<1.00	<5.00	<1.00	<1.00	20.7	<0.400	3.25	181	0.975	<0.500	68.8	<0.400	<0.500	35.6	66.3

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
MGMS2-3(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	
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	

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)	3/7/2011	<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
	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	

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)	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
	3/4/2021	<1.00	<5.00	<1.00	<1.00	0.455	<0.400	<0.400	10.2	<0.400	<0.500	11.7	<0.400	<0.500	5.95	0.524
	6/17/2021	<1.00	<5.00	<1.00	<1.00	0.621	<0.400	<0.400	11.8	<0.400	<0.500	15.5	<0.400	<0.500	8.23	0.602
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	<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	
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	

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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
MGMS2-2(110) (continued)	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
6/17/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	5.23	<0.400	<0.500	2.89	<0.400	<0.500	3.01	1.74	
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
	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	

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)	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	
6/17/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	7.06	<0.400	<0.500	2.9	<0.400	<0.500	3.34	2.54	
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

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) (continued)	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
	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	

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) (continued)	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
	12/12/2014	<2	<2	<2	<2	7.9	<2	<2	490	4.2	<2	36	<2	<2	28	20
	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	

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) (continued)	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
	10/6/2020	<1.00	<5.00	<1.00	<1.00	4.23	<0.400	<0.400	67.2	<0.400	<0.500	0.85	<0.400	<0.500	<0.400	83.9
	10/6/2020 DUP	<1.00	<5.00	<1.00	<1.00	4.38	<0.400	<0.400	66.9	<0.400	<0.500	0.828	<0.400	<0.500	<0.400	84
	12/10/2020	<40.0	<100	<20.0	<20.0	<8.00	<8.00	<8.00	104	<8.00	<10.0	<8.00	<8.00	<8.00	<10.0	<8.00
	12/10/2020 DUP	<40.0	<100	<20.0	<20.0	<8.00	<8.00	<8.00	125	<8.00	<10.0	<8.00	<8.00	<8.00	<10.0	<8.00
	3/4/2021	<1.00	<5.00	<1.00	<1.00	6.69	<0.400	<0.400	111	<0.400	<0.500	0.698	<0.400	<0.500	<0.400	137
3/4/2021 DUP	<1.00	<5.00	<1.00	<1.00	6.81	<0.400	<0.400	116	<0.400	<0.500	0.617	<0.400	<0.500	<0.400	137	
6/16/2021	<1.00	<5.00	<1.00	<1.00	4.74	<0.400	<0.400	16.3	<0.400	<0.500	0.486	<0.400	<0.500	<0.400	109	
6/16/2021 DUP	<1.00	<5.00	<1.00	<1.00	4.8	<0.400	<0.400	17	<0.400	<0.500	0.466	<0.400	<0.500	<0.400	108	

Please refer to notes at end of table.

Appendix B  
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
MGMS3-3(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
	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

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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
MGMS3-3(60) (continued)	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
	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	

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)	3/12/2020	<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	<1.00	<5.00	<1.00	<1.00	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	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	5.76	<0.400	<0.500	1.86	<0.400	<0.500	1.11	<0.400
	3/4/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	9.54	<0.400	<0.500	2.44	<0.400	<0.500	1.95	<0.400
	6/16/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	4.65	<0.400	<0.500	1.38	<0.400	<0.500	0.949	<0.400
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	
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	

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)	3/12/2013	<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
	12/10/2020	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	<0.400	<0.400	<0.500	1.45	<0.400	<0.500	<0.400	<0.400
6/16/2021	<1.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	0.482	<0.400	<0.500	1.34	<0.400	<0.500	0.572	<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
	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	

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)	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
	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	
12/10/2020	<2.00	<5.00	<1.00	<1.00	<0.400	<0.400	<0.400	2.73	<0.400	<0.500	3.61	<0.400	<0.500	2.46	<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	
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	<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	<0.50
	11/17/2005	<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	<0.50
	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	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.6	<0.50	--	<0.50	<0.50	
	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	<0.50	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	
	5/26/2006	Well Abandoned															
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	

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)	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
	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	
6/17/2021	<1.00	<5.00	<1.00	<1.00	4.55	<0.400	3.90	415	2.33	<0.500	4,570.0	12.4	<0.500	322	22.2	

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
MP-1	3/23/2009	<4	<4	<4	<4	6	<4	<4	89	<4	<4	1,200	10	<4	180	<4
	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
	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

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)	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	<4.00	<10.0	<2.00	<2.00	1.15	<0.800	<0.800	29.5	<0.800	<1.00	362	<0.800	<1.00	41.3	<0.800
	3/3/2021	<5.00	<25.0	<5.00	<5.00	<2.00	<2.00	2.34	70.1	<2.00	<2.5	831	<2.00	<2.5	100	<2.00
	6/16/2021	<10.0	<50.0	<10.0	<10.0	<0.400	<0.400	<0.400	70.7	<4.00	<5.00	309	<4.00	<5.00	52	<4.00
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:

1. HVOCs = Halogenated volatile organic compounds analysis by U.S. Environmental Protection Agency (EPA) Method 8260B; results reported in micrograms per liter (µg/L).
2. 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).
3. -- = Not sampled or not analyzed.
4. < = Not detected at or above the specified laboratory method reporting limit (MRL).
5. B = Estimated concentration based on data quality review - similar detection in associated field blank/equipment blanks (less than 5x difference).
6. J = Estimated concentration based on data quality review.
7. 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.
8. ND = Not detected and no reporting limit specified.
10. 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.
11. \* = Well EX was decommissioned during the third quarter 2019 and a replacement well was installed adjacent (offset 3-4 ft) in April 2021. Historically the well has been referred to as EX or EX-1.

**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 March and June 2021 groundwater sampling events, and air samples collected during the February, April, and June 2021 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
A1C0077	3/17/2021	3/2/2021	First Quarter Groundwater Monitoring Event
A1C0126	3/19/2021	3/3/2021	First Quarter Groundwater Monitoring Event
A1C0179	3/22/2021	3/4/2021	First Quarter Groundwater Monitoring Event
A1C0204	3/22/2021	3/5/2021	First Quarter Groundwater Monitoring Event
A1F0589	7/14/2021	6/15/2021	Second Quarter Groundwater Monitoring Event
A1F0672	7/8/2021	6/16/2021	Second Quarter Groundwater Monitoring Event
A1F0730	7/14/2021	6/17/2021	Second Quarter Groundwater Monitoring Event
2102642	3/10/2021	2/23/2021	Soil Vapor Extraction System Monitoring
2104254	4/23/2021	4/9/2021	Soil Vapor Extraction System Monitoring
2106528	7/6/2021	6/17/2021	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-NH<sub>3</sub> 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 5 bottles from sample MW-26 (report A1F0730) and 1 of 3 bottles from sample S-2 (report A1F0589). Field staff check for headspace when collecting samples and sealing bottles and additional sample volume is added if headspace is present. The lab was notified in case the VOA supply had defective septa. Sediment was noted by the laboratory in all sample bottles from MW-12 (report A1C0204) and all sample bottles from MW-1 and MW-2 (report A1C0179). 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-26 (2Q/lab report A1F0730) and MW-8 (2Q/lab report A1F0672). The hold time for nitrate is 48 hours and the initial analysis of the sample MW-26 was made within the recommended hold time. Based on the results of the first analysis, the sample was reanalyzed with 100x dilution. The analysis of the diluted sample was conducted after the method recommended hold time. It is not expected that the slight hold time exceedance would compromise the quality or usability of the data.

**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 or air 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 was within acceptable recovery limits, with the following exceptions:

- Report A1C0077. The LCS recovery of 1,2-dibromo-3-chloropropane, dichlorodifluoromethane, 2,2-dichloropropane, and trans-1,3-dichloropropene was outside acceptable limits for sample batch 1030312. No associated sample data were detected; therefore, no sample data were flagged.
- Report A1C0126. The LCS recovery of dibromochloromethane and 2,2-dichloropropane was outside acceptable limits for sample batch 1030531. The LCS recovery of bromoform,



chloromethane, dibromochloromethane, and 1,2,4-trichlorobenzene was outside acceptable limits for sample batch 1030531. The LCS recovery percentage of bromoform, bromomethane, and chloromethane was outside acceptable limits for sample batch 1030535. No associated sample data were detected; therefore, no sample data were flagged.

- Report A1C0179. The LCS recovery of bromomethane, 1,2-dibromo-3-chloropropane, dichlorodifluoromethane, 2,2-dichloropropane, trans-1,3-dichloropropene, and trichlorofluoromethane in sample batch 1030424 was outside acceptable limits. No associated sample data were detected; therefore, no sample data were flagged.
- Report A1C0204. The LCS recovery of bromoform, bromomethane, chloromethane, and 2,2-dichloropropane was outside acceptable limits in sample batch 1030585. No associated sample data were detected; therefore, no sample data were flagged.
- Report A1F0730. The LCS recovery of bromomethane and dichlorodifluoromethane was outside acceptable limits for sample batch 1061117. No associated sample data were detected; therefore, no sample data were flagged.
- Report A1F0672. The LCS recovery of bromomethane and dichlorodifluoromethane was outside acceptable limits for sample batches 1060845, 1060979, and 1061041. The LCS recovery of bromomethane, chloromethane, dichlorodifluoromethane, and trans-1,3-dichloropropene was outside acceptable limits for sample batch 10600907. No associated sample data were detected; therefore, no sample data were flagged.
- Report A1F0589. The LCS recovery of bromomethane, chloromethane, dichlorodifluoromethane, and trans-1,3-dichloropropene was outside acceptable limits for sample batch 1060907. No associated sample data were detected; therefore, no sample data were flagged.
- Report 2102642. The LCS and LCSD recovery of hexachlorobutadiene 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 A1F0730. The MS (using source samples MW-19i and the non-source sample) and MSD (using the non-source sample from sample batch 1061117) recovery percentage of bromomethane and dichlorodifluoromethane was outside acceptable recovery limits. The MS recovery percentage (using the non-source sample from sample batch 1061117) of cis-1,2-dichloroethene was outside acceptable recovery limits; the associated LCS and LCSD recovery percentages as well as the MS recovery percentage (using source samples MW-19i and the non-source sample from sample batch 1061041) of cis-1,2-dichloroethene were within acceptable range; therefore, no sample data was flagged. The MS and MSD recovery percentage (using the non-source sample from sample batch 1061168) for ammonia was outside acceptable recovery limits. The MS and MSD (using the non-source sample) and LCS recovery percentages (for sample batch 1061169) were within acceptable recovery limits; therefore, no sample data were flagged. The MS (using source sample MW-24i) was outside acceptable recovery limits of total organic carbon for sample batch 1061261; the associated LCS and LCD recovery percentages were within acceptable recovery limits; therefore, no sample data were flagged.
- Report A1F0672. The MS recovery percentage (using the non-source sample) was outside acceptable limits for bromomethane and dichlorodifluoromethane for sample batches 1060979 and 1061041; the MSD recovery percentages for the associated sample batches are within acceptable limits. The MS and MSD recovery percentage (using the non-source sample) was outside acceptable limits for ammonia for sample batch 1061168; the LCS and LCSD recovery percentages were within acceptable limits. Therefore, no data were flagged.
- Report A1F0589. The MS recovery percentage (using the non-source sample) was outside acceptable limits for bromomethane and 1,1-dichloropropene for sample batch 1060793; associated LCS and LCSD recovery percentages were within acceptable limits. The MS recovery percentage (using the non-source sample) was outside acceptable limits for total organic carbon for sample batch 1061261; associated LCS and LCSD recovery percentages were within acceptable limits. Therefore, no 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.

**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% with the exception of ammonia in the primary and duplicate sample MW-19; these data were given a “D” flag to represent this exceedance.

**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.

3/10/2021

Ms. Lindsay Wallis  
Cascadia Associates, LLC  
5820 SW Kelly Ave  
Unit B  
Portland OR 97239

Project Name: Nustar VAN SVE OVM  
Project #:  
Workorder #: 2102642

Dear Ms. Lindsay Wallis

The following report includes the data for the above referenced project for sample(s) received on 2/25/2021 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 #: 2102642**

Work Order Summary

<b>CLIENT:</b>	Ms. Lindsay Wallis Cascadia Associates, LLC 5820 SW Kelly Ave Unit B Portland, OR 97239	<b>BILL TO:</b>	Ms. Lindsay Wallis Cascadia Associates, LLC 5820 SW Kelly Ave Unit B Portland, OR 97239
<b>PHONE:</b>	(503)906-6577	<b>P.O. #</b>	0060-002-004
<b>FAX:</b>	(503)906-6567	<b>PROJECT #</b>	Nustar VAN SVE OVM
<b>DATE RECEIVED:</b>	02/25/2021	<b>CONTACT:</b>	Alexandra Winslow
<b>DATE COMPLETED:</b>	03/10/2021		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	SVE_South_PostCarbon_022321	TO-15	4.0 "Hg	5 psi
02A	SVE_South_PreCarbon_022321	TO-15	2.0 "Hg	5 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: 03/10/21

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# 2102642**

Two 6 Liter Summa Canister samples were received on February 25, 2021. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

**Receiving Notes**

The Chain of Custody (COC) information for sample SVE\_South\_PreCarbon\_022321 did not match the information on the canister with regard to canister barcode. The sample labeled SL0123 on the COC is labeled as 6L0123 on the canister. The client was notified of the discrepancy and the information on the canister was used to process and report the sample.

**Analytical Notes**

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page.

**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\_022321**

**Lab ID#: 2102642-01A**

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
1,1-Dichloroethene	1.2	1.5	4.9	6.0
trans-1,2-Dichloroethene	0.62	0.88	2.4	3.5
1,1-Dichloroethane	0.46	0.60	1.9	2.4
cis-1,2-Dichloroethene	0.62	38	2.4	150
1,1,1-Trichloroethane	0.46	1.3	2.5	7.0
Trichloroethene	0.62	6.8	3.3	36

**Client Sample ID: SVE\_South\_PreCarbon\_022321**

**Lab ID#: 2102642-02A**

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
cis-1,2-Dichloroethene	11	32	46	120
Trichloroethene	11	73	62	390
Tetrachloroethene	11	2700	78	18000



Air Toxics

Client Sample ID: SVE\_South\_PostCarbon\_022321

Lab ID#: 2102642-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	p030427	Date of Collection:	2/23/21 7:55:00 AM
Dil. Factor:	1.55	Date of Analysis:	3/5/21 08:41 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.62	Not Detected	3.1	Not Detected
Freon 114	0.62	Not Detected	4.3	Not Detected
Chloromethane	7.8	Not Detected	16	Not Detected
Vinyl Chloride	0.62	Not Detected	1.6	Not Detected
Bromomethane	7.8	Not Detected	30	Not Detected
Chloroethane	3.1	Not Detected	8.2	Not Detected
Freon 11	0.62	Not Detected	3.5	Not Detected
Freon 113	0.62	Not Detected	4.8	Not Detected
1,1-Dichloroethene	1.2	1.5	4.9	6.0
Acetone	7.8	Not Detected	18	Not Detected
Carbon Disulfide	3.1	Not Detected	9.6	Not Detected
Methylene Chloride	7.8	Not Detected	27	Not Detected
trans-1,2-Dichloroethene	0.62	0.88	2.4	3.5
1,1-Dichloroethane	0.46	0.60	1.9	2.4
2-Butanone (Methyl Ethyl Ketone)	3.1	Not Detected	9.1	Not Detected
cis-1,2-Dichloroethene	0.62	38	2.4	150
Chloroform	0.46	Not Detected	2.3	Not Detected
1,1,1-Trichloroethane	0.46	1.3	2.5	7.0
Carbon Tetrachloride	1.2	Not Detected	7.8	Not Detected
Benzene	0.62	Not Detected	2.0	Not Detected
1,2-Dichloroethane	1.2	Not Detected	5.0	Not Detected
Trichloroethene	0.62	6.8	3.3	36
1,2-Dichloropropane	0.62	Not Detected	2.9	Not Detected
Bromodichloromethane	0.46	Not Detected	3.1	Not Detected
cis-1,3-Dichloropropene	0.62	Not Detected	2.8	Not Detected
4-Methyl-2-pentanone	0.62	Not Detected	2.5	Not Detected
Toluene	0.62	Not Detected	2.3	Not Detected
trans-1,3-Dichloropropene	0.62	Not Detected	2.8	Not Detected
1,1,2-Trichloroethane	0.62	Not Detected	3.4	Not Detected
Tetrachloroethene	0.62	Not Detected	4.2	Not Detected
2-Hexanone	3.1	Not Detected	13	Not Detected
Dibromochloromethane	0.62	Not Detected	5.3	Not Detected
1,2-Dibromoethane (EDB)	1.2	Not Detected	9.5	Not Detected
Chlorobenzene	0.46	Not Detected	2.1	Not Detected
Ethyl Benzene	0.62	Not Detected	2.7	Not Detected
m,p-Xylene	1.2	Not Detected	5.4	Not Detected
o-Xylene	0.62	Not Detected	2.7	Not Detected
Styrene	0.62	Not Detected	2.6	Not Detected
Bromoform	0.62	Not Detected	6.4	Not Detected
1,1,2,2-Tetrachloroethane	0.62	Not Detected	4.2	Not Detected
4-Ethyltoluene	0.62	Not Detected	3.0	Not Detected
1,3,5-Trimethylbenzene	0.62	Not Detected	3.0	Not Detected





Air Toxics

Client Sample ID: SVE\_South\_PostCarbon\_022321

Lab ID#: 2102642-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	p030427	Date of Collection:	2/23/21 7:55:00 AM
Dil. Factor:	1.55	Date of Analysis:	3/5/21 08:41 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,2,4-Trimethylbenzene	1.2	Not Detected	6.1	Not Detected
1,3-Dichlorobenzene	0.62	Not Detected	3.7	Not Detected
1,4-Dichlorobenzene	0.62	Not Detected	3.7	Not Detected
alpha-Chlorotoluene	1.2	Not Detected	6.4	Not Detected
1,2-Dichlorobenzene	0.62	Not Detected	3.7	Not Detected
1,2,4-Trichlorobenzene	3.1	Not Detected	23	Not Detected
Hexachlorobutadiene	3.1	Not Detected	33	Not Detected
Vinyl Acetate	3.1	Not Detected	11	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	92	70-130
1,2-Dichloroethane-d4	112	70-130
4-Bromofluorobenzene	116	70-130



Air Toxics

Client Sample ID: SVE\_South\_PreCarbon\_022321

Lab ID#: 2102642-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	p030425	Date of Collection:	2/23/21 8:10:00 AM
Dil. Factor:	28.7	Date of Analysis:	3/5/21 02:17 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	11	Not Detected	57	Not Detected
Freon 114	11	Not Detected	80	Not Detected
Chloromethane	140	Not Detected	300	Not Detected
Vinyl Chloride	11	Not Detected	29	Not Detected
Bromomethane	140	Not Detected	560	Not Detected
Chloroethane	57	Not Detected	150	Not Detected
Freon 11	11	Not Detected	64	Not Detected
Freon 113	11	Not Detected	88	Not Detected
1,1-Dichloroethene	23	Not Detected	91	Not Detected
Acetone	140	Not Detected	340	Not Detected
Carbon Disulfide	57	Not Detected	180	Not Detected
Methylene Chloride	140	Not Detected	500	Not Detected
trans-1,2-Dichloroethene	11	Not Detected	46	Not Detected
1,1-Dichloroethane	8.6	Not Detected	35	Not Detected
2-Butanone (Methyl Ethyl Ketone)	57	Not Detected	170	Not Detected
cis-1,2-Dichloroethene	11	32	46	120
Chloroform	8.6	Not Detected	42	Not Detected
1,1,1-Trichloroethane	8.6	Not Detected	47	Not Detected
Carbon Tetrachloride	23	Not Detected	140	Not Detected
Benzene	11	Not Detected	37	Not Detected
1,2-Dichloroethane	23	Not Detected	93	Not Detected
Trichloroethene	11	73	62	390
1,2-Dichloropropane	11	Not Detected	53	Not Detected
Bromodichloromethane	8.6	Not Detected	58	Not Detected
cis-1,3-Dichloropropene	11	Not Detected	52	Not Detected
4-Methyl-2-pentanone	11	Not Detected	47	Not Detected
Toluene	11	Not Detected	43	Not Detected
trans-1,3-Dichloropropene	11	Not Detected	52	Not Detected
1,1,2-Trichloroethane	11	Not Detected	63	Not Detected
Tetrachloroethene	11	2700	78	18000
2-Hexanone	57	Not Detected	240	Not Detected
Dibromochloromethane	11	Not Detected	98	Not Detected
1,2-Dibromoethane (EDB)	23	Not Detected	180	Not Detected
Chlorobenzene	8.6	Not Detected	40	Not Detected
Ethyl Benzene	11	Not Detected	50	Not Detected
m,p-Xylene	23	Not Detected	100	Not Detected
o-Xylene	11	Not Detected	50	Not Detected
Styrene	11	Not Detected	49	Not Detected
Bromoform	11	Not Detected	120	Not Detected
1,1,2,2-Tetrachloroethane	11	Not Detected	79	Not Detected
4-Ethyltoluene	11	Not Detected	56	Not Detected
1,3,5-Trimethylbenzene	11	Not Detected	56	Not Detected



Air Toxics

Client Sample ID: SVE\_South\_PreCarbon\_022321

Lab ID#: 2102642-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	p030425	Date of Collection:	2/23/21 8:10:00 AM
Dil. Factor:	28.7	Date of Analysis:	3/5/21 02:17 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,2,4-Trimethylbenzene	23	Not Detected	110	Not Detected
1,3-Dichlorobenzene	11	Not Detected	69	Not Detected
1,4-Dichlorobenzene	11	Not Detected	69	Not Detected
alpha-Chlorotoluene	23	Not Detected	120	Not Detected
1,2-Dichlorobenzene	11	Not Detected	69	Not Detected
1,2,4-Trichlorobenzene	57	Not Detected	430	Not Detected
Hexachlorobutadiene	57	Not Detected	610	Not Detected
Vinyl Acetate	57	Not Detected	200	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	95	70-130
1,2-Dichloroethane-d4	109	70-130
4-Bromofluorobenzene	114	70-130



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 2102642-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	p030407e	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 3/4/21 02:19 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	5.0	Not Detected	19	Not Detected
Chloroethane	2.0	Not Detected	5.3	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	5.0	Not Detected	17	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)	2.0	Not Detected	5.9	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	0.80	Not Detected	3.2	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	2.0	Not Detected	8.2	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#: 2102642-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	p030407e	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 3/4/21 02:19 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	2.0	Not Detected	7.0	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	94	70-130
1,2-Dichloroethane-d4	115	70-130
4-Bromofluorobenzene	114	70-130

Client Sample ID: CCV

Lab ID#: 2102642-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	p030402	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 3/4/21 10:13 AM

Compound	%Recovery
Freon 12	121
Freon 114	101
Chloromethane	113
Vinyl Chloride	97
Bromomethane	102
Chloroethane	90
Freon 11	118
Freon 113	106
1,1-Dichloroethene	101
Acetone	78
Carbon Disulfide	90
Methylene Chloride	82
trans-1,2-Dichloroethene	97
1,1-Dichloroethane	92
2-Butanone (Methyl Ethyl Ketone)	88
cis-1,2-Dichloroethene	98
Chloroform	108
1,1,1-Trichloroethane	109
Carbon Tetrachloride	116
Benzene	96
1,2-Dichloroethane	120
Trichloroethene	102
1,2-Dichloropropane	76
Bromodichloromethane	107
cis-1,3-Dichloropropene	98
4-Methyl-2-pentanone	72
Toluene	94
trans-1,3-Dichloropropene	108
1,1,2-Trichloroethane	93
Tetrachloroethene	113
2-Hexanone	76
Dibromochloromethane	109
1,2-Dibromoethane (EDB)	96
Chlorobenzene	98
Ethyl Benzene	100
m,p-Xylene	102
o-Xylene	101
Styrene	104
Bromoform	118
1,1,2,2-Tetrachloroethane	84
4-Ethyltoluene	101
1,3,5-Trimethylbenzene	98

Client Sample ID: CCV

Lab ID#: 2102642-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	p030402	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 3/4/21 10:13 AM

Compound	%Recovery
1,2,4-Trimethylbenzene	105
1,3-Dichlorobenzene	100
1,4-Dichlorobenzene	100
alpha-Chlorotoluene	101
1,2-Dichlorobenzene	100
1,2,4-Trichlorobenzene	112
Hexachlorobutadiene	122
Vinyl Acetate	100

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	95	70-130
1,2-Dichloroethane-d4	110	70-130
4-Bromofluorobenzene	115	70-130

Client Sample ID: LCS

Lab ID#: 2102642-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	p030403	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 3/4/21 10:42 AM

Compound	%Recovery	Method Limits
Freon 12	122	70-130
Freon 114	106	70-130
Chloromethane	101	70-130
Vinyl Chloride	110	70-130
Bromomethane	102	70-130
Chloroethane	91	70-130
Freon 11	119	70-130
Freon 113	108	70-130
1,1-Dichloroethene	110	70-130
Acetone	82	70-130
Carbon Disulfide	92	70-130
Methylene Chloride	83	70-130
trans-1,2-Dichloroethene	101	70-130
1,1-Dichloroethane	93	70-130
2-Butanone (Methyl Ethyl Ketone)	87	70-130
cis-1,2-Dichloroethene	100	70-130
Chloroform	111	70-130
1,1,1-Trichloroethane	110	70-130
Carbon Tetrachloride	116	70-130
Benzene	94	70-130
1,2-Dichloroethane	118	70-130
Trichloroethene	99	70-130
1,2-Dichloropropane	76	70-130
Bromodichloromethane	108	70-130
cis-1,3-Dichloropropene	96	70-130
4-Methyl-2-pentanone	73	70-130
Toluene	91	70-130
trans-1,3-Dichloropropene	106	70-130
1,1,2-Trichloroethane	93	70-130
Tetrachloroethene	111	70-130
2-Hexanone	73	70-130
Dibromochloromethane	106	70-130
1,2-Dibromoethane (EDB)	94	70-130
Chlorobenzene	96	70-130
Ethyl Benzene	99	70-130
m,p-Xylene	99	70-130
o-Xylene	99	70-130
Styrene	100	70-130
Bromoform	116	70-130
1,1,2,2-Tetrachloroethane	82	70-130
4-Ethyltoluene	97	70-130
1,3,5-Trimethylbenzene	97	70-130



Client Sample ID: LCS

Lab ID#: 2102642-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	p030403	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 3/4/21 10:42 AM

Compound	%Recovery	Method Limits
1,2,4-Trimethylbenzene	104	70-130
1,3-Dichlorobenzene	98	70-130
1,4-Dichlorobenzene	99	70-130
alpha-Chlorotoluene	97	70-130
1,2-Dichlorobenzene	96	70-130
1,2,4-Trichlorobenzene	117	70-130
Hexachlorobutadiene	132 Q	70-130
Vinyl Acetate	106	60-140

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	95	70-130
1,2-Dichloroethane-d4	113	70-130
4-Bromofluorobenzene	115	70-130

Client Sample ID: LCSD

Lab ID#: 2102642-05AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	p030404	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 3/4/21 11:11 AM

Compound	%Recovery	Method Limits
Freon 12	124	70-130
Freon 114	106	70-130
Chloromethane	97	70-130
Vinyl Chloride	107	70-130
Bromomethane	100	70-130
Chloroethane	99	70-130
Freon 11	120	70-130
Freon 113	109	70-130
1,1-Dichloroethene	111	70-130
Acetone	82	70-130
Carbon Disulfide	93	70-130
Methylene Chloride	82	70-130
trans-1,2-Dichloroethene	100	70-130
1,1-Dichloroethane	94	70-130
2-Butanone (Methyl Ethyl Ketone)	93	70-130
cis-1,2-Dichloroethene	104	70-130
Chloroform	113	70-130
1,1,1-Trichloroethane	112	70-130
Carbon Tetrachloride	121	70-130
Benzene	95	70-130
1,2-Dichloroethane	118	70-130
Trichloroethene	102	70-130
1,2-Dichloropropane	77	70-130
Bromodichloromethane	106	70-130
cis-1,3-Dichloropropene	97	70-130
4-Methyl-2-pentanone	72	70-130
Toluene	91	70-130
trans-1,3-Dichloropropene	109	70-130
1,1,2-Trichloroethane	94	70-130
Tetrachloroethene	111	70-130
2-Hexanone	72	70-130
Dibromochloromethane	109	70-130
1,2-Dibromoethane (EDB)	97	70-130
Chlorobenzene	98	70-130
Ethyl Benzene	100	70-130
m,p-Xylene	102	70-130
o-Xylene	102	70-130
Styrene	104	70-130
Bromoform	117	70-130
1,1,2,2-Tetrachloroethane	85	70-130
4-Ethyltoluene	99	70-130
1,3,5-Trimethylbenzene	97	70-130

Client Sample ID: LCSD

Lab ID#: 2102642-05AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	p030404	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 3/4/21 11:11 AM

Compound	%Recovery	Method Limits
1,2,4-Trimethylbenzene	106	70-130
1,3-Dichlorobenzene	99	70-130
1,4-Dichlorobenzene	101	70-130
alpha-Chlorotoluene	101	70-130
1,2-Dichlorobenzene	99	70-130
1,2,4-Trichlorobenzene	124	70-130
Hexachlorobutadiene	137 Q	70-130
Vinyl Acetate	110	60-140

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	95	70-130
1,2-Dichloroethane-d4	116	70-130
4-Bromofluorobenzene	116	70-130

4/23/2021

Ms. Lindsay Wallis  
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5820 SW Kelly Ave  
Unit B  
Portland OR 97239

Project Name: Nustar Van SVE O&M  
Project #: 0060-002-012  
Workorder #: 2104254

Dear Ms. Lindsay Wallis

The following report includes the data for the above referenced project for sample(s) received on 4/13/2021 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: Monica Tran at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Monica Tran  
Project Manager

**WORK ORDER #: 2104254**

Work Order Summary

<b>CLIENT:</b>	Ms. Lindsay Wallis Cascadia Associates, LLC 5820 SW Kelly Ave Unit B Portland, OR 97239	<b>BILL TO:</b>	Ms. Lindsay Wallis Cascadia Associates, LLC 5820 SW Kelly Ave Unit B Portland, OR 97239
<b>PHONE:</b>	(503)906-6577	<b>P.O. #</b>	0060-002-004
<b>FAX:</b>	(503)906-6567	<b>PROJECT #</b>	0060-002-012 Nustar Van SVE O&M
<b>DATE RECEIVED:</b>	04/13/2021	<b>CONTACT:</b>	Monica Tran
<b>DATE COMPLETED:</b>	04/23/2021		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	SVE_South_PostCarbon_040921	TO-15	4.5 "Hg	1.8 psi
02A	SVE_South_PreCarbon_040921	TO-15	4.9 "Hg	1.9 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: 04/23/21

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

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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# 2104254**

Two 6 Liter Summa Canister samples were received on April 13, 2021. 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\_040921 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\_040921**

**Lab ID#: 2104254-01A**

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
Freon 12	0.53	0.63	2.6	3.1
Acetone	6.6	18	16	43
trans-1,2-Dichloroethene	0.53	2.4	2.1	9.7
1,1-Dichloroethane	0.40	1.2	1.6	5.0
cis-1,2-Dichloroethene	0.53	99	2.1	390
Chloroform	0.40	0.84	1.9	4.1
1,1,1-Trichloroethane	0.40	1.3	2.2	7.1
Trichloroethene	0.53	7.6	2.8	41
1,3-Dichlorobenzene	0.53	0.80	3.2	4.8

**Client Sample ID: SVE\_South\_PreCarbon\_040921**

**Lab ID#: 2104254-02A**

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
cis-1,2-Dichloroethene	4.3	38	17	150
1,1,1-Trichloroethane	3.2	6.0	18	32
Trichloroethene	4.3	84	23	450
Tetrachloroethene	4.3	2000	29	14000



Air Toxics

Client Sample ID: SVE\_South\_PostCarbon\_040921

Lab ID#: 2104254-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3042006	Date of Collection:	4/9/21 2:15:00 PM
Dil. Factor:	1.32	Date of Analysis:	4/20/21 01:26 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.53	0.63	2.6	3.1
Freon 114	0.53	Not Detected	3.7	Not Detected
Chloromethane	6.6	Not Detected	14	Not Detected
Vinyl Chloride	0.53	Not Detected	1.3	Not Detected
Bromomethane	6.6	Not Detected	26	Not Detected
Chloroethane	2.6	Not Detected	7.0	Not Detected
Freon 11	0.53	Not Detected	3.0	Not Detected
Freon 113	0.53	Not Detected	4.0	Not Detected
1,1-Dichloroethene	1.0	Not Detected	4.2	Not Detected
Acetone	6.6	18	16	43
Carbon Disulfide	2.6	Not Detected	8.2	Not Detected
Methylene Chloride	6.6	Not Detected	23	Not Detected
trans-1,2-Dichloroethene	0.53	2.4	2.1	9.7
1,1-Dichloroethane	0.40	1.2	1.6	5.0
2-Butanone (Methyl Ethyl Ketone)	2.6	Not Detected	7.8	Not Detected
cis-1,2-Dichloroethene	0.53	99	2.1	390
Chloroform	0.40	0.84	1.9	4.1
1,1,1-Trichloroethane	0.40	1.3	2.2	7.1
Carbon Tetrachloride	1.0	Not Detected	6.6	Not Detected
Benzene	0.53	Not Detected	1.7	Not Detected
1,2-Dichloroethane	1.0	Not Detected	4.3	Not Detected
Trichloroethene	0.53	7.6	2.8	41
1,2-Dichloropropane	0.53	Not Detected	2.4	Not Detected
Bromodichloromethane	0.40	Not Detected	2.6	Not Detected
cis-1,3-Dichloropropene	0.53	Not Detected	2.4	Not Detected
4-Methyl-2-pentanone	0.53	Not Detected	2.2	Not Detected
Toluene	0.53	Not Detected	2.0	Not Detected
trans-1,3-Dichloropropene	0.53	Not Detected	2.4	Not Detected
1,1,2-Trichloroethane	0.53	Not Detected	2.9	Not Detected
Tetrachloroethene	0.53	Not Detected	3.6	Not Detected
2-Hexanone	2.6	Not Detected	11	Not Detected
Dibromochloromethane	0.53	Not Detected	4.5	Not Detected
1,2-Dibromoethane (EDB)	1.0	Not Detected	8.1	Not Detected
Chlorobenzene	0.40	Not Detected	1.8	Not Detected
Ethyl Benzene	0.53	Not Detected	2.3	Not Detected
m,p-Xylene	1.0	Not Detected	4.6	Not Detected
o-Xylene	0.53	Not Detected	2.3	Not Detected
Styrene	0.53	Not Detected	2.2	Not Detected
Bromoform	0.53	Not Detected	5.4	Not Detected
1,1,2,2-Tetrachloroethane	0.53	Not Detected	3.6	Not Detected
4-Ethyltoluene	0.53	Not Detected	2.6	Not Detected
1,3,5-Trimethylbenzene	0.53	Not Detected	2.6	Not Detected





Air Toxics

Client Sample ID: SVE\_South\_PostCarbon\_040921

Lab ID#: 2104254-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3042006	Date of Collection:	4/9/21 2:15:00 PM
Dil. Factor:	1.32	Date of Analysis:	4/20/21 01:26 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,2,4-Trimethylbenzene	1.0	Not Detected	5.2	Not Detected
1,3-Dichlorobenzene	0.53	0.80	3.2	4.8
1,4-Dichlorobenzene	0.53	Not Detected	3.2	Not Detected
alpha-Chlorotoluene	1.0	Not Detected	5.5	Not Detected
1,2-Dichlorobenzene	0.53	Not Detected	3.2	Not Detected
1,2,4-Trichlorobenzene	2.6	Not Detected	20	Not Detected
Hexachlorobutadiene	2.6	Not Detected	28	Not Detected
Vinyl Acetate	2.6	Not Detected	9.3	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	98	70-130
4-Bromofluorobenzene	102	70-130



Air Toxics

Client Sample ID: SVE\_South\_PreCarbon\_040921

Lab ID#: 2104254-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3042007	Date of Collection:	4/9/21 2:25:00 PM
Dil. Factor:	10.8	Date of Analysis:	4/20/21 01:53 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	4.3	Not Detected	21	Not Detected
Freon 114	4.3	Not Detected	30	Not Detected
Chloromethane	54	Not Detected	110	Not Detected
Vinyl Chloride	4.3	Not Detected	11	Not Detected
Bromomethane	54	Not Detected	210	Not Detected
Chloroethane	22	Not Detected	57	Not Detected
Freon 11	4.3	Not Detected	24	Not Detected
Freon 113	4.3	Not Detected	33	Not Detected
1,1-Dichloroethene	8.6	Not Detected	34	Not Detected
Acetone	54	Not Detected	130	Not Detected
Carbon Disulfide	22	Not Detected	67	Not Detected
Methylene Chloride	54	Not Detected	190	Not Detected
trans-1,2-Dichloroethene	4.3	Not Detected	17	Not Detected
1,1-Dichloroethane	3.2	Not Detected	13	Not Detected
2-Butanone (Methyl Ethyl Ketone)	22	Not Detected	64	Not Detected
cis-1,2-Dichloroethene	4.3	38	17	150
Chloroform	3.2	Not Detected	16	Not Detected
1,1,1-Trichloroethane	3.2	6.0	18	32
Carbon Tetrachloride	8.6	Not Detected	54	Not Detected
Benzene	4.3	Not Detected	14	Not Detected
1,2-Dichloroethane	8.6	Not Detected	35	Not Detected
Trichloroethene	4.3	84	23	450
1,2-Dichloropropane	4.3	Not Detected	20	Not Detected
Bromodichloromethane	3.2	Not Detected	22	Not Detected
cis-1,3-Dichloropropene	4.3	Not Detected	20	Not Detected
4-Methyl-2-pentanone	4.3	Not Detected	18	Not Detected
Toluene	4.3	Not Detected	16	Not Detected
trans-1,3-Dichloropropene	4.3	Not Detected	20	Not Detected
1,1,2-Trichloroethane	4.3	Not Detected	24	Not Detected
Tetrachloroethene	4.3	2000	29	14000
2-Hexanone	22	Not Detected	88	Not Detected
Dibromochloromethane	4.3	Not Detected	37	Not Detected
1,2-Dibromoethane (EDB)	8.6	Not Detected	66	Not Detected
Chlorobenzene	3.2	Not Detected	15	Not Detected
Ethyl Benzene	4.3	Not Detected	19	Not Detected
m,p-Xylene	8.6	Not Detected	38	Not Detected
o-Xylene	4.3	Not Detected	19	Not Detected
Styrene	4.3	Not Detected	18	Not Detected
Bromoform	4.3	Not Detected	45	Not Detected
1,1,2,2-Tetrachloroethane	4.3	Not Detected	30	Not Detected
4-Ethyltoluene	4.3	Not Detected	21	Not Detected
1,3,5-Trimethylbenzene	4.3	Not Detected	21	Not Detected



Air Toxics

Client Sample ID: SVE\_South\_PreCarbon\_040921

Lab ID#: 2104254-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3042007	Date of Collection:	4/9/21 2:25:00 PM
Dil. Factor:	10.8	Date of Analysis:	4/20/21 01:53 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,2,4-Trimethylbenzene	8.6	Not Detected	42	Not Detected
1,3-Dichlorobenzene	4.3	Not Detected	26	Not Detected
1,4-Dichlorobenzene	4.3	Not Detected	26	Not Detected
alpha-Chlorotoluene	8.6	Not Detected	45	Not Detected
1,2-Dichlorobenzene	4.3	Not Detected	26	Not Detected
1,2,4-Trichlorobenzene	22	Not Detected	160	Not Detected
Hexachlorobutadiene	22	Not Detected	230	Not Detected
Vinyl Acetate	22	Not Detected	76	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	100	70-130
4-Bromofluorobenzene	102	70-130



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 2104254-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3042005d	Date of Collection:	NA
Dil. Factor:	1.00	Date of Analysis:	4/20/21 12:23 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	5.0	Not Detected	19	Not Detected
Chloroethane	2.0	Not Detected	5.3	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	5.0	Not Detected	17	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)	2.0	Not Detected	5.9	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	0.80	Not Detected	3.2	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	2.0	Not Detected	8.2	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#: 2104254-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3042005d	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/20/21 12:23 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	2.0	Not Detected	7.0	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	97	70-130
4-Bromofluorobenzene	103	70-130

Client Sample ID: CCV

Lab ID#: 2104254-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3042002	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/20/21 10:45 AM

Compound	%Recovery
Freon 12	113
Freon 114	112
Chloromethane	97
Vinyl Chloride	109
Bromomethane	103
Chloroethane	100
Freon 11	110
Freon 113	112
1,1-Dichloroethene	113
Acetone	100
Carbon Disulfide	107
Methylene Chloride	94
trans-1,2-Dichloroethene	107
1,1-Dichloroethane	104
2-Butanone (Methyl Ethyl Ketone)	103
cis-1,2-Dichloroethene	107
Chloroform	107
1,1,1-Trichloroethane	104
Carbon Tetrachloride	107
Benzene	98
1,2-Dichloroethane	104
Trichloroethene	101
1,2-Dichloropropane	93
Bromodichloromethane	104
cis-1,3-Dichloropropene	104
4-Methyl-2-pentanone	93
Toluene	94
trans-1,3-Dichloropropene	108
1,1,2-Trichloroethane	103
Tetrachloroethene	107
2-Hexanone	98
Dibromochloromethane	107
1,2-Dibromoethane (EDB)	105
Chlorobenzene	100
Ethyl Benzene	98
m,p-Xylene	100
o-Xylene	100
Styrene	105
Bromoform	110
1,1,2,2-Tetrachloroethane	95
4-Ethyltoluene	103
1,3,5-Trimethylbenzene	104

Client Sample ID: CCV

Lab ID#: 2104254-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3042002	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/20/21 10:45 AM

Compound	%Recovery
1,2,4-Trimethylbenzene	106
1,3-Dichlorobenzene	104
1,4-Dichlorobenzene	104
alpha-Chlorotoluene	103
1,2-Dichlorobenzene	106
1,2,4-Trichlorobenzene	114
Hexachlorobutadiene	110
Vinyl Acetate	118

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	98	70-130
4-Bromofluorobenzene	104	70-130

Client Sample ID: LCS

Lab ID#: 2104254-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3042003	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/20/21 11:12 AM

Compound	%Recovery	Method Limits
Freon 12	109	70-130
Freon 114	112	70-130
Chloromethane	95	70-130
Vinyl Chloride	111	70-130
Bromomethane	103	70-130
Chloroethane	100	70-130
Freon 11	110	70-130
Freon 113	112	70-130
1,1-Dichloroethene	114	70-130
Acetone	100	70-130
Carbon Disulfide	105	70-130
Methylene Chloride	91	70-130
trans-1,2-Dichloroethene	109	70-130
1,1-Dichloroethane	103	70-130
2-Butanone (Methyl Ethyl Ketone)	103	70-130
cis-1,2-Dichloroethene	108	70-130
Chloroform	107	70-130
1,1,1-Trichloroethane	105	70-130
Carbon Tetrachloride	109	70-130
Benzene	100	70-130
1,2-Dichloroethane	106	70-130
Trichloroethene	104	70-130
1,2-Dichloropropane	93	70-130
Bromodichloromethane	105	70-130
cis-1,3-Dichloropropene	106	70-130
4-Methyl-2-pentanone	96	70-130
Toluene	95	70-130
trans-1,3-Dichloropropene	108	70-130
1,1,2-Trichloroethane	103	70-130
Tetrachloroethene	108	70-130
2-Hexanone	102	70-130
Dibromochloromethane	110	70-130
1,2-Dibromoethane (EDB)	107	70-130
Chlorobenzene	101	70-130
Ethyl Benzene	99	70-130
m,p-Xylene	104	70-130
o-Xylene	100	70-130
Styrene	104	70-130
Bromoform	111	70-130
1,1,2,2-Tetrachloroethane	95	70-130
4-Ethyltoluene	106	70-130
1,3,5-Trimethylbenzene	102	70-130



Client Sample ID: LCS

Lab ID#: 2104254-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3042003	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/20/21 11:12 AM

Compound	%Recovery	Method Limits
1,2,4-Trimethylbenzene	107	70-130
1,3-Dichlorobenzene	104	70-130
1,4-Dichlorobenzene	105	70-130
alpha-Chlorotoluene	109	70-130
1,2-Dichlorobenzene	103	70-130
1,2,4-Trichlorobenzene	122	70-130
Hexachlorobutadiene	122	70-130
Vinyl Acetate	113	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	97	70-130
4-Bromofluorobenzene	104	70-130

Client Sample ID: LCSD

Lab ID#: 2104254-05AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3042004	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/20/21 11:39 AM

Compound	%Recovery	Method Limits
Freon 12	110	70-130
Freon 114	110	70-130
Chloromethane	95	70-130
Vinyl Chloride	106	70-130
Bromomethane	100	70-130
Chloroethane	101	70-130
Freon 11	109	70-130
Freon 113	113	70-130
1,1-Dichloroethene	114	70-130
Acetone	99	70-130
Carbon Disulfide	106	70-130
Methylene Chloride	89	70-130
trans-1,2-Dichloroethene	108	70-130
1,1-Dichloroethane	102	70-130
2-Butanone (Methyl Ethyl Ketone)	103	70-130
cis-1,2-Dichloroethene	106	70-130
Chloroform	105	70-130
1,1,1-Trichloroethane	103	70-130
Carbon Tetrachloride	109	70-130
Benzene	97	70-130
1,2-Dichloroethane	104	70-130
Trichloroethene	104	70-130
1,2-Dichloropropane	77	70-130
Bromodichloromethane	103	70-130
cis-1,3-Dichloropropene	106	70-130
4-Methyl-2-pentanone	94	70-130
Toluene	94	70-130
trans-1,3-Dichloropropene	108	70-130
1,1,2-Trichloroethane	101	70-130
Tetrachloroethene	107	70-130
2-Hexanone	99	70-130
Dibromochloromethane	108	70-130
1,2-Dibromoethane (EDB)	106	70-130
Chlorobenzene	99	70-130
Ethyl Benzene	98	70-130
m,p-Xylene	102	70-130
o-Xylene	98	70-130
Styrene	101	70-130
Bromoform	109	70-130
1,1,2,2-Tetrachloroethane	93	70-130
4-Ethyltoluene	104	70-130
1,3,5-Trimethylbenzene	99	70-130

Client Sample ID: LCSD

Lab ID#: 2104254-05AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3042004	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 4/20/21 11:39 AM

Compound	%Recovery	Method Limits
1,2,4-Trimethylbenzene	104	70-130
1,3-Dichlorobenzene	104	70-130
1,4-Dichlorobenzene	102	70-130
alpha-Chlorotoluene	107	70-130
1,2-Dichlorobenzene	101	70-130
1,2,4-Trichlorobenzene	122	70-130
Hexachlorobutadiene	121	70-130
Vinyl Acetate	113	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	98	70-130
4-Bromofluorobenzene	103	70-130

7/6/2021

Ms. Lindsay Wallis  
Cascadia Associates, LLC  
5820 SW Kelly Ave  
Unit B  
Portland OR 97239

Project Name: Nustar Van SVE O+M  
Project #:  
Workorder #: 2106528

Dear Ms. Lindsay Wallis

The following report includes the data for the above referenced project for sample(s) received on 6/22/2021 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: Monica Tran at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Monica Tran  
Project Manager

**WORK ORDER #: 2106528**

Work Order Summary

<b>CLIENT:</b>	Ms. Lindsay Wallis Cascadia Associates, LLC 5820 SW Kelly Ave Unit B Portland, OR 97239	<b>BILL TO:</b>	Ms. Lindsay Wallis Cascadia Associates, LLC 5820 SW Kelly Ave Unit B Portland, OR 97239
<b>PHONE:</b>	(503)906-6577	<b>P.O. #</b>	0060-002-004
<b>FAX:</b>	(503)906-6567	<b>PROJECT #</b>	Nustar Van SVE O+M
<b>DATE RECEIVED:</b>	06/22/2021	<b>CONTACT:</b>	Monica Tran
<b>DATE COMPLETED:</b>	07/06/2021		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	SVE_South_Precarbon_061721	TO-15	5.5 "Hg	1.9 psi
02A	SVE_South_Postcarbon_061721	TO-15	3.9 "Hg	1.8 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: 07/06/21

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# 2106528**

Two 6 Liter Summa Canister samples were received on June 22, 2021. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

**Receiving Notes**

The Chain of Custody (COC) information for sample SVE\_South\_Postcarbon\_061721 did not match the information on the canister with regard to canister barcode. The sample labeled 6L2525 on the COC is labeled as 6L2505 on the canister. The client was notified of the discrepancy and the information on the canister was used to process and report the sample.

**Analytical Notes**

Dilution was performed on samples SVE\_South\_Precarbon\_061721 and SVE\_South\_Postcarbon\_061721 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\_Precarbon\_061721**

**Lab ID#: 2106528-01A**

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
2-Butanone (Methyl Ethyl Ketone)	18	44	54	130
cis-1,2-Dichloroethene	3.7	24	15	94
1,1,1-Trichloroethane	2.8	5.6	15	31
Trichloroethene	3.7	70	20	380
Tetrachloroethene	3.7	1600	25	11000

**Client Sample ID: SVE\_South\_Postcarbon\_061721**

**Lab ID#: 2106528-02A**

<b>Compound</b>	<b>Rpt. Limit (ppbv)</b>	<b>Amount (ppbv)</b>	<b>Rpt. Limit (ug/m3)</b>	<b>Amount (ug/m3)</b>
2-Butanone (Methyl Ethyl Ketone)	13	44	38	130
cis-1,2-Dichloroethene	2.6	100	10	400
1,1,1-Trichloroethane	1.9	170	10	940
Trichloroethene	2.6	890	14	4800
Tetrachloroethene	2.6	50	18	340



Air Toxics

Client Sample ID: SVE\_South\_Precarbon\_061721

Lab ID#: 2106528-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070220	Date of Collection:	6/17/21 12:40:00 PM
Dil. Factor:	9.22	Date of Analysis:	7/2/21 10:41 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	3.7	Not Detected	18	Not Detected
Freon 114	3.7	Not Detected	26	Not Detected
Chloromethane	46	Not Detected	95	Not Detected
Vinyl Chloride	3.7	Not Detected	9.4	Not Detected
Bromomethane	46	Not Detected	180	Not Detected
Chloroethane	18	Not Detected	49	Not Detected
Freon 11	3.7	Not Detected	21	Not Detected
Freon 113	3.7	Not Detected	28	Not Detected
1,1-Dichloroethene	7.4	Not Detected	29	Not Detected
Acetone	46	Not Detected	110	Not Detected
Carbon Disulfide	18	Not Detected	57	Not Detected
Methylene Chloride	46	Not Detected	160	Not Detected
trans-1,2-Dichloroethene	3.7	Not Detected	15	Not Detected
1,1-Dichloroethane	2.8	Not Detected	11	Not Detected
2-Butanone (Methyl Ethyl Ketone)	18	44	54	130
cis-1,2-Dichloroethene	3.7	24	15	94
Chloroform	2.8	Not Detected	14	Not Detected
1,1,1-Trichloroethane	2.8	5.6	15	31
Carbon Tetrachloride	7.4	Not Detected	46	Not Detected
Benzene	3.7	Not Detected	12	Not Detected
1,2-Dichloroethane	7.4	Not Detected	30	Not Detected
Trichloroethene	3.7	70	20	380
1,2-Dichloropropane	3.7	Not Detected	17	Not Detected
Bromodichloromethane	2.8	Not Detected	18	Not Detected
cis-1,3-Dichloropropene	3.7	Not Detected	17	Not Detected
4-Methyl-2-pentanone	3.7	Not Detected	15	Not Detected
Toluene	3.7	Not Detected	14	Not Detected
trans-1,3-Dichloropropene	3.7	Not Detected	17	Not Detected
1,1,2-Trichloroethane	3.7	Not Detected	20	Not Detected
Tetrachloroethene	3.7	1600	25	11000
2-Hexanone	18	Not Detected	76	Not Detected
Dibromochloromethane	3.7	Not Detected	31	Not Detected
1,2-Dibromoethane (EDB)	7.4	Not Detected	57	Not Detected
Chlorobenzene	2.8	Not Detected	13	Not Detected
Ethyl Benzene	3.7	Not Detected	16	Not Detected
m,p-Xylene	7.4	Not Detected	32	Not Detected
o-Xylene	3.7	Not Detected	16	Not Detected
Styrene	3.7	Not Detected	16	Not Detected
Bromoform	3.7	Not Detected	38	Not Detected
1,1,2,2-Tetrachloroethane	3.7	Not Detected	25	Not Detected
4-Ethyltoluene	3.7	Not Detected	18	Not Detected
1,3,5-Trimethylbenzene	3.7	Not Detected	18	Not Detected





Air Toxics

Client Sample ID: SVE\_South\_Precarbon\_061721

Lab ID#: 2106528-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070220	Date of Collection:	6/17/21 12:40:00 PM
Dil. Factor:	9.22	Date of Analysis:	7/2/21 10:41 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,2,4-Trimethylbenzene	7.4	Not Detected	36	Not Detected
1,3-Dichlorobenzene	3.7	Not Detected	22	Not Detected
1,4-Dichlorobenzene	3.7	Not Detected	22	Not Detected
alpha-Chlorotoluene	7.4	Not Detected	38	Not Detected
1,2-Dichlorobenzene	3.7	Not Detected	22	Not Detected
1,2,4-Trichlorobenzene	18	Not Detected	140	Not Detected
Hexachlorobutadiene	18	Not Detected	200	Not Detected
Vinyl Acetate	18	Not Detected	65	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	96	70-130
1,2-Dichloroethane-d4	100	70-130
4-Bromofluorobenzene	99	70-130



Air Toxics

Client Sample ID: SVE\_South\_Postcarbon\_061721

Lab ID#: 2106528-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070221	Date of Collection:	6/17/21 12:30:00 PM
Dil. Factor:	6.45	Date of Analysis:	7/2/21 11:09 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	2.6	Not Detected	13	Not Detected
Freon 114	2.6	Not Detected	18	Not Detected
Chloromethane	32	Not Detected	66	Not Detected
Vinyl Chloride	2.6	Not Detected	6.6	Not Detected
Bromomethane	32	Not Detected	120	Not Detected
Chloroethane	13	Not Detected	34	Not Detected
Freon 11	2.6	Not Detected	14	Not Detected
Freon 113	2.6	Not Detected	20	Not Detected
1,1-Dichloroethene	5.2	Not Detected	20	Not Detected
Acetone	32	Not Detected	77	Not Detected
Carbon Disulfide	13	Not Detected	40	Not Detected
Methylene Chloride	32	Not Detected	110	Not Detected
trans-1,2-Dichloroethene	2.6	Not Detected	10	Not Detected
1,1-Dichloroethane	1.9	Not Detected	7.8	Not Detected
2-Butanone (Methyl Ethyl Ketone)	13	44	38	130
cis-1,2-Dichloroethene	2.6	100	10	400
Chloroform	1.9	Not Detected	9.4	Not Detected
1,1,1-Trichloroethane	1.9	170	10	940
Carbon Tetrachloride	5.2	Not Detected	32	Not Detected
Benzene	2.6	Not Detected	8.2	Not Detected
1,2-Dichloroethane	5.2	Not Detected	21	Not Detected
Trichloroethene	2.6	890	14	4800
1,2-Dichloropropane	2.6	Not Detected	12	Not Detected
Bromodichloromethane	1.9	Not Detected	13	Not Detected
cis-1,3-Dichloropropene	2.6	Not Detected	12	Not Detected
4-Methyl-2-pentanone	2.6	Not Detected	10	Not Detected
Toluene	2.6	Not Detected	9.7	Not Detected
trans-1,3-Dichloropropene	2.6	Not Detected	12	Not Detected
1,1,2-Trichloroethane	2.6	Not Detected	14	Not Detected
Tetrachloroethene	2.6	50	18	340
2-Hexanone	13	Not Detected	53	Not Detected
Dibromochloromethane	2.6	Not Detected	22	Not Detected
1,2-Dibromoethane (EDB)	5.2	Not Detected	40	Not Detected
Chlorobenzene	1.9	Not Detected	8.9	Not Detected
Ethyl Benzene	2.6	Not Detected	11	Not Detected
m,p-Xylene	5.2	Not Detected	22	Not Detected
o-Xylene	2.6	Not Detected	11	Not Detected
Styrene	2.6	Not Detected	11	Not Detected
Bromoform	2.6	Not Detected	27	Not Detected
1,1,2,2-Tetrachloroethane	2.6	Not Detected	18	Not Detected
4-Ethyltoluene	2.6	Not Detected	13	Not Detected
1,3,5-Trimethylbenzene	2.6	Not Detected	13	Not Detected



Air Toxics

Client Sample ID: SVE\_South\_Postcarbon\_061721

Lab ID#: 2106528-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070221	Date of Collection:	6/17/21 12:30:00 PM
Dil. Factor:	6.45	Date of Analysis:	7/2/21 11:09 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,2,4-Trimethylbenzene	5.2	Not Detected	25	Not Detected
1,3-Dichlorobenzene	2.6	Not Detected	16	Not Detected
1,4-Dichlorobenzene	2.6	Not Detected	16	Not Detected
alpha-Chlorotoluene	5.2	Not Detected	27	Not Detected
1,2-Dichlorobenzene	2.6	Not Detected	16	Not Detected
1,2,4-Trichlorobenzene	13	Not Detected	96	Not Detected
Hexachlorobutadiene	13	Not Detected	140	Not Detected
Vinyl Acetate	13	Not Detected	45	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	100	70-130
4-Bromofluorobenzene	97	70-130



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 2106528-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070206d	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/2/21 12:08 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	5.0	Not Detected	19	Not Detected
Chloroethane	2.0	Not Detected	5.3	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	5.0	Not Detected	17	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)	2.0	Not Detected	5.9	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	0.80	Not Detected	3.2	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	2.0	Not Detected	8.2	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#: 2106528-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070206d	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/2/21 12:08 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	2.0	Not Detected	7.0	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	96	70-130
1,2-Dichloroethane-d4	101	70-130
4-Bromofluorobenzene	98	70-130

Client Sample ID: CCV

Lab ID#: 2106528-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070202	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/2/21 09:36 AM

Compound	%Recovery
Freon 12	100
Freon 114	99
Chloromethane	109
Vinyl Chloride	100
Bromomethane	98
Chloroethane	97
Freon 11	103
Freon 113	98
1,1-Dichloroethene	91
Acetone	94
Carbon Disulfide	99
Methylene Chloride	98
trans-1,2-Dichloroethene	89
1,1-Dichloroethane	94
2-Butanone (Methyl Ethyl Ketone)	95
cis-1,2-Dichloroethene	89
Chloroform	95
1,1,1-Trichloroethane	91
Carbon Tetrachloride	98
Benzene	98
1,2-Dichloroethane	101
Trichloroethene	97
1,2-Dichloropropane	88
Bromodichloromethane	93
cis-1,3-Dichloropropene	96
4-Methyl-2-pentanone	89
Toluene	97
trans-1,3-Dichloropropene	97
1,1,2-Trichloroethane	96
Tetrachloroethene	100
2-Hexanone	98
Dibromochloromethane	100
1,2-Dibromoethane (EDB)	100
Chlorobenzene	97
Ethyl Benzene	98
m,p-Xylene	98
o-Xylene	97
Styrene	99
Bromoform	100
1,1,2,2-Tetrachloroethane	97
4-Ethyltoluene	99
1,3,5-Trimethylbenzene	97

Client Sample ID: CCV

Lab ID#: 2106528-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070202	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/2/21 09:36 AM

Compound	%Recovery
1,2,4-Trimethylbenzene	98
1,3-Dichlorobenzene	102
1,4-Dichlorobenzene	100
alpha-Chlorotoluene	97
1,2-Dichlorobenzene	102
1,2,4-Trichlorobenzene	82
Hexachlorobutadiene	84
Vinyl Acetate	95

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	101	70-130
4-Bromofluorobenzene	100	70-130

Client Sample ID: LCS

Lab ID#: 2106528-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070203	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/2/21 10:04 AM

Compound	%Recovery	Method Limits
Freon 12	102	70-130
Freon 114	103	70-130
Chloromethane	107	70-130
Vinyl Chloride	100	70-130
Bromomethane	101	70-130
Chloroethane	101	70-130
Freon 11	105	70-130
Freon 113	101	70-130
1,1-Dichloroethene	94	70-130
Acetone	97	70-130
Carbon Disulfide	103	70-130
Methylene Chloride	99	70-130
trans-1,2-Dichloroethene	90	70-130
1,1-Dichloroethane	96	70-130
2-Butanone (Methyl Ethyl Ketone)	95	70-130
cis-1,2-Dichloroethene	90	70-130
Chloroform	96	70-130
1,1,1-Trichloroethane	92	70-130
Carbon Tetrachloride	101	70-130
Benzene	99	70-130
1,2-Dichloroethane	101	70-130
Trichloroethene	99	70-130
1,2-Dichloropropane	79	70-130
Bromodichloromethane	94	70-130
cis-1,3-Dichloropropene	97	70-130
4-Methyl-2-pentanone	90	70-130
Toluene	96	70-130
trans-1,3-Dichloropropene	97	70-130
1,1,2-Trichloroethane	97	70-130
Tetrachloroethene	101	70-130
2-Hexanone	97	70-130
Dibromochloromethane	101	70-130
1,2-Dibromoethane (EDB)	101	70-130
Chlorobenzene	98	70-130
Ethyl Benzene	99	70-130
m,p-Xylene	99	70-130
o-Xylene	98	70-130
Styrene	98	70-130
Bromoform	101	70-130
1,1,2,2-Tetrachloroethane	97	70-130
4-Ethyltoluene	100	70-130
1,3,5-Trimethylbenzene	97	70-130



Client Sample ID: LCS

Lab ID#: 2106528-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070203	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/2/21 10:04 AM

Compound	%Recovery	Method Limits
1,2,4-Trimethylbenzene	100	70-130
1,3-Dichlorobenzene	103	70-130
1,4-Dichlorobenzene	101	70-130
alpha-Chlorotoluene	98	70-130
1,2-Dichlorobenzene	102	70-130
1,2,4-Trichlorobenzene	103	70-130
Hexachlorobutadiene	106	70-130
Vinyl Acetate	96	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	100	70-130
4-Bromofluorobenzene	99	70-130

Client Sample ID: LCSD

Lab ID#: 2106528-05AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070204	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/2/21 10:32 AM

Compound	%Recovery	Method Limits
Freon 12	99	70-130
Freon 114	100	70-130
Chloromethane	103	70-130
Vinyl Chloride	96	70-130
Bromomethane	98	70-130
Chloroethane	96	70-130
Freon 11	102	70-130
Freon 113	98	70-130
1,1-Dichloroethene	92	70-130
Acetone	93	70-130
Carbon Disulfide	100	70-130
Methylene Chloride	96	70-130
trans-1,2-Dichloroethene	88	70-130
1,1-Dichloroethane	92	70-130
2-Butanone (Methyl Ethyl Ketone)	95	70-130
cis-1,2-Dichloroethene	90	70-130
Chloroform	94	70-130
1,1,1-Trichloroethane	91	70-130
Carbon Tetrachloride	97	70-130
Benzene	98	70-130
1,2-Dichloroethane	99	70-130
Trichloroethene	97	70-130
1,2-Dichloropropane	79	70-130
Bromodichloromethane	94	70-130
cis-1,3-Dichloropropene	96	70-130
4-Methyl-2-pentanone	89	70-130
Toluene	96	70-130
trans-1,3-Dichloropropene	98	70-130
1,1,2-Trichloroethane	97	70-130
Tetrachloroethene	101	70-130
2-Hexanone	98	70-130
Dibromochloromethane	103	70-130
1,2-Dibromoethane (EDB)	102	70-130
Chlorobenzene	98	70-130
Ethyl Benzene	100	70-130
m,p-Xylene	100	70-130
o-Xylene	98	70-130
Styrene	99	70-130
Bromoform	102	70-130
1,1,2,2-Tetrachloroethane	98	70-130
4-Ethyltoluene	100	70-130
1,3,5-Trimethylbenzene	98	70-130

Client Sample ID: LCSD

Lab ID#: 2106528-05AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070204	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/2/21 10:32 AM

Compound	%Recovery	Method Limits
1,2,4-Trimethylbenzene	101	70-130
1,3-Dichlorobenzene	104	70-130
1,4-Dichlorobenzene	102	70-130
alpha-Chlorotoluene	100	70-130
1,2-Dichlorobenzene	103	70-130
1,2,4-Trichlorobenzene	114	70-130
Hexachlorobutadiene	116	70-130
Vinyl Acetate	96	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	98	70-130
1,2-Dichloroethane-d4	100	70-130
4-Bromofluorobenzene	101	70-130



ANALYTICAL REPORT

**Apex Laboratories, LLC**  
6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

Wednesday, March 17, 2021

Stephanie Salisbury  
Cascadia Associates  
5820 SW Kelly Ave Unit B  
Portland, OR 97239

RE: A1C0077 - Nustar-Vancouver - GWM1Q21

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 A1C0077, which was received by the laboratory on 3/2/2021 at 4:10:00PM.

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](mailto: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.

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Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler#1	0.3 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.

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Lisa Domenighini, Client Services Manager



**ANALYTICAL REPORT**

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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**ANALYTICAL REPORT FOR SAMPLES**

**SAMPLE INFORMATION**

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-32i	A1C0077-01	Water	03/02/21 07:55	03/02/21 16:10
MW-32s	A1C0077-02	Water	03/02/21 08:41	03/02/21 16:10
MW-25i	A1C0077-03	Water	03/02/21 11:09	03/02/21 16:10
MW-23i	A1C0077-04	Water	03/02/21 11:52	03/02/21 16:10
MW-21i-40	A1C0077-05	Water	03/02/21 12:40	03/02/21 16:10
MW-20i	A1C0077-06	Water	03/02/21 13:25	03/02/21 16:10
EW-1	A1C0077-07	Water	03/02/21 14:01	03/02/21 16:10

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	Report ID: <b>A1C0077 - 03 17 21 1034</b>
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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
<b>MW-32i (A1C0077-01)</b>			<b>Matrix: Water</b>		<b>Batch: 1030312</b>			
Bromobenzene	ND	---	0.500	ug/L	1	03/09/21 11:32	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/09/21 11:32	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/09/21 11:32	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/09/21 11:32	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/09/21 11:32	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/09/21 11:32	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/09/21 11:32	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 11:32	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 11:32	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 11:32	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
<b>1,1-Dichloroethane</b>	<b>0.599</b>	---	0.400	ug/L	1	03/09/21 11:32	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/09/21 11:32	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 11:32	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>13.3</b>	---	0.400	ug/L	1	03/09/21 11:32	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 11:32	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/09/21 11:32	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/09/21 11:32	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/09/21 11:32	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/09/21 11:32	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/09/21 11:32	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>9.34</b>	---	0.400	ug/L	1	03/09/21 11:32	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 11:32	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 11:32	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/09/21 11:32	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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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
<b>MW-32i (A1C0077-01)</b>				<b>Matrix: Water</b>		<b>Batch: 1030312</b>		
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/09/21 11:32	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>4.41</b>	---	0.400	ug/L	1	03/09/21 11:32	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/09/21 11:32	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/09/21 11:32	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/09/21 11:32	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/09/21 11:32</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/09/21 11:32</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/09/21 11:32</i>	<i>EPA 8260D</i>

<b>MW-32s (A1C0077-02)</b>				<b>Matrix: Water</b>		<b>Batch: 1030312</b>		
Bromobenzene	ND	---	0.500	ug/L	1	03/09/21 12:27	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/09/21 12:27	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/09/21 12:27	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/09/21 12:27	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/09/21 12:27	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/09/21 12:27	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/09/21 12:27	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 12:27	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 12:27	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 12:27	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/09/21 12:27	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/09/21 12:27	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 12:27	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 12:27	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 12:27	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/09/21 12:27	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030312</b>		
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/09/21 12:27	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/09/21 12:27	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/09/21 12:27	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/09/21 12:27	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	03/09/21 12:27	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 12:27	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 12:27	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/09/21 12:27	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/09/21 12:27	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	03/09/21 12:27	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/09/21 12:27	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/09/21 12:27	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/09/21 12:27	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 104 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>03/09/21 12:27</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>			<i>103 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/09/21 12:27</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>			<i>103 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/09/21 12:27</i>	<i>EPA 8260D</i>	

			<b>Matrix: Water</b>			<b>Batch: 1030312</b>		
Bromobenzene	ND	---	0.500	ug/L	1	03/09/21 12:54	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/09/21 12:54	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/09/21 12:54	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/09/21 12:54	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/09/21 12:54	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/09/21 12:54	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/09/21 12:54	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 12:54	EPA 8260D	

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Lisa Domenighini, Client Services Manager





ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030312</b>		
<b>MW-25i (A1C0077-03)</b>								
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 12:54	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 12:54	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/09/21 12:54	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/09/21 12:54	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 12:54	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 12:54	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 12:54	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/09/21 12:54	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/09/21 12:54	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/09/21 12:54	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/09/21 12:54	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/09/21 12:54	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	03/09/21 12:54	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 12:54	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 12:54	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/09/21 12:54	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/09/21 12:54	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	03/09/21 12:54	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/09/21 12:54	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/09/21 12:54	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/09/21 12:54	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 104 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>03/09/21 12:54</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>			<i>103 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/09/21 12:54</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>			<i>104 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/09/21 12:54</i>	<i>EPA 8260D</i>	

			<b>Matrix: Water</b>			<b>Batch: 1030312</b>		
<b>MW-23i (A1C0077-04)</b>								
Bromobenzene	ND	---	0.500	ug/L	1	03/09/21 13:21	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/09/21 13:21	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030312</b>		
<b>MW-23i (A1C0077-04)</b>								
Chlorobenzene	ND	---	0.500	ug/L	1	03/09/21 13:21	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/09/21 13:21	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/09/21 13:21	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/09/21 13:21	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/09/21 13:21	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 13:21	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 13:21	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 13:21	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/09/21 13:21	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/09/21 13:21	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 13:21	EPA 8260D	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 13:21	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 13:21	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/09/21 13:21	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/09/21 13:21	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/09/21 13:21	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/09/21 13:21	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/09/21 13:21	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	03/09/21 13:21	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 13:21	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 13:21	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/09/21 13:21	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/09/21 13:21	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	03/09/21 13:21	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/09/21 13:21	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/09/21 13:21	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/09/21 13:21	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030312</b>		
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 104 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>03/09/21 13:21</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>			<i>103 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/09/21 13:21</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>			<i>104 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/09/21 13:21</i>	<i>EPA 8260D</i>	
			<b>Matrix: Water</b>			<b>Batch: 1030312</b>		
Bromobenzene	ND	---	0.500	ug/L	1	03/09/21 13:49	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/09/21 13:49	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/09/21 13:49	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/09/21 13:49	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/09/21 13:49	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/09/21 13:49	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/09/21 13:49	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 13:49	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 13:49	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 13:49	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
<b>1,1-Dichloroethane</b>	<b>1.73</b>	---	0.400	ug/L	1	03/09/21 13:49	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/09/21 13:49	EPA 8260D	
<b>1,1-Dichloroethene</b>	<b>0.403</b>	---	0.400	ug/L	1	03/09/21 13:49	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>38.1</b>	---	0.400	ug/L	1	03/09/21 13:49	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 13:49	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/09/21 13:49	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/09/21 13:49	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/09/21 13:49	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030312</b>		
<b>MW-21i-40 (A1C0077-05)</b>								
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/09/21 13:49	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/09/21 13:49	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>19.6</b>	---	0.400	ug/L	1	03/09/21 13:49	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 13:49	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 13:49	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/09/21 13:49	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/09/21 13:49	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>12.7</b>	---	0.400	ug/L	1	03/09/21 13:49	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/09/21 13:49	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/09/21 13:49	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/09/21 13:49	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/09/21 13:49</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/09/21 13:49</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/09/21 13:49</i>	<i>EPA 8260D</i>

			<b>Matrix: Water</b>			<b>Batch: 1030312</b>		
<b>MW-20i (A1C0077-06)</b>								
Bromobenzene	ND	---	0.500	ug/L	1	03/09/21 14:16	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/09/21 14:16	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/09/21 14:16	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/09/21 14:16	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/09/21 14:16	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/09/21 14:16	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/09/21 14:16	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 14:16	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 14:16	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 14:16	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/09/21 14:16	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/09/21 14:16	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

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503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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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
<b>MW-20i (A1C0077-06)</b>				<b>Matrix: Water</b>		<b>Batch: 1030312</b>		
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 14:16	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>8.68</b>	---	0.400	ug/L	1	03/09/21 14:16	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 14:16	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/09/21 14:16	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/09/21 14:16	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/09/21 14:16	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/09/21 14:16	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/09/21 14:16	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>1.16</b>	---	0.400	ug/L	1	03/09/21 14:16	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 14:16	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 14:16	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/09/21 14:16	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/09/21 14:16	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>0.902</b>	---	0.400	ug/L	1	03/09/21 14:16	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/09/21 14:16	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/09/21 14:16	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/09/21 14:16	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 104 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>03/09/21 14:16</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>			<i>104 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/09/21 14:16</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>			<i>104 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/09/21 14:16</i>	<i>EPA 8260D</i>	

<b>EW-1 (A1C0077-07)</b>				<b>Matrix: Water</b>		<b>Batch: 1030312</b>		
Bromobenzene	ND	---	0.500	ug/L	1	03/09/21 14:43	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/09/21 14:43	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/09/21 14:43	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/09/21 14:43	EPA 8260D	
<b>Chloroform</b>	<b>3.05</b>	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/09/21 14:43	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
--	---	---

**ANALYTICAL SAMPLE RESULTS**

**Halogenated Volatile Organic Compounds by EPA 8260D**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
			<b>Matrix: Water</b>			<b>Batch: 1030312</b>		
<b>EW-1 (A1C0077-07)</b>								
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/09/21 14:43	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/09/21 14:43	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 14:43	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 14:43	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/09/21 14:43	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/09/21 14:43	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/09/21 14:43	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 14:43	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>0.609</b>	---	0.400	ug/L	1	03/09/21 14:43	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/09/21 14:43	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/09/21 14:43	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/09/21 14:43	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/09/21 14:43	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/09/21 14:43	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/09/21 14:43	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>37.8</b>	---	0.400	ug/L	1	03/09/21 14:43	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 14:43	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/09/21 14:43	EPA 8260D	
<b>1,1,1-Trichloroethane</b>	<b>0.938</b>	---	0.400	ug/L	1	03/09/21 14:43	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/09/21 14:43	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>15.0</b>	---	0.400	ug/L	1	03/09/21 14:43	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/09/21 14:43	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/09/21 14:43	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/09/21 14:43	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>03/09/21 14:43</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>	<i>1</i>	<i>03/09/21 14:43</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>105 %</i>		<i>80-120 %</i>	<i>1</i>	<i>03/09/21 14:43</i>	<i>EPA 8260D</i>	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
--	---	---

**ANALYTICAL SAMPLE RESULTS**

**Ammonia by Gas Diffusion and Colorimetric Detection**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW-32i (A1C0077-01)</b>				<b>Matrix: Water</b>		<b>Batch: 1030122</b>		
Ammonia as N	ND	---	0.0200	mg/L	1	03/03/21 16:10	SM 4500-NH3 G	
<b>MW-32s (A1C0077-02)</b>				<b>Matrix: Water</b>		<b>Batch: 1030122</b>		
Ammonia as N	ND	---	0.0200	mg/L	1	03/03/21 16:12	SM 4500-NH3 G	
<b>MW-25i (A1C0077-03)</b>				<b>Matrix: Water</b>		<b>Batch: 1030122</b>		
Ammonia as N	ND	---	0.0200	mg/L	1	03/03/21 15:51	SM 4500-NH3 G	
<b>MW-23i (A1C0077-04)</b>				<b>Matrix: Water</b>		<b>Batch: 1030122</b>		
Ammonia as N	ND	---	0.0200	mg/L	1	03/03/21 16:13	SM 4500-NH3 G	
<b>MW-21i-40 (A1C0077-05)</b>				<b>Matrix: Water</b>		<b>Batch: 1030122</b>		
Ammonia as N	<b>0.117</b>	---	0.0200	mg/L	1	03/03/21 16:15	SM 4500-NH3 G	
<b>MW-20i (A1C0077-06)</b>				<b>Matrix: Water</b>		<b>Batch: 1030122</b>		
Ammonia as N	ND	---	0.0200	mg/L	1	03/03/21 16:16	SM 4500-NH3 G	
<b>EW-1 (A1C0077-07)</b>				<b>Matrix: Water</b>		<b>Batch: 1030122</b>		
Ammonia as N	ND	---	0.0200	mg/L	1	03/03/21 16:18	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
<b>MW-32i (A1C0077-01) Matrix: Water</b>								
Batch: 1030093								
Nitrate-Nitrogen	<b>1.36</b>	---	0.250	mg/L	1	03/02/21 21:37	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/02/21 21:37	EPA 300.0	
<b>MW-32s (A1C0077-02) Matrix: Water</b>								
Batch: 1030093								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	03/02/21 21:59	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/02/21 21:59	EPA 300.0	
<b>MW-25i (A1C0077-03) Matrix: Water</b>								
Batch: 1030093								
Nitrate-Nitrogen	<b>0.797</b>	---	0.250	mg/L	1	03/02/21 23:03	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/02/21 23:03	EPA 300.0	
<b>MW-23i (A1C0077-04) Matrix: Water</b>								
Batch: 1030093								
Nitrate-Nitrogen	<b>0.616</b>	---	0.250	mg/L	1	03/02/21 23:25	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/02/21 23:25	EPA 300.0	
<b>MW-21i-40 (A1C0077-05) Matrix: Water</b>								
Batch: 1030093								
Nitrate-Nitrogen	<b>3.70</b>	---	0.250	mg/L	1	03/02/21 23:46	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/02/21 23:46	EPA 300.0	
<b>MW-20i (A1C0077-06) Matrix: Water</b>								
Batch: 1030093								
Nitrate-Nitrogen	<b>0.330</b>	---	0.250	mg/L	1	03/03/21 00:08	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/03/21 00:08	EPA 300.0	
<b>EW-1 (A1C0077-07) Matrix: Water</b>								
Batch: 1030093								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/03/21 00:29	EPA 300.0	
<b>EW-1 (A1C0077-07RE1) Matrix: Water</b>								
Batch: 1030093								
Nitrate-Nitrogen	<b>25.3</b>	---	1.25	mg/L	5	03/03/21 13:19	EPA 300.0	

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Lisa Domenighini, Client Services Manager





**ANALYTICAL REPORT**

**Apex Laboratories, LLC**

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Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWM1Q21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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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
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ANALYTICAL REPORT

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ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> A1C0077 - 03 17 21 1034
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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
<b>Batch 1030312 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (1030312-BLK1)</b>		Prepared: 03/09/21 07:30			Analyzed: 03/09/21 10:37							
<b>EPA 8260D</b>												
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



ANALYTICAL REPORT

**Apex Laboratories, LLC**

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Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
--	---	---

**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
<b>Batch 1030312 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (1030312-BLK1)</b>		Prepared: 03/09/21 07:30			Analyzed: 03/09/21 10:37							
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: 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>103 %</i>		<i>80-120 %</i>		<i>"</i>						

<b>LCS (1030312-BS1)</b>		Prepared: 03/09/21 07:30			Analyzed: 03/09/21 09:41							
<b>EPA 8260D</b>												
Bromobenzene	20.5	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Bromochloromethane	21.2	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
Bromodichloromethane	19.3	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
Bromoform	17.5	---	1.00	ug/L	1	20.0	---	88	80 - 120%	---	---	
Bromomethane	22.8	---	5.00	ug/L	1	20.0	---	114	80 - 120%	---	---	
Carbon tetrachloride	16.1	---	1.00	ug/L	1	20.0	---	81	80 - 120%	---	---	
Chlorobenzene	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Chloroethane	21.6	---	5.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Chloroform	19.9	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
Chloromethane	20.5	---	5.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
2-Chlorotoluene	21.2	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
4-Chlorotoluene	21.0	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
Dibromochloromethane	17.9	---	1.00	ug/L	1	20.0	---	90	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	15.2	---	5.00	ug/L	1	20.0	---	<b>76</b>	<b>80 - 120%</b>	---	---	Q-55
1,2-Dibromoethane (EDB)	19.1	---	0.500	ug/L	1	20.0	---	96	80 - 120%	---	---	
Dibromomethane	20.8	---	1.00	ug/L	1	20.0	---	104	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



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
--	---	---

**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												
<b>Batch 1030312 - EPA 5030B</b>																								
						<b>Water</b>																		
<b>LCS (1030312-BS1)</b>			Prepared: 03/09/21 07:30			Analyzed: 03/09/21 09:41																		
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	28.9	---	1.00	ug/L	1	20.0	---	<b>145</b>	<b>80 - 120%</b>	---	---	Q-56												
1,1-Dichloroethane	19.0	---	0.400	ug/L	1	20.0	---	95	80 - 120%	---	---													
1,2-Dichloroethane (EDC)	19.7	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---													
1,1-Dichloroethene	20.2	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---													
cis-1,2-Dichloroethene	20.6	---	0.400	ug/L	1	20.0	---	103	80 - 120%	---	---													
trans-1,2-Dichloroethene	20.6	---	0.400	ug/L	1	20.0	---	103	80 - 120%	---	---													
1,2-Dichloropropane	19.0	---	0.500	ug/L	1	20.0	---	95	80 - 120%	---	---													
1,3-Dichloropropane	20.3	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---													
2,2-Dichloropropane	13.0	---	1.00	ug/L	1	20.0	---	<b>65</b>	<b>80 - 120%</b>	---	---	Q-55												
1,1-Dichloropropene	21.7	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---													
cis-1,3-Dichloropropene	18.0	---	1.00	ug/L	1	20.0	---	90	80 - 120%	---	---													
trans-1,3-Dichloropropene	15.0	---	1.00	ug/L	1	20.0	---	<b>75</b>	<b>80 - 120%</b>	---	---	Q-55												
Hexachlorobutadiene	23.0	---	5.00	ug/L	1	20.0	---	115	80 - 120%	---	---													
Methylene chloride	18.9	---	10.0	ug/L	1	20.0	---	94	80 - 120%	---	---													
1,1,1,2-Tetrachloroethane	16.6	---	0.400	ug/L	1	20.0	---	83	80 - 120%	---	---													
1,1,2,2-Tetrachloroethane	19.4	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---													
Tetrachloroethene (PCE)	21.7	---	0.400	ug/L	1	20.0	---	109	80 - 120%	---	---													
1,2,3-Trichlorobenzene	16.9	---	2.00	ug/L	1	20.0	---	85	80 - 120%	---	---													
1,2,4-Trichlorobenzene	18.6	---	2.00	ug/L	1	20.0	---	93	80 - 120%	---	---													
1,1,1-Trichloroethane	18.4	---	0.400	ug/L	1	20.0	---	92	80 - 120%	---	---													
1,1,2-Trichloroethane	20.7	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---													
Trichloroethene (TCE)	21.3	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---													
Trichlorofluoromethane	23.2	---	2.00	ug/L	1	20.0	---	116	80 - 120%	---	---													
1,2,3-Trichloropropane	20.4	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---													
Vinyl chloride	22.6	---	0.400	ug/L	1	20.0	---	113	80 - 120%	---	---													
<table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">Surr: 1,4-Difluorobenzene (Surr)</td> <td style="width: 20%;">Recovery: 97 %</td> <td style="width: 20%;">Limits: 80-120 %</td> <td style="width: 30%;">Dilution: 1x</td> </tr> <tr> <td>Toluene-d8 (Surr)</td> <td>99 %</td> <td>80-120 %</td> <td>"</td> </tr> <tr> <td>4-Bromofluorobenzene (Surr)</td> <td>99 %</td> <td>80-120 %</td> <td>"</td> </tr> </table>													Surr: 1,4-Difluorobenzene (Surr)	Recovery: 97 %	Limits: 80-120 %	Dilution: 1x	Toluene-d8 (Surr)	99 %	80-120 %	"	4-Bromofluorobenzene (Surr)	99 %	80-120 %	"
Surr: 1,4-Difluorobenzene (Surr)	Recovery: 97 %	Limits: 80-120 %	Dilution: 1x																					
Toluene-d8 (Surr)	99 %	80-120 %	"																					
4-Bromofluorobenzene (Surr)	99 %	80-120 %	"																					

**Duplicate (1030312-DUP1)**      Prepared: 03/09/21 10:05      Analyzed: 03/09/21 11:59

**QC Source Sample: MW-32i (A1C0077-01)**  
**EPA 8260D**

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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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
<b>Batch 1030312 - EPA 5030B</b>						<b>Water</b>						
<b>Duplicate (1030312-DUP1)</b>		Prepared: 03/09/21 10:05		Analyzed: 03/09/21 11:59								
<b>QC Source Sample: MW-32i (A1C0077-01)</b>												
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%	
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	<b>0.619</b>	---	0.400	ug/L	1	---	0.599	---	---	3	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	<b>13.9</b>	---	0.400	ug/L	1	---	13.3	---	---	4	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



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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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
<b>Batch 1030312 - EPA 5030B</b>												
<b>Water</b>												
<b>Duplicate (1030312-DUP1)</b>			Prepared: 03/09/21 10:05			Analyzed: 03/09/21 11:59						
<b>QC Source Sample: MW-32i (A1C0077-01)</b>												
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)	<b>9.84</b>	---	0.400	ug/L	1	---	9.34	---	---	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)	<b>4.44</b>	---	0.400	ug/L	1	---	4.41	---	---	0.8	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: 103 %</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>			

<b>Matrix Spike (1030312-MS1)</b>												
			Prepared: 03/09/21 10:05			Analyzed: 03/09/21 15:11						
<b>QC Source Sample: EW-1 (A1C0077-07)</b>												
<b>EPA 8260D</b>												
Bromobenzene	21.1	---	0.500	ug/L	1	20.0	ND	106	80 - 120%	---	---	
Bromochloromethane	22.1	---	1.00	ug/L	1	20.0	ND	111	78 - 123%	---	---	
Bromodichloromethane	20.7	---	1.00	ug/L	1	20.0	ND	104	79 - 125%	---	---	
Bromoform	18.2	---	1.00	ug/L	1	20.0	ND	91	66 - 130%	---	---	
Bromomethane	25.6	---	5.00	ug/L	1	20.0	ND	128	53 - 141%	---	---	
Carbon tetrachloride	16.3	---	1.00	ug/L	1	20.0	ND	81	72 - 136%	---	---	
Chlorobenzene	20.5	---	0.500	ug/L	1	20.0	ND	103	80 - 120%	---	---	
Chloroethane	23.5	---	5.00	ug/L	1	20.0	ND	118	60 - 138%	---	---	
Chloroform	24.6	---	1.00	ug/L	1	20.0	3.05	108	79 - 124%	---	---	
Chloromethane	22.6	---	5.00	ug/L	1	20.0	ND	113	50 - 139%	---	---	
2-Chlorotoluene	21.6	---	1.00	ug/L	1	20.0	ND	108	79 - 122%	---	---	
4-Chlorotoluene	21.6	---	1.00	ug/L	1	20.0	ND	108	78 - 122%	---	---	
Dibromochloromethane	18.6	---	1.00	ug/L	1	20.0	ND	93	74 - 126%	---	---	
1,2-Dibromo-3-chloropropane	15.3	---	5.00	ug/L	1	20.0	ND	77	62 - 128%	---	---	Q-54b
1,2-Dibromoethane (EDB)	19.7	---	0.500	ug/L	1	20.0	ND	98	77 - 121%	---	---	

Apex Laboratories

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
--	---	---

**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	Limit RPD	RPD Limit	Notes
<b>Batch 1030312 - EPA 5030B</b>						<b>Water</b>					
<b>Matrix Spike (1030312-MS1)</b>		Prepared: 03/09/21 10:05		Analyzed: 03/09/21 15:11							
<b>QC Source Sample: EW-1 (A1C0077-07)</b>											
Dibromomethane	21.9	---	1.00	ug/L	1	20.0	ND	109	79 - 123%	---	---
1,2-Dichlorobenzene	20.5	---	0.500	ug/L	1	20.0	ND	102	80 - 120%	---	---
1,3-Dichlorobenzene	20.6	---	0.500	ug/L	1	20.0	ND	103	80 - 120%	---	---
1,4-Dichlorobenzene	20.1	---	0.500	ug/L	1	20.0	ND	101	79 - 120%	---	---
Dichlorodifluoromethane	30.3	---	1.00	ug/L	1	20.0	ND	152	32 - 152%	---	Q-54
1,1-Dichloroethane	20.4	---	0.400	ug/L	1	20.0	ND	102	77 - 125%	---	---
1,2-Dichloroethane (EDC)	21.6	---	0.400	ug/L	1	20.0	ND	108	73 - 128%	---	---
1,1-Dichloroethene	21.5	---	0.400	ug/L	1	20.0	ND	108	71 - 131%	---	---
cis-1,2-Dichloroethene	22.6	---	0.400	ug/L	1	20.0	0.609	110	78 - 123%	---	---
trans-1,2-Dichloroethene	21.9	---	0.400	ug/L	1	20.0	ND	110	75 - 124%	---	---
1,2-Dichloropropane	20.8	---	0.500	ug/L	1	20.0	ND	104	78 - 122%	---	---
1,3-Dichloropropane	21.7	---	1.00	ug/L	1	20.0	ND	108	80 - 120%	---	---
2,2-Dichloropropane	12.1	---	1.00	ug/L	1	20.0	ND	61	60 - 139%	---	Q-54a
1,1-Dichloropropene	22.9	---	1.00	ug/L	1	20.0	ND	115	79 - 125%	---	---
cis-1,3-Dichloropropene	18.0	---	1.00	ug/L	1	20.0	ND	90	75 - 124%	---	---
trans-1,3-Dichloropropene	15.0	---	1.00	ug/L	1	20.0	ND	75	73 - 127%	---	Q-54c
Hexachlorobutadiene	20.8	---	5.00	ug/L	1	20.0	ND	104	66 - 134%	---	---
Methylene chloride	20.2	---	10.0	ug/L	1	20.0	ND	101	74 - 124%	---	---
1,1,1,2-Tetrachloroethane	17.0	---	0.400	ug/L	1	20.0	ND	85	78 - 124%	---	---
1,1,2,2-Tetrachloroethane	21.2	---	0.500	ug/L	1	20.0	ND	106	71 - 121%	---	---
Tetrachloroethene (PCE)	59.0	---	0.400	ug/L	1	20.0	37.8	106	74 - 129%	---	---
1,2,3-Trichlorobenzene	15.6	---	2.00	ug/L	1	20.0	ND	78	69 - 129%	---	---
1,2,4-Trichlorobenzene	16.8	---	2.00	ug/L	1	20.0	ND	84	69 - 130%	---	---
1,1,1-Trichloroethane	20.0	---	0.400	ug/L	1	20.0	0.938	95	74 - 131%	---	---
1,1,2-Trichloroethane	21.5	---	0.500	ug/L	1	20.0	ND	107	80 - 120%	---	---
Trichloroethene (TCE)	37.0	---	0.400	ug/L	1	20.0	15.0	110	79 - 123%	---	---
Trichlorofluoromethane	24.6	---	2.00	ug/L	1	20.0	ND	123	65 - 141%	---	---
1,2,3-Trichloropropane	21.3	---	1.00	ug/L	1	20.0	ND	106	73 - 122%	---	---
Vinyl chloride	24.4	---	0.400	ug/L	1	20.0	ND	122	58 - 137%	---	---
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 98 %</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>97 %</i>		<i>80-120 %</i>		<i>"</i>					

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
 Tigard, OR 97223  
 503-718-2323  
 ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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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
<b>Batch 1030122 - Method Prep: Aq</b>						<b>Water</b>						
<b>Blank (1030122-BLK1)</b>		Prepared: 03/03/21 11:50 Analyzed: 03/03/21 15:46										
<b>SM 4500-NH3 G</b>												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	---
<b>LCS (1030122-BS1)</b>		Prepared: 03/03/21 11:50 Analyzed: 03/03/21 15:48										
<b>SM 4500-NH3 G</b>												
Ammonia as N	1.97	---	0.0200	mg/L	1	2.00	---	99	87 - 116%	---	---	---
<b>Matrix Spike (1030122-MS1)</b>		Prepared: 03/03/21 11:50 Analyzed: 03/03/21 15:52										
<b>QC Source Sample: MW-25i (A1C0077-03)</b>												
<b>SM 4500-NH3 G</b>												
Ammonia as N	2.48	---	0.0250	mg/L	1	2.50	ND	99	87 - 116%	---	---	---
<b>Matrix Spike Dup (1030122-MSD1)</b>		Prepared: 03/03/21 11:50 Analyzed: 03/03/21 15:54										
<b>QC Source Sample: MW-25i (A1C0077-03)</b>												
<b>SM 4500-NH3 G</b>												
Ammonia as N	2.45	---	0.0250	mg/L	1	2.50	ND	98	87 - 116%	0.9	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
<b>Batch 1030093 - Method Prep: Aq</b>						<b>Water</b>						
<b>Blank (1030093-BLK1)</b>		Prepared: 03/02/21 16:30 Analyzed: 03/02/21 17:18										
<b>EPA 300.0</b>												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
<b>LCS (1030093-BS1)</b>		Prepared: 03/02/21 16:30 Analyzed: 03/02/21 17:40										
<b>EPA 300.0</b>												
Nitrate-Nitrogen	1.91	---	0.250	mg/L	1	2.00	---	96	90 - 110%	---	---	---
Nitrite-Nitrogen	1.97	---	0.250	mg/L	1	2.00	---	98	90 - 110%	---	---	---
<b>Duplicate (1030093-DUP2)</b>		Prepared: 03/02/21 16:30 Analyzed: 03/02/21 22:20										
<b>QC Source Sample: MW-32s (A1C0077-02)</b>												
<b>EPA 300.0</b>												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	0.159	---	---	---	***	5%
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	---	10%
<b>Matrix Spike (1030093-MS2)</b>		Prepared: 03/02/21 16:30 Analyzed: 03/02/21 22:42										
<b>QC Source Sample: MW-32s (A1C0077-02)</b>												
<b>EPA 300.0</b>												
Nitrate-Nitrogen	2.56	---	0.312	mg/L	1	2.50	0.159	96	86 - 118%	---	---	---
Nitrite-Nitrogen	2.42	---	0.312	mg/L	1	2.50	ND	97	82 - 117%	---	---	---

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503-718-2323

ORELAP ID: OR100062

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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
<b>Batch: 1030312</b>							
A1C0077-01	Water	EPA 8260D	03/02/21 07:55	03/09/21 10:05	5mL/5mL	5mL/5mL	1.00
A1C0077-02	Water	EPA 8260D	03/02/21 08:41	03/09/21 10:05	5mL/5mL	5mL/5mL	1.00
A1C0077-03	Water	EPA 8260D	03/02/21 11:09	03/09/21 10:05	5mL/5mL	5mL/5mL	1.00
A1C0077-04	Water	EPA 8260D	03/02/21 11:52	03/09/21 10:05	5mL/5mL	5mL/5mL	1.00
A1C0077-05	Water	EPA 8260D	03/02/21 12:40	03/09/21 10:05	5mL/5mL	5mL/5mL	1.00
A1C0077-06	Water	EPA 8260D	03/02/21 13:25	03/09/21 10:05	5mL/5mL	5mL/5mL	1.00
A1C0077-07	Water	EPA 8260D	03/02/21 14:01	03/09/21 10:05	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
<b>Batch: 1030122</b>							
A1C0077-01	Water	SM 4500-NH3 G	03/02/21 07:55	03/03/21 11:50	10mL/10mL	10mL/10mL	1.00
A1C0077-02	Water	SM 4500-NH3 G	03/02/21 08:41	03/03/21 11:50	10mL/10mL	10mL/10mL	1.00
A1C0077-03	Water	SM 4500-NH3 G	03/02/21 11:09	03/03/21 11:50	10mL/10mL	10mL/10mL	1.00
A1C0077-04	Water	SM 4500-NH3 G	03/02/21 11:52	03/03/21 11:50	10mL/10mL	10mL/10mL	1.00
A1C0077-05	Water	SM 4500-NH3 G	03/02/21 12:40	03/03/21 11:50	10mL/10mL	10mL/10mL	1.00
A1C0077-06	Water	SM 4500-NH3 G	03/02/21 13:25	03/03/21 11:50	10mL/10mL	10mL/10mL	1.00
A1C0077-07	Water	SM 4500-NH3 G	03/02/21 14:01	03/03/21 11:50	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
<b>Batch: 1030093</b>							
A1C0077-01	Water	EPA 300.0	03/02/21 07:55	03/02/21 16:30	5mL/5mL	5mL/5mL	1.00
A1C0077-02	Water	EPA 300.0	03/02/21 08:41	03/02/21 16:30	5mL/5mL	5mL/5mL	1.00
A1C0077-03	Water	EPA 300.0	03/02/21 11:09	03/02/21 16:30	5mL/5mL	5mL/5mL	1.00
A1C0077-04	Water	EPA 300.0	03/02/21 11:52	03/02/21 16:30	5mL/5mL	5mL/5mL	1.00
A1C0077-05	Water	EPA 300.0	03/02/21 12:40	03/02/21 16:30	5mL/5mL	5mL/5mL	1.00
A1C0077-06	Water	EPA 300.0	03/02/21 13:25	03/02/21 16:30	5mL/5mL	5mL/5mL	1.00
A1C0077-07	Water	EPA 300.0	03/02/21 14:01	03/02/21 16:30	5mL/5mL	5mL/5mL	1.00
A1C0077-07RE1	Water	EPA 300.0	03/02/21 14:01	03/02/21 16:30	5mL/5mL	5mL/5mL	1.00

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Lisa Domenighini, Client Services Manager



**ANALYTICAL REPORT**

**Apex Laboratories, LLC**

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Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>GWMIQ21</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0077 - 03 17 21 1034</b>
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**QUALIFIER DEFINITIONS**

**Client Sample and Quality Control (QC) Sample Qualifier Definitions:**

**Apex Laboratories**

- Q-54** 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-54a** Daily Continuing Calibration Verification recovery for this analyte failed the +/-20% criteria listed in EPA method 8260/8270 by -15%. 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 -4%. 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 -5%. 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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**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.

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ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with 3 columns: Client (Cascadia Associates), Project (Nustar-Vancouver), and Report ID (A1C0077 - 03 17 21 1034).

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

Table header with columns: 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

Handwritten signature of Lisa Domenighini

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--	---	--

**APEX LABS**  
6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

**CHAIN OF CUSTODY**

Company: Cascadia Associates  
Address: 5820 SW Kelly Ave Portland, OR 97239  
Project Mgr: Stephanie Salisbury  
Project Name: Nustar Vancouver  
Lab # **AIC0077**

Sampled by: J. Wierzbicki  
Site Location: **OR WA CA**

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTFH-HCID	NWTFH-DI	NWTFH-GI	8260 BTEX	8260 RBDNI VOCs	8260 HMI VOCs	8260 VOCs (13)	8270 SIM PAHs	8270 Semi-Vols Full List	8002 PCBs	8001 Pest	RCRA Metals (9)	Priority Metals (13)	AL, SR, AR, BA, BR, CA, CB, CC, CD, CE, CH, CR, CU, CY, FE, FG, HG, HR, HM, HO, NI, NK, NS, AR, NA, TL, TCFE, TCFP, TCFE	TCF Metals (9)	NH3	RSK 175	TOC	Archive		
																									TAT Requested (circle)	RECEIVED BY: Signature
MW-22		3/17/20	15:00		5																					
MW-23		3/17/20	15:00																							
MW-24		3/17/20	15:00																							
MW-25		3/17/20	15:00																							
MW-26		3/17/20	15:00																							
EW-1		3/17/20	15:00																							
Top Deck																										

**SPECIAL INSTRUCTIONS:**  
VOC same list as Nustar-Vancouver AIC20  
H Hold for PM request

**TAT Requested (circle):** 1 Day    2 Day    3 Day    4 Day    5 Day    Other: \_\_\_\_\_

**SAMPLES ARE HELD FOR 30 DAYS**

<b>RELINQUISHED BY:</b> Signature: [Signature] Date: 3/17/20 Printed Name: J. Wierzbicki Company: Cascadia Assoc.	<b>RECEIVED BY:</b> Signature: [Signature] Date: 3/22/20 Printed Name: [Name] Company: [Company]
---	--

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*Lisa Domenighini*

Lisa Domenighini, Client Services Manager







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**APEX LABS COOLER RECEIPT FORM**

**Client:** Cascadia Assoc. **Element WO#:** A1C0077

**Project/Project #:** Nustar Vancouver GWMIQ21

**Delivery Info:**  
 Date/time received: 3/2/21 @ 1410 By: JS  
 Delivered by: Apex  Client  ESS  FedEx  UPS  Swift  Senvoy  SDS  Other

**Cooler Inspection** Date/time inspected: 3/2/21 @ 1456 By: JS  
 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>						
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: \_\_\_\_\_  
 Green dots applied to out of temperature samples? Yes/No \_\_\_\_\_  
 Out of temperature samples form initiated? Yes/No \_\_\_\_\_

**Sample Inspection:** Date/time inspected: 3-2-21 @ 17:05 By: FAA  
 All samples intact? Yes  No  Comments: \_\_\_\_\_

Bottle labels/COCs agree? Yes  No  Comments: TB# 2673

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: FAA                      Witness: AM                      Cooler Inspected by: FAA

Apex Laboratories

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Lisa Domenighini

Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**  
6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

Friday, March 19, 2021  
Stephanie Salisbury  
Cascadia Associates  
5820 SW Kelly Ave Unit B  
Portland, OR 97239

RE: A1C0126 - Nustar-Vancouver - Shore Terminal-Vancouver-GWM1Q21

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 A1C0126, which was received by the laboratory on 3/3/2021 at 4:03:00PM.

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](mailto: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.

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Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler#1	0.5 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.

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Lisa Domenighini, Client Services Manager



**ANALYTICAL REPORT**

**Apex Laboratories, LLC**

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Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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**ANALYTICAL REPORT FOR SAMPLES**

**SAMPLE INFORMATION**

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-17	A1C0126-01	Water	03/03/21 08:40	03/03/21 16:03
S-1	A1C0126-02	Water	03/03/21 09:40	03/03/21 16:03
S-2	A1C0126-03	Water	03/03/21 10:30	03/03/21 16:03
MW-19	A1C0126-04	Water	03/03/21 11:30	03/03/21 16:03
MW-19 DUP	A1C0126-05	Water	03/03/21 11:30	03/03/21 16:03
MP-1	A1C0126-06	Water	03/03/21 12:10	03/03/21 16:03
MW-9	A1C0126-07	Water	03/03/21 13:00	03/03/21 16:03
MW-7	A1C0126-08	Water	03/03/21 14:05	03/03/21 16:03
MW-7 DUP	A1C0126-09	Water	03/03/21 14:05	03/03/21 16:03
MW-5	A1C0126-10	Water	03/03/21 08:07	03/03/21 16:03
MW-8	A1C0126-11	Water	03/03/21 09:05	03/03/21 16:03
MW-16	A1C0126-12	Water	03/03/21 09:48	03/03/21 16:03
MW-18i	A1C0126-13	Water	03/03/21 10:27	03/03/21 16:03
MW-19i	A1C0126-14	Water	03/03/21 11:21	03/03/21 16:03
MW-24D	A1C0126-15	Water	03/03/21 12:54	03/03/21 16:03
MW-24i	A1C0126-16	Water	03/03/21 14:14	03/03/21 16:03

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**ANALYTICAL CASE NARRATIVE**

**Work Order: A1C0126**

Subcontract

This report is not complete without the attached subcontract laboratory report for RSK 175 from Air Technology.

Apex Laboratories

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ANALYTICAL REPORT

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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
			<b>Matrix: Water</b>			<b>Batch: 1030424</b>		
<b>MW-17 (A1C0126-01)</b>								
Bromobenzene	ND	---	0.500	ug/L	1	03/11/21 15:49	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/11/21 15:49	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/11/21 15:49	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/11/21 15:49	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/11/21 15:49	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/11/21 15:49	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/11/21 15:49	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/11/21 15:49	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/11/21 15:49	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/11/21 15:49	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
<b>1,1-Dichloroethane</b>	<b>0.684</b>	---	0.400	ug/L	1	03/11/21 15:49	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/11/21 15:49	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/11/21 15:49	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>22.8</b>	---	0.400	ug/L	1	03/11/21 15:49	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/11/21 15:49	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/11/21 15:49	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/11/21 15:49	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/11/21 15:49	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/11/21 15:49	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/11/21 15:49	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>4.19</b>	---	0.400	ug/L	1	03/11/21 15:49	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/11/21 15:49	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/11/21 15:49	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/11/21 15:49	EPA 8260D	

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Lisa Domenighini, Client Services Manager



**ANALYTICAL REPORT**

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
<b>MW-17 (A1C0126-01)</b>			<b>Matrix: Water</b>		<b>Batch: 1030424</b>			
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/11/21 15:49	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>11.0</b>	---	0.400	ug/L	1	03/11/21 15:49	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/11/21 15:49	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/11/21 15:49	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/11/21 15:49	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/11/21 15:49</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/11/21 15:49</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>107 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/11/21 15:49</i>	<i>EPA 8260D</i>

<b>S-1 (A1C0126-02)</b>			<b>Matrix: Water</b>		<b>Batch: 1030424</b>			
Bromobenzene	ND	---	0.500	ug/L	1	03/11/21 16:17	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/11/21 16:17	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/11/21 16:17	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/11/21 16:17	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/11/21 16:17	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/11/21 16:17	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/11/21 16:17	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/11/21 16:17	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/11/21 16:17	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/11/21 16:17	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/11/21 16:17	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/11/21 16:17	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/11/21 16:17	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>2.20</b>	---	0.400	ug/L	1	03/11/21 16:17	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/11/21 16:17	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/11/21 16:17	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

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 Tigard, OR 97223  
 503-718-2323  
 ORELAP ID: OR100062

<b>Cascadia Associates</b>	Project: <b>Nustar-Vancouver</b>	
5820 SW Kelly Ave Unit B	Project Number: <b>Shore Terminal-Vancouver-</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Stephanie Salisbury</b>	<b>A1C0126 - 03 19 21 0755</b>

**ANALYTICAL SAMPLE RESULTS**

**Halogenated Volatile Organic Compounds by EPA 8260D**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>S-1 (A1C0126-02)</b>				<b>Matrix: Water</b>		<b>Batch: 1030424</b>		
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/11/21 16:17	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/11/21 16:17	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/11/21 16:17	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/11/21 16:17	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>0.852</b>	---	0.400	ug/L	1	03/11/21 16:17	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/11/21 16:17	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/11/21 16:17	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/11/21 16:17	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/11/21 16:17	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>1.60</b>	---	0.400	ug/L	1	03/11/21 16:17	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/11/21 16:17	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/11/21 16:17	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/11/21 16:17	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>03/11/21 16:17</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>	<i>1</i>	<i>03/11/21 16:17</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>106 %</i>		<i>80-120 %</i>	<i>1</i>	<i>03/11/21 16:17</i>	<i>EPA 8260D</i>	

<b>S-2 (A1C0126-03)</b>				<b>Matrix: Water</b>		<b>Batch: 1030424</b>		
Bromobenzene	ND	---	0.500	ug/L	1	03/11/21 16:45	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/11/21 16:45	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/11/21 16:45	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/11/21 16:45	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/11/21 16:45	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/11/21 16:45	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/11/21 16:45	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/11/21 16:45	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
 Tigard, OR 97223  
 503-718-2323  
 ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	Report ID: <b>A1C0126 - 03 19 21 0755</b>
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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
<b>S-2 (A1C0126-03)</b>				<b>Matrix: Water</b>		<b>Batch: 1030424</b>		
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/11/21 16:45	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/11/21 16:45	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
<b>1,1-Dichloroethane</b>	<b>8.00</b>	---	0.400	ug/L	1	03/11/21 16:45	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/11/21 16:45	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/11/21 16:45	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>37.2</b>	---	0.400	ug/L	1	03/11/21 16:45	EPA 8260D	
<b>trans-1,2-Dichloroethene</b>	<b>0.578</b>	---	0.400	ug/L	1	03/11/21 16:45	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/11/21 16:45	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/11/21 16:45	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/11/21 16:45	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/11/21 16:45	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/11/21 16:45	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	03/11/21 16:45	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/11/21 16:45	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/11/21 16:45	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/11/21 16:45	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/11/21 16:45	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>1.44</b>	---	0.400	ug/L	1	03/11/21 16:45	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/11/21 16:45	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/11/21 16:45	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/11/21 16:45	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/11/21 16:45</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/11/21 16:45</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/11/21 16:45</i>	<i>EPA 8260D</i>

<b>MW-19 (A1C0126-04)</b>				<b>Matrix: Water</b>		<b>Batch: 1030424</b>		
Bromobenzene	ND	---	0.500	ug/L	1	03/11/21 17:12	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/11/21 17:12	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	

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Lisa Domenighini, Client Services Manager





ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030424</b>		
<b>MW-19 (A1C0126-04)</b>								
Chlorobenzene	ND	---	0.500	ug/L	1	03/11/21 17:12	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/11/21 17:12	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/11/21 17:12	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/11/21 17:12	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/11/21 17:12	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/11/21 17:12	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/11/21 17:12	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/11/21 17:12	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
<b>1,1-Dichloroethane</b>	<b>41.4</b>	---	0.400	ug/L	1	03/11/21 17:12	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/11/21 17:12	EPA 8260D	
<b>1,1-Dichloroethene</b>	<b>51.0</b>	---	0.400	ug/L	1	03/11/21 17:12	EPA 8260D	
<b>trans-1,2-Dichloroethene</b>	<b>11.4</b>	---	0.400	ug/L	1	03/11/21 17:12	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/11/21 17:12	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/11/21 17:12	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/11/21 17:12	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/11/21 17:12	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/11/21 17:12	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/11/21 17:12	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/11/21 17:12	EPA 8260D	
<b>1,1,1-Trichloroethane</b>	<b>27.8</b>	---	0.400	ug/L	1	03/11/21 17:12	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/11/21 17:12	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/11/21 17:12	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/11/21 17:12	EPA 8260D	
<b>Vinyl chloride</b>	<b>53.6</b>	---	0.400	ug/L	1	03/11/21 17:12	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 97 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/11/21 17:12</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/11/21 17:12</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>114 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/11/21 17:12</i>	<i>EPA 8260D</i>

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
<b>MW-19 (A1C0126-04RE1)</b>			<b>Matrix: Water</b>			<b>Batch: 1030535</b>		
cis-1,2-Dichloroethene	<b>1120</b>	---	20.0	ug/L	50	03/15/21 13:23	EPA 8260D	
Tetrachloroethene (PCE)	<b>4470</b>	---	20.0	ug/L	50	03/15/21 13:23	EPA 8260D	
Trichloroethene (TCE)	<b>1880</b>	---	20.0	ug/L	50	03/15/21 13:23	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 101 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/15/21 13:23</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/15/21 13:23</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>96 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/15/21 13:23</i>	<i>EPA 8260D</i>

<b>MW-19 DUP (A1C0126-05)</b>			<b>Matrix: Water</b>			<b>Batch: 1030535</b>		
Bromobenzene	ND	---	25.0	ug/L	50	03/15/21 13:50	EPA 8260D	
Bromochloromethane	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
Bromodichloromethane	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
Bromoform	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
Bromomethane	ND	---	250	ug/L	50	03/15/21 13:50	EPA 8260D	
Carbon tetrachloride	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
Chlorobenzene	ND	---	25.0	ug/L	50	03/15/21 13:50	EPA 8260D	
Chloroethane	ND	---	250	ug/L	50	03/15/21 13:50	EPA 8260D	
Chloroform	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
Chloromethane	ND	---	250	ug/L	50	03/15/21 13:50	EPA 8260D	
2-Chlorotoluene	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
4-Chlorotoluene	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
Dibromochloromethane	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	250	ug/L	50	03/15/21 13:50	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	25.0	ug/L	50	03/15/21 13:50	EPA 8260D	
Dibromomethane	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
1,2-Dichlorobenzene	ND	---	25.0	ug/L	50	03/15/21 13:50	EPA 8260D	
1,3-Dichlorobenzene	ND	---	25.0	ug/L	50	03/15/21 13:50	EPA 8260D	
1,4-Dichlorobenzene	ND	---	25.0	ug/L	50	03/15/21 13:50	EPA 8260D	
Dichlorodifluoromethane	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
<b>1,1-Dichloroethane</b>	<b>35.8</b>	---	20.0	ug/L	50	03/15/21 13:50	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	20.0	ug/L	50	03/15/21 13:50	EPA 8260D	
<b>1,1-Dichloroethene</b>	<b>48.5</b>	---	20.0	ug/L	50	03/15/21 13:50	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>1140</b>	---	20.0	ug/L	50	03/15/21 13:50	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	20.0	ug/L	50	03/15/21 13:50	EPA 8260D	
1,2-Dichloropropane	ND	---	25.0	ug/L	50	03/15/21 13:50	EPA 8260D	
1,3-Dichloropropane	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
2,2-Dichloropropane	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
1,1-Dichloropropene	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
<b>MW-19 DUP (A1C0126-05)</b>			<b>Matrix: Water</b>		<b>Batch: 1030535</b>			
trans-1,3-Dichloropropene	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
Hexachlorobutadiene	ND	---	250	ug/L	50	03/15/21 13:50	EPA 8260D	
Methylene chloride	ND	---	500	ug/L	50	03/15/21 13:50	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	20.0	ug/L	50	03/15/21 13:50	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	25.0	ug/L	50	03/15/21 13:50	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>4620</b>	---	20.0	ug/L	50	03/15/21 13:50	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	100	ug/L	50	03/15/21 13:50	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	100	ug/L	50	03/15/21 13:50	EPA 8260D	
<b>1,1,1-Trichloroethane</b>	<b>26.4</b>	---	20.0	ug/L	50	03/15/21 13:50	EPA 8260D	
1,1,2-Trichloroethane	ND	---	25.0	ug/L	50	03/15/21 13:50	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>1920</b>	---	20.0	ug/L	50	03/15/21 13:50	EPA 8260D	
Trichlorofluoromethane	ND	---	100	ug/L	50	03/15/21 13:50	EPA 8260D	
1,2,3-Trichloropropane	ND	---	50.0	ug/L	50	03/15/21 13:50	EPA 8260D	
<b>Vinyl chloride</b>	<b>50.0</b>	---	20.0	ug/L	50	03/15/21 13:50	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 101 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/15/21 13:50</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/15/21 13:50</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/15/21 13:50</i>	<i>EPA 8260D</i>

<b>MP-1 (A1C0126-06)</b>			<b>Matrix: Water</b>		<b>Batch: 1030535</b>			
Bromobenzene	ND	---	2.50	ug/L	5	03/15/21 14:17	EPA 8260D	
Bromochloromethane	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
Bromodichloromethane	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
Bromoform	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
Bromomethane	ND	---	25.0	ug/L	5	03/15/21 14:17	EPA 8260D	
Carbon tetrachloride	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
Chlorobenzene	ND	---	2.50	ug/L	5	03/15/21 14:17	EPA 8260D	
Chloroethane	ND	---	25.0	ug/L	5	03/15/21 14:17	EPA 8260D	
Chloroform	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
Chloromethane	ND	---	25.0	ug/L	5	03/15/21 14:17	EPA 8260D	
2-Chlorotoluene	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
4-Chlorotoluene	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
Dibromochloromethane	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	25.0	ug/L	5	03/15/21 14:17	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	2.50	ug/L	5	03/15/21 14:17	EPA 8260D	
Dibromomethane	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
1,2-Dichlorobenzene	ND	---	2.50	ug/L	5	03/15/21 14:17	EPA 8260D	
1,3-Dichlorobenzene	ND	---	2.50	ug/L	5	03/15/21 14:17	EPA 8260D	
1,4-Dichlorobenzene	ND	---	2.50	ug/L	5	03/15/21 14:17	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030535</b>		
<b>MP-1 (A1C0126-06)</b>								
Dichlorodifluoromethane	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
1,1-Dichloroethane	ND	---	2.00	ug/L	5	03/15/21 14:17	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	2.00	ug/L	5	03/15/21 14:17	EPA 8260D	
<b>1,1-Dichloroethene</b>	<b>2.34</b>	---	2.00	ug/L	5	03/15/21 14:17	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>70.1</b>	---	2.00	ug/L	5	03/15/21 14:17	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	2.00	ug/L	5	03/15/21 14:17	EPA 8260D	
1,2-Dichloropropane	ND	---	2.50	ug/L	5	03/15/21 14:17	EPA 8260D	
1,3-Dichloropropane	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
2,2-Dichloropropane	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
1,1-Dichloropropene	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
Hexachlorobutadiene	ND	---	25.0	ug/L	5	03/15/21 14:17	EPA 8260D	
Methylene chloride	ND	---	50.0	ug/L	5	03/15/21 14:17	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	2.00	ug/L	5	03/15/21 14:17	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	2.50	ug/L	5	03/15/21 14:17	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>831</b>	---	2.00	ug/L	5	03/15/21 14:17	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	10.0	ug/L	5	03/15/21 14:17	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	10.0	ug/L	5	03/15/21 14:17	EPA 8260D	
1,1,1-Trichloroethane	ND	---	2.00	ug/L	5	03/15/21 14:17	EPA 8260D	
1,1,2-Trichloroethane	ND	---	2.50	ug/L	5	03/15/21 14:17	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>100</b>	---	2.00	ug/L	5	03/15/21 14:17	EPA 8260D	
Trichlorofluoromethane	ND	---	10.0	ug/L	5	03/15/21 14:17	EPA 8260D	
1,2,3-Trichloropropane	ND	---	5.00	ug/L	5	03/15/21 14:17	EPA 8260D	
Vinyl chloride	ND	---	2.00	ug/L	5	03/15/21 14:17	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 101 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/15/21 14:17</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/15/21 14:17</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>99 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/15/21 14:17</i>	<i>EPA 8260D</i>

			<b>Matrix: Water</b>			<b>Batch: 1030535</b>		
<b>MW-9 (A1C0126-07)</b>								
Bromobenzene	ND	---	0.500	ug/L	1	03/15/21 12:56	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/15/21 12:56	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/15/21 12:56	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/15/21 12:56	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
				<b>Matrix: Water</b>				
						<b>Batch: 1030535</b>		
<b>MW-9 (A1C0126-07)</b>								
Chloroform	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/15/21 12:56	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/15/21 12:56	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/15/21 12:56	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/15/21 12:56	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/15/21 12:56	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/15/21 12:56	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/15/21 12:56	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/15/21 12:56	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/15/21 12:56	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>1.56</b>	---	0.400	ug/L	1	03/15/21 12:56	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/15/21 12:56	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/15/21 12:56	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/15/21 12:56	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/15/21 12:56	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/15/21 12:56	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/15/21 12:56	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>73.5</b>	---	0.400	ug/L	1	03/15/21 12:56	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/15/21 12:56	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/15/21 12:56	EPA 8260D	
<b>1,1,1-Trichloroethane</b>	<b>1.38</b>	---	0.400	ug/L	1	03/15/21 12:56	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/15/21 12:56	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>26.4</b>	---	0.400	ug/L	1	03/15/21 12:56	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/15/21 12:56	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/15/21 12:56	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/15/21 12:56	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 102 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>03/15/21 12:56</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>			<i>101 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/15/21 12:56</i>	<i>EPA 8260D</i>	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030535</b>		
<i>Surrogate: 4-Bromofluorobenzene (Surr)</i>		<i>Recovery: 97 %</i>		<i>Limits: 80-120 %</i>		<i>1 03/15/21 12:56</i>		<i>EPA 8260D</i>
			<b>Matrix: Water</b>			<b>Batch: 1030531</b>		
Bromobenzene	ND	---	0.500	ug/L	1	03/14/21 18:20	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/14/21 18:20	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/14/21 18:20	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/14/21 18:20	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/14/21 18:20	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/14/21 18:20	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/14/21 18:20	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 18:20	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 18:20	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 18:20	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
<b>1,1-Dichloroethane</b>	<b>1.28</b>	---	0.400	ug/L	1	03/14/21 18:20	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/14/21 18:20	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 18:20	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>20.0</b>	---	0.400	ug/L	1	03/14/21 18:20	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 18:20	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/14/21 18:20	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/14/21 18:20	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/14/21 18:20	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/14/21 18:20	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/14/21 18:20	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
<b>MW-7 (A1C0126-08RE1)</b>			<b>Matrix: Water</b>		<b>Batch: 1030531</b>			
<b>Tetrachloroethene (PCE)</b>	<b>56.4</b>	---	0.400	ug/L	1	03/14/21 18:20	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 18:20	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 18:20	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/14/21 18:20	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/14/21 18:20	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>22.4</b>	---	0.400	ug/L	1	03/14/21 18:20	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/14/21 18:20	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/14/21 18:20	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/14/21 18:20	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 100 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/14/21 18:20</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/14/21 18:20</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/14/21 18:20</i>	<i>EPA 8260D</i>

<b>MW-7 DUP (A1C0126-09RE1)</b>			<b>Matrix: Water</b>		<b>Batch: 1030531</b>			
Bromobenzene	ND	---	0.500	ug/L	1	03/14/21 18:47	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/14/21 18:47	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/14/21 18:47	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/14/21 18:47	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/14/21 18:47	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/14/21 18:47	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/14/21 18:47	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 18:47	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 18:47	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 18:47	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
<b>1,1-Dichloroethane</b>	<b>1.24</b>	---	0.400	ug/L	1	03/14/21 18:47	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/14/21 18:47	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 18:47	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>19.2</b>	---	0.400	ug/L	1	03/14/21 18:47	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030531</b>		
<b>MW-7 DUP (A1C0126-09RE1)</b>								
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 18:47	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/14/21 18:47	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/14/21 18:47	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/14/21 18:47	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/14/21 18:47	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/14/21 18:47	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>54.3</b>	---	0.400	ug/L	1	03/14/21 18:47	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 18:47	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 18:47	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/14/21 18:47	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/14/21 18:47	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>22.2</b>	---	0.400	ug/L	1	03/14/21 18:47	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/14/21 18:47	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/14/21 18:47	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/14/21 18:47	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/14/21 18:47</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/14/21 18:47</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>96 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/14/21 18:47</i>	<i>EPA 8260D</i>

			<b>Matrix: Water</b>			<b>Batch: 1030531</b>		
<b>MW-5 (A1C0126-10RE1)</b>								
Bromobenzene	ND	---	0.500	ug/L	1	03/14/21 19:14	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/14/21 19:14	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/14/21 19:14	EPA 8260D	
<b>Chloroethane</b>	<b>6.41</b>	---	5.00	ug/L	1	03/14/21 19:14	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/14/21 19:14	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	

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Lisa Domenighini, Client Services Manager





ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> A1C0126 - 03 19 21 0755
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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
			<b>Matrix: Water</b>			<b>Batch: 1030531</b>		
<b>MW-5 (A1C0126-10RE1)</b>								
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/14/21 19:14	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/14/21 19:14	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 19:14	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 19:14	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 19:14	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
<b>1,1-Dichloroethane</b>	<b>0.664</b>	---	0.400	ug/L	1	03/14/21 19:14	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/14/21 19:14	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 19:14	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>10.4</b>	---	0.400	ug/L	1	03/14/21 19:14	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 19:14	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/14/21 19:14	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/14/21 19:14	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/14/21 19:14	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/14/21 19:14	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/14/21 19:14	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>7.50</b>	---	0.400	ug/L	1	03/14/21 19:14	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 19:14	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 19:14	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/14/21 19:14	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/14/21 19:14	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>5.55</b>	---	0.400	ug/L	1	03/14/21 19:14	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/14/21 19:14	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/14/21 19:14	EPA 8260D	
<b>Vinyl chloride</b>	<b>20.5</b>	---	0.400	ug/L	1	03/14/21 19:14	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 101 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>03/14/21 19:14</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>			<i>101 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/14/21 19:14</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>			<i>97 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/14/21 19:14</i>	<i>EPA 8260D</i>	

			<b>Matrix: Water</b>			<b>Batch: 1030531</b>		
<b>MW-8 (A1C0126-11RE1)</b>								
Bromobenzene	ND	---	0.500	ug/L	1	03/14/21 19:41	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
<b>MW-8 (A1C0126-11RE1)</b>			<b>Matrix: Water</b>		<b>Batch: 1030531</b>			
Bromodichloromethane	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/14/21 19:41	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/14/21 19:41	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/14/21 19:41	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/14/21 19:41	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/14/21 19:41	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/14/21 19:41	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 19:41	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 19:41	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 19:41	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/14/21 19:41	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/14/21 19:41	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 19:41	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>0.575</b>	---	0.400	ug/L	1	03/14/21 19:41	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 19:41	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/14/21 19:41	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/14/21 19:41	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/14/21 19:41	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/14/21 19:41	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/14/21 19:41	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>2.71</b>	---	0.400	ug/L	1	03/14/21 19:41	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 19:41	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 19:41	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/14/21 19:41	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/14/21 19:41	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	03/14/21 19:41	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030531</b>		
MW-8 (A1C0126-11RE1)								
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/14/21 19:41	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/14/21 19:41	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/14/21 19:41	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 101 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/14/21 19:41</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/14/21 19:41</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>96 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/14/21 19:41</i>	<i>EPA 8260D</i>

			<b>Matrix: Water</b>			<b>Batch: 1030531</b>		
MW-16 (A1C0126-12RE1)								
Bromobenzene	ND	---	0.500	ug/L	1	03/14/21 20:08	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/14/21 20:08	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/14/21 20:08	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/14/21 20:08	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/14/21 20:08	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/14/21 20:08	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/14/21 20:08	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 20:08	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 20:08	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 20:08	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/14/21 20:08	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/14/21 20:08	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 20:08	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>13.2</b>	---	0.400	ug/L	1	03/14/21 20:08	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 20:08	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/14/21 20:08	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> A1C0126 - 03 19 21 0755
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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
<b>MW-16 (A1C0126-12RE1)</b>			<b>Matrix: Water</b>		<b>Batch: 1030531</b>			
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/14/21 20:08	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/14/21 20:08	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/14/21 20:08	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/14/21 20:08	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>71.1</b>	---	0.400	ug/L	1	03/14/21 20:08	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 20:08	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 20:08	EPA 8260D	
<b>1,1,1-Trichloroethane</b>	<b>0.457</b>	---	0.400	ug/L	1	03/14/21 20:08	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/14/21 20:08	EPA 8260D	
<b>Trichloroethene (TCE)</b>	<b>12.2</b>	---	0.400	ug/L	1	03/14/21 20:08	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/14/21 20:08	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/14/21 20:08	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/14/21 20:08	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/14/21 20:08</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/14/21 20:08</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/14/21 20:08</i>	<i>EPA 8260D</i>

<b>MW-18i (A1C0126-13RE1)</b>			<b>Matrix: Water</b>		<b>Batch: 1030531</b>			
Bromobenzene	ND	---	0.500	ug/L	1	03/14/21 20:35	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/14/21 20:35	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/14/21 20:35	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/14/21 20:35	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/14/21 20:35	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/14/21 20:35	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/14/21 20:35	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 20:35	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 20:35	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 20:35	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030531</b>		
<b>MW-18i (A1C0126-13RE1)</b>								
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/14/21 20:35	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/14/21 20:35	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 20:35	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>0.664</b>	---	0.400	ug/L	1	03/14/21 20:35	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 20:35	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/14/21 20:35	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/14/21 20:35	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/14/21 20:35	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/14/21 20:35	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/14/21 20:35	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>0.808</b>	---	0.400	ug/L	1	03/14/21 20:35	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 20:35	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 20:35	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/14/21 20:35	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/14/21 20:35	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	03/14/21 20:35	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/14/21 20:35	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/14/21 20:35	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/14/21 20:35	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 102 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>03/14/21 20:35</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>			<i>101 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/14/21 20:35</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>			<i>98 %</i>	<i>80-120 %</i>	<i>1</i>	<i>03/14/21 20:35</i>	<i>EPA 8260D</i>	

			<b>Matrix: Water</b>			<b>Batch: 1030531</b>		
<b>MW-19i (A1C0126-14RE1)</b>								
Bromobenzene	ND	---	0.500	ug/L	1	03/14/21 21:01	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/14/21 21:01	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/14/21 21:01	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/14/21 21:01	EPA 8260D	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
 Tigard, OR 97223  
 503-718-2323  
 ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030531</b>		
<b>MW-19i (A1C0126-14RE1)</b>								
Chloroform	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/14/21 21:01	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/14/21 21:01	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/14/21 21:01	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 21:01	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 21:01	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/14/21 21:01	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/14/21 21:01	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/14/21 21:01	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 21:01	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>0.566</b>	---	0.400	ug/L	1	03/14/21 21:01	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/14/21 21:01	EPA 8260D	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/14/21 21:01	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/14/21 21:01	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/14/21 21:01	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/14/21 21:01	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/14/21 21:01	EPA 8260D	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	03/14/21 21:01	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 21:01	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/14/21 21:01	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/14/21 21:01	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/14/21 21:01	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	03/14/21 21:01	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/14/21 21:01	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/14/21 21:01	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/14/21 21:01	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 101 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/14/21 21:01</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/14/21 21:01</i>	<i>EPA 8260D</i>

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> A1C0126 - 03 19 21 0755
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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	
<b>MW-19i (A1C0126-14RE1)</b>			<b>Matrix: Water</b>		<b>Batch: 1030531</b>				
<i>Surrogate: 4-Bromofluorobenzene (Surr)</i>		<i>Recovery: 98 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>		<i>03/14/21 21:01</i>	<i>EPA 8260D</i>
<b>MW-24D (A1C0126-15RE1)</b>			<b>Matrix: Water</b>		<b>Batch: 1030535</b>				
Bromobenzene	ND	---	0.500	ug/L	1	03/15/21 12:01	EPA 8260D		
Bromochloromethane	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
Bromodichloromethane	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
Bromoform	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
Bromomethane	ND	---	5.00	ug/L	1	03/15/21 12:01	EPA 8260D		
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
Chlorobenzene	ND	---	0.500	ug/L	1	03/15/21 12:01	EPA 8260D		
Chloroethane	ND	---	5.00	ug/L	1	03/15/21 12:01	EPA 8260D		
Chloroform	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
Chloromethane	ND	---	5.00	ug/L	1	03/15/21 12:01	EPA 8260D		
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
Dibromochloromethane	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/15/21 12:01	EPA 8260D		
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/15/21 12:01	EPA 8260D		
Dibromomethane	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/15/21 12:01	EPA 8260D		
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/15/21 12:01	EPA 8260D		
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/15/21 12:01	EPA 8260D		
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/15/21 12:01	EPA 8260D		
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/15/21 12:01	EPA 8260D		
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/15/21 12:01	EPA 8260D		
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/15/21 12:01	EPA 8260D		
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/15/21 12:01	EPA 8260D		
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/15/21 12:01	EPA 8260D		
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D		
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/15/21 12:01	EPA 8260D		
Methylene chloride	ND	---	10.0	ug/L	1	03/15/21 12:01	EPA 8260D		
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/15/21 12:01	EPA 8260D		
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/15/21 12:01	EPA 8260D		
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	03/15/21 12:01	EPA 8260D		

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030535</b>		
<b>MW-24D (A1C0126-15RE1)</b>								
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/15/21 12:01	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/15/21 12:01	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/15/21 12:01	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/15/21 12:01	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	03/15/21 12:01	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/15/21 12:01	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/15/21 12:01	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/15/21 12:01	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 101 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>03/15/21 12:01</i>	<i>EPA 8260D</i>	
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>	<i>1</i>	<i>03/15/21 12:01</i>	<i>EPA 8260D</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>80-120 %</i>	<i>1</i>	<i>03/15/21 12:01</i>	<i>EPA 8260D</i>	

			<b>Matrix: Water</b>			<b>Batch: 1030535</b>		
<b>MW-24i (A1C0126-16RE1)</b>								
Bromobenzene	ND	---	0.500	ug/L	1	03/15/21 12:29	EPA 8260D	
Bromochloromethane	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
Bromodichloromethane	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
Bromoform	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
Bromomethane	ND	---	5.00	ug/L	1	03/15/21 12:29	EPA 8260D	
Carbon tetrachloride	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
Chlorobenzene	ND	---	0.500	ug/L	1	03/15/21 12:29	EPA 8260D	
Chloroethane	ND	---	5.00	ug/L	1	03/15/21 12:29	EPA 8260D	
Chloroform	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
Chloromethane	ND	---	5.00	ug/L	1	03/15/21 12:29	EPA 8260D	
2-Chlorotoluene	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
4-Chlorotoluene	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
Dibromochloromethane	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	03/15/21 12:29	EPA 8260D	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	03/15/21 12:29	EPA 8260D	
Dibromomethane	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	03/15/21 12:29	EPA 8260D	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	03/15/21 12:29	EPA 8260D	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	03/15/21 12:29	EPA 8260D	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	03/15/21 12:29	EPA 8260D	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	03/15/21 12:29	EPA 8260D	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	03/15/21 12:29	EPA 8260D	
<b>cis-1,2-Dichloroethene</b>	<b>0.505</b>	---	0.400	ug/L	1	03/15/21 12:29	EPA 8260D	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	03/15/21 12:29	EPA 8260D	

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Lisa Domenighini, Client Services Manager





ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
			<b>Matrix: Water</b>			<b>Batch: 1030535</b>		
<b>MW-24i (A1C0126-16RE1)</b>								
1,2-Dichloropropane	ND	---	0.500	ug/L	1	03/15/21 12:29	EPA 8260D	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	03/15/21 12:29	EPA 8260D	
Methylene chloride	ND	---	10.0	ug/L	1	03/15/21 12:29	EPA 8260D	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	03/15/21 12:29	EPA 8260D	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	03/15/21 12:29	EPA 8260D	
<b>Tetrachloroethene (PCE)</b>	<b>0.955</b>	---	0.400	ug/L	1	03/15/21 12:29	EPA 8260D	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	03/15/21 12:29	EPA 8260D	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	03/15/21 12:29	EPA 8260D	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	03/15/21 12:29	EPA 8260D	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	03/15/21 12:29	EPA 8260D	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	03/15/21 12:29	EPA 8260D	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	03/15/21 12:29	EPA 8260D	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	03/15/21 12:29	EPA 8260D	
Vinyl chloride	ND	---	0.400	ug/L	1	03/15/21 12:29	EPA 8260D	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 102 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>03/15/21 12:29</i>	<i>EPA 8260D</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/15/21 12:29</i>	<i>EPA 8260D</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>96 %</i>		<i>80-120 %</i>		<i>1</i>	<i>03/15/21 12:29</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
<b>MW-17 (A1C0126-01)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	1.00	---	0.0200	mg/L	1	03/05/21 12:10	SM 4500-NH3 G	
<b>S-1 (A1C0126-02)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	ND	---	0.0200	mg/L	1	03/05/21 12:15	SM 4500-NH3 G	
<b>S-2 (A1C0126-03RE1)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	5.61	---	0.0400	mg/L	2	03/05/21 13:59	SM 4500-NH3 G	
<b>MW-19 (A1C0126-04RE2)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	156	---	1.00	mg/L	50	03/05/21 14:43	SM 4500-NH3 G	
<b>MW-19 DUP (A1C0126-05RE2)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	166	---	1.00	mg/L	50	03/05/21 14:44	SM 4500-NH3 G	
<b>MP-1 (A1C0126-06RE1)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	6.68	---	0.0400	mg/L	2	03/05/21 14:07	SM 4500-NH3 G	
<b>MW-9 (A1C0126-07RE1)</b>				<b>Matrix: Water</b>		<b>Batch: 1030268</b>		
Ammonia as N	ND	---	0.0200	mg/L	1	03/08/21 16:49	SM 4500-NH3 G	
<b>MW-7 (A1C0126-08RE1)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	5.94	---	0.0400	mg/L	2	03/05/21 14:08	SM 4500-NH3 G	
<b>MW-7 DUP (A1C0126-09RE1)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	5.97	---	0.0400	mg/L	2	03/05/21 14:10	SM 4500-NH3 G	
<b>MW-5 (A1C0126-10)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	0.543	---	0.0200	mg/L	1	03/05/21 12:34	SM 4500-NH3 G	
<b>MW-8 (A1C0126-11)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	ND	---	0.0200	mg/L	1	03/05/21 12:36	SM 4500-NH3 G	
<b>MW-16 (A1C0126-12)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	ND	---	0.0200	mg/L	1	03/05/21 12:37	SM 4500-NH3 G	
<b>MW-18i (A1C0126-13)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		

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<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
<b>MW-18i (A1C0126-13)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	ND	---	0.0200	mg/L	1	03/05/21 12:39	SM 4500-NH3 G	
<b>MW-19i (A1C0126-14)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	<b>0.198</b>	---	0.0200	mg/L	1	03/05/21 12:40	SM 4500-NH3 G	
<b>MW-24D (A1C0126-15RE1)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	<b>0.163</b>	---	0.0200	mg/L	1	03/05/21 15:18	SM 4500-NH3 G	
<b>MW-24i (A1C0126-16)</b>				<b>Matrix: Water</b>		<b>Batch: 1030155</b>		
Ammonia as N	ND	---	0.0200	mg/L	1	03/05/21 12:51	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
<b>MW-17 (A1C0126-01RE1)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrate-Nitrogen	<b>2.95</b>	---	0.250	mg/L	1	03/03/21 19:20	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/03/21 19:20	EPA 300.0	
<b>S-1 (A1C0126-02)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrate-Nitrogen	<b>1.39</b>	---	0.250	mg/L	1	03/03/21 19:42	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/03/21 19:42	EPA 300.0	
<b>S-2 (A1C0126-03)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	03/03/21 20:47	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/03/21 20:47	EPA 300.0	
<b>MW-19 (A1C0126-04)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrate-Nitrogen	<b>137</b>	---	5.00	mg/L	20	03/03/21 21:09	EPA 300.0	
<b>MW-19 (A1C0126-04RE1)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/03/21 21:31	EPA 300.0	
<b>MW-19 DUP (A1C0126-05)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrate-Nitrogen	<b>160</b>	---	5.00	mg/L	20	03/03/21 21:53	EPA 300.0	
<b>MW-19 DUP (A1C0126-05RE1)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/03/21 22:14	EPA 300.0	
<b>MP-1 (A1C0126-06)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrate-Nitrogen	<b>140</b>	---	5.00	mg/L	20	03/03/21 23:20	EPA 300.0	
<b>MP-1 (A1C0126-06RE1)</b>				<b>Matrix: Water</b>				
Batch: 1030131								

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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
<b>MP-1 (A1C0126-06RE1)</b>				<b>Matrix: Water</b>				
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/03/21 23:42	EPA 300.0	
<b>MW-9 (A1C0126-07)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrate-Nitrogen	<b>298</b>	---	12.5	mg/L	50	03/04/21 00:04	EPA 300.0	
<b>MW-9 (A1C0126-07RE1)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/04/21 00:25	EPA 300.0	
<b>MW-7 (A1C0126-08RE1)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/04/21 01:09	EPA 300.0	
<b>MW-7 (A1C0126-08RE2)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrate-Nitrogen	<b>10.6</b>	---	0.500	mg/L	2	03/04/21 15:50	EPA 300.0	
<b>MW-7 DUP (A1C0126-09RE1)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/04/21 01:53	EPA 300.0	
<b>MW-7 DUP (A1C0126-09RE2)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrate-Nitrogen	<b>10.7</b>	---	0.500	mg/L	2	03/04/21 16:12	EPA 300.0	
<b>MW-5 (A1C0126-10)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrate-Nitrogen	<b>4.64</b>	---	0.250	mg/L	1	03/04/21 02:14	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/04/21 02:14	EPA 300.0	
<b>MW-8 (A1C0126-11)</b>				<b>Matrix: Water</b>				
Batch: 1030131								
Nitrate-Nitrogen	<b>317</b>	---	12.5	mg/L	50	03/04/21 02:36	EPA 300.0	
<b>MW-8 (A1C0126-11RE1)</b>				<b>Matrix: Water</b>				

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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
<b>MW-8 (A1C0126-11RE1)</b>				<b>Matrix: Water</b>				
<u>Batch: 1030131</u>								
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/04/21 03:40	EPA 300.0	
<b>MW-16 (A1C0126-12RE1)</b>				<b>Matrix: Water</b>				
<u>Batch: 1030131</u>								
Nitrate-Nitrogen	<b>7.09</b>	---	0.250	mg/L	1	03/04/21 04:24	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/04/21 04:24	EPA 300.0	
<b>MW-18i (A1C0126-13)</b>				<b>Matrix: Water</b>				
<u>Batch: 1030131</u>								
Nitrate-Nitrogen	<b>0.528</b>	---	0.250	mg/L	1	03/04/21 04:45	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/04/21 04:45	EPA 300.0	
<b>MW-19i (A1C0126-14)</b>				<b>Matrix: Water</b>				
<u>Batch: 1030131</u>								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	03/04/21 05:07	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/04/21 05:07	EPA 300.0	
<b>MW-24D (A1C0126-15)</b>				<b>Matrix: Water</b>				
<u>Batch: 1030131</u>								
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	03/04/21 05:28	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/04/21 05:28	EPA 300.0	
<b>MW-24i (A1C0126-16RE1)</b>				<b>Matrix: Water</b>				
<u>Batch: 1030146</u>								
Nitrate-Nitrogen	<b>1.30</b>	---	0.250	mg/L	1	03/04/21 08:21	EPA 300.0	
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	03/04/21 08:21	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
<b>MW-19 (A1C0126-04)</b>				<b>Matrix: Water</b>		<b>Batch: 1030260</b>		
Total Organic Carbon	5.84	---	1.00	mg/L	1	03/08/21 19:52	SM 5310 C	
<b>MP-1 (A1C0126-06)</b>				<b>Matrix: Water</b>		<b>Batch: 1030260</b>		
Total Organic Carbon	1.83	---	1.00	mg/L	1	03/08/21 20:25	SM 5310 C	
<b>MW-7 (A1C0126-08)</b>				<b>Matrix: Water</b>		<b>Batch: 1030260</b>		
Total Organic Carbon	4.53	---	1.00	mg/L	1	03/08/21 20:58	SM 5310 C	
<b>MW-24i (A1C0126-16)</b>				<b>Matrix: Water</b>		<b>Batch: 1030260</b>		
Total Organic Carbon	ND	---	1.00	mg/L	1	03/08/21 21:29	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
<b>Batch 1030424 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (1030424-BLK1)</b>		Prepared: 03/11/21 08:00		Analyzed: 03/11/21 10:46								
<b>EPA 8260D</b>												
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





ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> A1C0126 - 03 19 21 0755
--	---	--

**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
<b>Batch 1030424 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (1030424-BLK1)</b>			Prepared: 03/11/21 08:00		Analyzed: 03/11/21 10:46							
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>						

<b>LCS (1030424-BS1)</b>			Prepared: 03/11/21 08:00		Analyzed: 03/11/21 09:26							
<b>EPA 8260D</b>												
Bromobenzene	20.6	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
Bromochloromethane	21.6	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Bromodichloromethane	21.8	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Bromoform	23.7	---	1.00	ug/L	1	20.0	---	119	80 - 120%	---	---	
Bromomethane	22.3	---	5.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
Carbon tetrachloride	19.6	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
Chlorobenzene	20.3	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
Chloroethane	22.6	---	5.00	ug/L	1	20.0	---	113	80 - 120%	---	---	
Chloroform	21.1	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
Chloromethane	21.5	---	5.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
2-Chlorotoluene	20.9	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
4-Chlorotoluene	20.3	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
Dibromochloromethane	21.2	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	20.4	---	5.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.8	---	0.500	ug/L	1	20.0	---	104	80 - 120%	---	---	
Dibromomethane	21.7	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,2-Dichlorobenzene	20.7	---	0.500	ug/L	1	20.0	---	104	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
--	---	---

**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
<b>Batch 1030424 - EPA 5030B</b>						<b>Water</b>						
<b>LCS (1030424-BS1)</b>		Prepared: 03/11/21 08:00		Analyzed: 03/11/21 09:26								
1,3-Dichlorobenzene	20.6	---	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	27.8	---	1.00	ug/L	1	20.0	---	<b>139</b>	<b>80 - 120%</b>	---	---	Q-56
1,1-Dichloroethane	19.4	---	0.400	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	21.2	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,1-Dichloroethene	20.1	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
cis-1,2-Dichloroethene	21.0	---	0.400	ug/L	1	20.0	---	105	80 - 120%	---	---	
trans-1,2-Dichloroethene	20.7	---	0.400	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,2-Dichloropropane	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,3-Dichloropropane	21.2	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
2,2-Dichloropropane	12.8	---	1.00	ug/L	1	20.0	---	<b>64</b>	<b>80 - 120%</b>	---	---	Q-55
1,1-Dichloropropene	21.3	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
cis-1,3-Dichloropropene	18.9	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
trans-1,3-Dichloropropene	17.3	---	1.00	ug/L	1	20.0	---	87	80 - 120%	---	---	
Hexachlorobutadiene	22.0	---	5.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
Methylene chloride	20.2	---	10.0	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	20.2	---	0.400	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	21.2	---	0.500	ug/L	1	20.0	---	106	80 - 120%	---	---	
Tetrachloroethene (PCE)	21.2	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,2,3-Trichlorobenzene	17.6	---	2.00	ug/L	1	20.0	---	88	80 - 120%	---	---	
1,2,4-Trichlorobenzene	18.4	---	2.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
1,1,1-Trichloroethane	19.8	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,1,2-Trichloroethane	21.4	---	0.500	ug/L	1	20.0	---	107	80 - 120%	---	---	
Trichloroethene (TCE)	21.5	---	0.400	ug/L	1	20.0	---	108	80 - 120%	---	---	
Trichlorofluoromethane	23.7	---	2.00	ug/L	1	20.0	---	118	80 - 120%	---	---	
1,2,3-Trichloropropane	21.3	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
Vinyl chloride	21.7	---	0.400	ug/L	1	20.0	---	108	80 - 120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 98 %</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>96 %</i>		<i>80-120 %</i>		<i>"</i>						

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
--	---	---

**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
<b>Batch 1030531 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (1030531-BLK1)</b>		Prepared: 03/14/21 08:30			Analyzed: 03/14/21 13:24							
<b>EPA 8260D</b>												
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



ANALYTICAL REPORT

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6700 S.W. Sandburg Street  
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503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
--	---	---

**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
<b>Batch 1030531 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (1030531-BLK1)</b>		Prepared: 03/14/21 08:30		Analyzed: 03/14/21 13:24								
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: 101 %</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>97 %</i>		<i>80-120 %</i>		<i>"</i>						

<b>LCS (1030531-BS1)</b>		Prepared: 03/14/21 08:30		Analyzed: 03/14/21 11:04								
<b>EPA 8260D</b>												
Bromobenzene	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Bromochloromethane	22.1	---	1.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
Bromodichloromethane	21.6	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Bromoform	25.5	---	1.00	ug/L	1	20.0	---	<b>128</b>	<b>80 - 120%</b>	---	---	Q-56
Bromomethane	19.2	---	5.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
Carbon tetrachloride	21.3	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
Chlorobenzene	19.7	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Chloroethane	20.1	---	5.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
Chloroform	20.3	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Chloromethane	15.2	---	5.00	ug/L	1	20.0	---	<b>76</b>	<b>80 - 120%</b>	---	---	Q-55
2-Chlorotoluene	20.7	---	1.00	ug/L	1	20.0	---	103	80 - 120%	---	---	
4-Chlorotoluene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Dibromochloromethane	22.5	---	1.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	21.2	---	5.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.9	---	0.500	ug/L	1	20.0	---	104	80 - 120%	---	---	
Dibromomethane	21.2	---	1.00	ug/L	1	20.0	---	106	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



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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
<b>Batch 1030531 - EPA 5030B</b>						<b>Water</b>						
<b>LCS (1030531-BS1)</b>		Prepared: 03/14/21 08:30		Analyzed: 03/14/21 11:04								
1,3-Dichlorobenzene	20.1	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,4-Dichlorobenzene	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Dichlorodifluoromethane	25.3	---	1.00	ug/L	1	20.0	---	<b>127</b>	<b>80 - 120%</b>	---	---	Q-56
1,1-Dichloroethane	18.1	---	0.400	ug/L	1	20.0	---	90	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	19.9	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,1-Dichloroethene	18.7	---	0.400	ug/L	1	20.0	---	93	80 - 120%	---	---	
cis-1,2-Dichloroethene	19.5	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---	
trans-1,2-Dichloroethene	19.4	---	0.400	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,2-Dichloropropane	18.7	---	0.500	ug/L	1	20.0	---	93	80 - 120%	---	---	
1,3-Dichloropropane	20.6	---	1.00	ug/L	1	20.0	---	103	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	19.9	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
trans-1,3-Dichloropropene	19.1	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
Hexachlorobutadiene	22.5	---	5.00	ug/L	1	20.0	---	113	80 - 120%	---	---	
Methylene chloride	20.0	---	10.0	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	21.3	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,1,1,2,2-Tetrachloroethane	20.5	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Tetrachloroethene (PCE)	20.7	---	0.400	ug/L	1	20.0	---	103	80 - 120%	---	---	
1,2,3-Trichlorobenzene	22.6	---	2.00	ug/L	1	20.0	---	113	80 - 120%	---	---	
1,2,4-Trichlorobenzene	24.7	---	2.00	ug/L	1	20.0	---	<b>124</b>	<b>80 - 120%</b>	---	---	Q-56
1,1,1-Trichloroethane	19.7	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,1,2-Trichloroethane	21.0	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
Trichloroethene (TCE)	20.4	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
Trichlorofluoromethane	22.1	---	2.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
1,2,3-Trichloropropane	20.1	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Vinyl chloride	20.5	---	0.400	ug/L	1	20.0	---	102	80 - 120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 97 %</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>97 %</i>		<i>80-120 %</i>		<i>"</i>						

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
--	---	---

**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
<b>Batch 1030535 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (1030535-BLK1)</b>		Prepared: 03/15/21 08:00			Analyzed: 03/15/21 11:34							
<u>EPA 8260D</u>												
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



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b>	Project: <b>Nustar-Vancouver</b>	
5820 SW Kelly Ave Unit B	Project Number: <b>Shore Terminal-Vancouver-</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Stephanie Salisbury</b>	<b>A1C0126 - 03 19 21 0755</b>

**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
<b>Batch 1030535 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (1030535-BLK1)</b>		Prepared: 03/15/21 08:00		Analyzed: 03/15/21 11:34								
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: 101 %</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>97 %</i>		<i>80-120 %</i>		<i>"</i>						

<b>LCS (1030535-BS1)</b>		Prepared: 03/15/21 08:00		Analyzed: 03/15/21 09:15								
<b>EPA 8260D</b>												
Bromobenzene	20.5	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Bromochloromethane	21.8	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Bromodichloromethane	21.0	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
Bromoform	25.3	---	1.00	ug/L	1	20.0	---	<b>127</b>	<b>80 - 120%</b>	---	---	Q-56
Bromomethane	25.1	---	5.00	ug/L	1	20.0	---	<b>126</b>	<b>80 - 120%</b>	---	---	Q-56
Carbon tetrachloride	21.0	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
Chlorobenzene	19.7	---	0.500	ug/L	1	20.0	---	98	80 - 120%	---	---	
Chloroethane	20.1	---	5.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Chloroform	20.0	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
Chloromethane	15.8	---	5.00	ug/L	1	20.0	---	<b>79</b>	<b>80 - 120%</b>	---	---	Q-55
2-Chlorotoluene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
4-Chlorotoluene	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
Dibromochloromethane	22.1	---	1.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	19.4	---	5.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.2	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
Dibromomethane	20.3	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2-Dichlorobenzene	20.3	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> A1C0126 - 03 19 21 0755
--	---	--

**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
<b>Batch 1030535 - EPA 5030B</b>						<b>Water</b>						
<b>LCS (1030535-BS1)</b>		Prepared: 03/15/21 08:00		Analyzed: 03/15/21 09:15								
1,3-Dichlorobenzene	20.1	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,4-Dichlorobenzene	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Dichlorodifluoromethane	23.8	---	1.00	ug/L	1	20.0	---	119	80 - 120%	---	---	
1,1-Dichloroethane	17.8	---	0.400	ug/L	1	20.0	---	89	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	19.7	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,1-Dichloroethene	18.3	---	0.400	ug/L	1	20.0	---	92	80 - 120%	---	---	
cis-1,2-Dichloroethene	19.0	---	0.400	ug/L	1	20.0	---	95	80 - 120%	---	---	
trans-1,2-Dichloroethene	18.9	---	0.400	ug/L	1	20.0	---	95	80 - 120%	---	---	
1,2-Dichloropropane	18.4	---	0.500	ug/L	1	20.0	---	92	80 - 120%	---	---	
1,3-Dichloropropane	19.9	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
2,2-Dichloropropane	16.1	---	1.00	ug/L	1	20.0	---	81	80 - 120%	---	---	
1,1-Dichloropropene	19.6	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
cis-1,3-Dichloropropene	19.1	---	1.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
trans-1,3-Dichloropropene	18.1	---	1.00	ug/L	1	20.0	---	91	80 - 120%	---	---	
Hexachlorobutadiene	21.4	---	5.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
Methylene chloride	20.4	---	10.0	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	21.0	---	0.400	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,1,2,2-Tetrachloroethane	19.4	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
Tetrachloroethene (PCE)	20.9	---	0.400	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,2,3-Trichlorobenzene	20.5	---	2.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2,4-Trichlorobenzene	22.3	---	2.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
1,1,1-Trichloroethane	19.3	---	0.400	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,1,2-Trichloroethane	21.0	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
Trichloroethene (TCE)	20.7	---	0.400	ug/L	1	20.0	---	104	80 - 120%	---	---	
Trichlorofluoromethane	22.3	---	2.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,2,3-Trichloropropane	19.9	---	1.00	ug/L	1	20.0	---	100	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: 98 %</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>96 %</i>		<i>80-120 %</i>		<i>"</i>						

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ANALYTICAL REPORT

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ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
--	---	---

**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
<b>Batch 1030155 - Method Prep: Aq</b>						<b>Water</b>						
<b>Blank (1030155-BLK1)</b>		Prepared: 03/04/21 14:55 Analyzed: 03/05/21 12:01										
<b>SM 4500-NH3 G</b>												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	---
<b>LCS (1030155-BS1)</b>		Prepared: 03/04/21 14:55 Analyzed: 03/05/21 12:03										
<b>SM 4500-NH3 G</b>												
Ammonia as N	2.01	---	0.0200	mg/L	1	2.00	---	101	87 - 116%	---	---	---
<b>Matrix Spike (1030155-MS1)</b>		Prepared: 03/04/21 14:55 Analyzed: 03/05/21 12:12										
<b>QC Source Sample: MW-17 (A1C0126-01)</b>												
<b>SM 4500-NH3 G</b>												
Ammonia as N	3.41	---	0.0250	mg/L	1	2.50	1.00	96	87 - 116%	---	---	---
<b>Matrix Spike Dup (1030155-MSD1)</b>		Prepared: 03/04/21 14:55 Analyzed: 03/05/21 12:13										
<b>QC Source Sample: MW-17 (A1C0126-01)</b>												
<b>SM 4500-NH3 G</b>												
Ammonia as N	3.38	---	0.0250	mg/L	1	2.50	1.00	95	87 - 116%	1	13%	---

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Lisa Domenighini, Client Services Manager

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<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
--	---	---

**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
<b>Batch 1030268 - Method Prep: Aq</b>						<b>Water</b>						
<b>Blank (1030268-BLK1)</b>		Prepared: 03/08/21 10:37 Analyzed: 03/08/21 16:40										
<b>SM 4500-NH3 G</b>												
Ammonia as N	ND	---	0.0200	mg/L	1	---	---	---	---	---	---	
<b>LCS (1030268-BS1)</b>		Prepared: 03/08/21 10:37 Analyzed: 03/08/21 16:41										
<b>SM 4500-NH3 G</b>												
Ammonia as N	2.07	---	0.0200	mg/L	1	2.00	---	103	87 - 116%	---	---	
<b>Matrix Spike (1030268-MS1)</b>		Prepared: 03/08/21 10:37 Analyzed: 03/08/21 16:50										
<b>QC Source Sample: MW-9 (A1C0126-07RE1)</b>												
<b>SM 4500-NH3 G</b>												
Ammonia as N	2.49	---	0.0250	mg/L	1	2.50	ND	100	87 - 116%	---	---	
<b>Matrix Spike Dup (1030268-MSD1)</b>		Prepared: 03/08/21 10:37 Analyzed: 03/08/21 16:52										
<b>QC Source Sample: MW-9 (A1C0126-07RE1)</b>												
<b>SM 4500-NH3 G</b>												
Ammonia as N	2.51	---	0.0250	mg/L	1	2.50	ND	100	87 - 116%	0.8	13%	

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503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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
<b>Batch 1030131 - Method Prep: Aq</b>						<b>Water</b>						
<b>Blank (1030131-BLK1)</b>		Prepared: 03/03/21 13:41 Analyzed: 03/03/21 14:24										
<b>EPA 300.0</b>												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
<b>LCS (1030131-BS1)</b>		Prepared: 03/03/21 13:41 Analyzed: 03/03/21 14:45										
<b>EPA 300.0</b>												
Nitrate-Nitrogen	1.95	---	0.250	mg/L	1	2.00	---	98	90 - 110%	---	---	---
Nitrite-Nitrogen	2.03	---	0.250	mg/L	1	2.00	---	101	90 - 110%	---	---	---
<b>Duplicate (1030131-DUP2)</b>		Prepared: 03/03/21 18:28 Analyzed: 03/03/21 20:03										
<b>QC Source Sample: S-1 (A1C0126-02)</b>												
<b>EPA 300.0</b>												
Nitrate-Nitrogen	<b>1.39</b>	---	0.250	mg/L	1	---	1.39	---	---	0.02	5%	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	---
<b>Matrix Spike (1030131-MS2)</b>		Prepared: 03/03/21 18:28 Analyzed: 03/03/21 20:25										
<b>QC Source Sample: S-1 (A1C0126-02)</b>												
<b>EPA 300.0</b>												
Nitrate-Nitrogen	3.87	---	0.312	mg/L	1	2.50	1.39	99	86 - 118%	---	---	---
Nitrite-Nitrogen	2.56	---	0.312	mg/L	1	2.50	ND	102	82 - 117%	---	---	---

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ANALYTICAL REPORT

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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
<b>Batch 1030146 - Method Prep: Aq</b>						<b>Water</b>						
<b>Blank (1030146-BLK1)</b>		Prepared: 03/03/21 18:28		Analyzed: 03/04/21 05:50								
<u>EPA 300.0</u>												
Nitrate-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	---	---	---	---	---	---
<b>LCS (1030146-BS1)</b>		Prepared: 03/03/21 18:28		Analyzed: 03/04/21 06:11								
<u>EPA 300.0</u>												
Nitrate-Nitrogen	1.94	---	0.250	mg/L	1	2.00	---	97	90 - 110%	---	---	---
Nitrite-Nitrogen	2.02	---	0.250	mg/L	1	2.00	---	101	90 - 110%	---	---	---
<b>Duplicate (1030146-DUP2)</b>		Prepared: 03/03/21 18:28		Analyzed: 03/04/21 08:42								
<u>QC Source Sample: MW-24i (A1C0126-16RE1)</u>												
<u>EPA 300.0</u>												
Nitrate-Nitrogen	<b>1.30</b>	---	0.250	mg/L	1	---	1.30	---	---	0.2	5%	Q-16
Nitrite-Nitrogen	ND	---	0.250	mg/L	1	---	ND	---	---	---	10%	Q-16
<b>Matrix Spike (1030146-MS2)</b>		Prepared: 03/03/21 18:28		Analyzed: 03/04/21 09:04								
<u>QC Source Sample: MW-24i (A1C0126-16RE1)</u>												
<u>EPA 300.0</u>												
Nitrate-Nitrogen	3.77	---	0.312	mg/L	1	2.50	1.30	99	86 - 118%	---	---	Q-16
Nitrite-Nitrogen	2.55	---	0.312	mg/L	1	2.50	ND	102	82 - 117%	---	---	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
<b>Batch 1030260 - Method Prep: Aq</b>						<b>Water</b>						
<b>Blank (1030260-BLK1)</b>		Prepared: 03/08/21 09:16 Analyzed: 03/08/21 17:50										
<b>SM 5310 C</b>												
Total Organic Carbon	ND	---	1.00	mg/L	1	---	---	---	---	---	---	
<b>LCS (1030260-BS1)</b>		Prepared: 03/08/21 09:16 Analyzed: 03/08/21 18:20										
<b>SM 5310 C</b>												
Total Organic Carbon	9.82	---	1.00	mg/L	1	10.0	---	98	90 - 114%	---	---	
<b>Duplicate (1030260-DUP1)</b>		Prepared: 03/08/21 09:16 Analyzed: 03/08/21 22:01										
<b>QC Source Sample: MW-24i (A1C0126-16)</b>												
<b>SM 5310 C</b>												
Total Organic Carbon	ND	---	1.00	mg/L	1	---	ND	---	---	---	10%	
<b>Matrix Spike (1030260-MS1)</b>		Prepared: 03/08/21 09:16 Analyzed: 03/08/21 22:31										
<b>QC Source Sample: MW-24i (A1C0126-16)</b>												
<b>SM 5310 C</b>												
Total Organic Carbon	10.5	---	1.01	mg/L	1	10.0	ND	105	90 - 114%	---	---	

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**SAMPLE PREPARATION INFORMATION**

Halogenated Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030B					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<b>Batch: 1030424</b>							
A1C0126-01	Water	EPA 8260D	03/03/21 08:40	03/11/21 09:54	5mL/5mL	5mL/5mL	1.00
A1C0126-02	Water	EPA 8260D	03/03/21 09:40	03/11/21 09:54	5mL/5mL	5mL/5mL	1.00
A1C0126-03	Water	EPA 8260D	03/03/21 10:30	03/11/21 09:54	5mL/5mL	5mL/5mL	1.00
A1C0126-04	Water	EPA 8260D	03/03/21 11:30	03/11/21 09:54	5mL/5mL	5mL/5mL	1.00
<b>Batch: 1030531</b>							
A1C0126-08RE1	Water	EPA 8260D	03/03/21 14:05	03/14/21 11:22	5mL/5mL	5mL/5mL	1.00
A1C0126-09RE1	Water	EPA 8260D	03/03/21 14:05	03/14/21 11:22	5mL/5mL	5mL/5mL	1.00
A1C0126-10RE1	Water	EPA 8260D	03/03/21 08:07	03/14/21 11:22	5mL/5mL	5mL/5mL	1.00
A1C0126-11RE1	Water	EPA 8260D	03/03/21 09:05	03/14/21 11:22	5mL/5mL	5mL/5mL	1.00
A1C0126-12RE1	Water	EPA 8260D	03/03/21 09:48	03/14/21 11:22	5mL/5mL	5mL/5mL	1.00
A1C0126-13RE1	Water	EPA 8260D	03/03/21 10:27	03/14/21 11:22	5mL/5mL	5mL/5mL	1.00
A1C0126-14RE1	Water	EPA 8260D	03/03/21 11:21	03/14/21 11:22	5mL/5mL	5mL/5mL	1.00
<b>Batch: 1030535</b>							
A1C0126-04RE1	Water	EPA 8260D	03/03/21 11:30	03/15/21 10:54	5mL/5mL	5mL/5mL	1.00
A1C0126-05	Water	EPA 8260D	03/03/21 11:30	03/15/21 10:54	5mL/5mL	5mL/5mL	1.00
A1C0126-06	Water	EPA 8260D	03/03/21 12:10	03/15/21 10:54	5mL/5mL	5mL/5mL	1.00
A1C0126-07	Water	EPA 8260D	03/03/21 13:00	03/15/21 10:54	5mL/5mL	5mL/5mL	1.00
A1C0126-15RE1	Water	EPA 8260D	03/03/21 12:54	03/15/21 10:54	5mL/5mL	5mL/5mL	1.00
A1C0126-16RE1	Water	EPA 8260D	03/03/21 14:14	03/15/21 10:54	5mL/5mL	5mL/5mL	1.00

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
<b>Batch: 1030155</b>							
A1C0126-01	Water	SM 4500-NH3 G	03/03/21 08:40	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-02	Water	SM 4500-NH3 G	03/03/21 09:40	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-03RE1	Water	SM 4500-NH3 G	03/03/21 10:30	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-04RE2	Water	SM 4500-NH3 G	03/03/21 11:30	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-05RE2	Water	SM 4500-NH3 G	03/03/21 11:30	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-06RE1	Water	SM 4500-NH3 G	03/03/21 12:10	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-08RE1	Water	SM 4500-NH3 G	03/03/21 14:05	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-09RE1	Water	SM 4500-NH3 G	03/03/21 14:05	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-10	Water	SM 4500-NH3 G	03/03/21 08:07	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-11	Water	SM 4500-NH3 G	03/03/21 09:05	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00

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**SAMPLE PREPARATION INFORMATION**

**Ammonia by Gas Diffusion and Colorimetric Detection**

<b>Prep: Method Prep: Aq</b>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
A1C0126-12	Water	SM 4500-NH3 G	03/03/21 09:48	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-13	Water	SM 4500-NH3 G	03/03/21 10:27	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-14	Water	SM 4500-NH3 G	03/03/21 11:21	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-15RE1	Water	SM 4500-NH3 G	03/03/21 12:54	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
A1C0126-16	Water	SM 4500-NH3 G	03/03/21 14:14	03/04/21 14:55	10mL/10mL	10mL/10mL	1.00
<b>Batch: 1030268</b>							
A1C0126-07RE1	Water	SM 4500-NH3 G	03/03/21 13:00	03/08/21 10:37	10mL/10mL	10mL/10mL	1.00

**Anions by Ion Chromatography**

<b>Prep: Method Prep: Aq</b>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<b>Batch: 1030131</b>							
A1C0126-01RE1	Water	EPA 300.0	03/03/21 08:40	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-02	Water	EPA 300.0	03/03/21 09:40	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-03	Water	EPA 300.0	03/03/21 10:30	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-04	Water	EPA 300.0	03/03/21 11:30	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-04RE1	Water	EPA 300.0	03/03/21 11:30	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-05	Water	EPA 300.0	03/03/21 11:30	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-05RE1	Water	EPA 300.0	03/03/21 11:30	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-06	Water	EPA 300.0	03/03/21 12:10	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-06RE1	Water	EPA 300.0	03/03/21 12:10	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-07	Water	EPA 300.0	03/03/21 13:00	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-07RE1	Water	EPA 300.0	03/03/21 13:00	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-08RE1	Water	EPA 300.0	03/03/21 14:05	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-08RE2	Water	EPA 300.0	03/03/21 14:05	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-09RE1	Water	EPA 300.0	03/03/21 14:05	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-09RE2	Water	EPA 300.0	03/03/21 14:05	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-10	Water	EPA 300.0	03/03/21 08:07	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-11	Water	EPA 300.0	03/03/21 09:05	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-11RE1	Water	EPA 300.0	03/03/21 09:05	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-12RE1	Water	EPA 300.0	03/03/21 09:48	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-13	Water	EPA 300.0	03/03/21 10:27	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-14	Water	EPA 300.0	03/03/21 11:21	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
A1C0126-15	Water	EPA 300.0	03/03/21 12:54	03/03/21 18:28	5mL/5mL	5mL/5mL	1.00
<b>Batch: 1030146</b>							

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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
A1C0126-16RE1	Water	EPA 300.0	03/03/21 14:14	03/03/21 18:28	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: 1030260</u>							
A1C0126-04	Water	SM 5310 C	03/03/21 11:30	03/08/21 09:16	40mL/40mL	40mL/40mL	1.00
A1C0126-06	Water	SM 5310 C	03/03/21 12:10	03/08/21 09:16	40mL/40mL	40mL/40mL	1.00
A1C0126-08	Water	SM 5310 C	03/03/21 14:05	03/08/21 09:16	40mL/40mL	40mL/40mL	1.00
A1C0126-16	Water	SM 5310 C	03/03/21 14:14	03/08/21 09:16	40mL/40mL	40mL/40mL	1.00

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**QUALIFIER DEFINITIONS**

**Client Sample and Quality Control (QC) Sample Qualifier Definitions:**

**Apex Laboratories**

- Q-16** Reanalysis of an original Batch QC sample.
- 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.

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Lisa Domenighini, Client Services Manager



**ANALYTICAL REPORT**

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> <b>A1C0126 - 03 19 21 0755</b>
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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



ANALYTICAL REPORT

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with 3 columns: Client (Cascadia Associates), Project (Nustar-Vancouver), and Report ID (A1C0126 - 03 19 21 0755).

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

Table with 6 columns: 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

Handwritten signature of Lisa Domenighini

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Lisa Domenighini, Client Services Manager







**ANALYTICAL REPORT**

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Cascadia Associates</b> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project: <b>Nustar-Vancouver</b> Project Number: <b>Shore Terminal-Vancouver-</b> Project Manager: <b>Stephanie Salisbury</b>	<b>Report ID:</b> A1C0126 - 03 19 21 0755
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**APEX LABS COOLER RECEIPT FORM**

**Client:** Cascadia Assoc. Element WO#: A1 CO126

**Project/Project #:** Nustar Vancouver GWM 1Q21

**Delivery Info:**  
Date/time received: 3/3/21 @ 1603 By: HAS  
Delivered by: Apex  Client  ESS  FedEx  UPS  Swift  Senvoy  SDS  Other

**Cooler Inspection** Date/time inspected: 3/3/21 @ 1708 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>0.5</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)	<u>gel + real</u>	<u>gel + real</u>					
Condition:	<u>good</u>	<u>good</u>					

Cooler out of temp? (Y/N)  Possible reason why: \_\_\_\_\_  
Green dots applied to out of temperature samples? Yes  No   
Out of temperature samples form initiated? Yes  No

**Sample Inspection:** Date/time inspected: 3/3/21 @ 1734 By: [Signature]

All samples intact? Yes  No  Comments: \_\_\_\_\_

Bottle labels/COCs agree? Yes  No  Comments: \_\_\_\_\_

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:** TP# 2673

Labeled by: [Signature] Witness: [Signature] Cooler Inspected by: [Signature]

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

March 18, 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: A1C0126  
Lab Number: M030502-01/04

Enclosed are results for sample(s) received 3/05/21 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

A1C0126

AB 3/13/21

MD30502-0/04

**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: A1C0126-04** **Water** **Sampled: 03/03/21 11:30** (MW-19)

Analysis	Due	Expires	Comments
<b>RSK 175 Preserved (Meth, Eth, Eth) (Sub)</b>	03/16/21 17:00	03/17/21 11:30	
<i>Containers Supplied:</i>			
(D)40 mL VOA - HCL			
(E)40 mL VOA - HCL			

**Sample Name: A1C0126-06** **Water** **Sampled: 03/03/21 12:10** (MP-1)

Analysis	Due	Expires	Comments
<b>RSK 175 Preserved (Meth, Eth, Eth) (Sub)</b>	03/16/21 17:00	03/17/21 12:10	
<i>Containers Supplied:</i>			
(D)40 mL VOA - HCL			
(E)40 mL VOA - HCL			

**Sample Name: A1C0126-08** **Water** **Sampled: 03/03/21 14:05** (MW-7)

Analysis	Due	Expires	Comments
<b>RSK 175 Preserved (Meth, Eth, Eth) (Sub)</b>	03/16/21 17:00	03/17/21 14:05	
<i>Containers Supplied:</i>			
(D)40 mL VOA - HCL			
(E)40 mL VOA - HCL			

**Sample Name: A1C0126-16** **Water** **Sampled: 03/03/21 14:14** (MW-24i)

Analysis	Due	Expires	Comments
<b>RSK 175 Preserved (Meth, Eth, Eth) (Sub)</b>	03/16/21 17:00	03/17/21 14:14	
<i>Containers Supplied:</i>			
(D)40 mL VOA - HCL			
(E)40 mL VOA - HCL			

Standard TAT

3°C

Released By *[Signature]* Date 3/4/21

UPS (Shipper)

Released By UPS (Shipper)

Received By *[Signature]* Date 3/5/21

Released By Date

Received By Date 0955



QC Batch No: 210311GC8A1

Matrix: Water

Reporting Units: ug/L

<b>RSK 175</b>
<b>LABORATORY CONTROL SAMPLE SUMMARY</b>

Lab No.:	METHOD BLANK					LCS	LCSD				
Date/Time Analyzed:	3/11/21 9:51					3/11/21 10:04	3/11/21 10:16				
Analyst Initials:	CM					CM	CM				
Dilution Factor:	1.0					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	1,240	109	1,180	103	5.6	70	130	30
Ethane	ND	1.0	1,200	1,370	111	1,340	109	2.3	70	130	30
Methane	ND	1.0	650	716	109	705	108	1.6	70	130	30

ND = Not Detected (below RL)

RL = Reporting Limit

Reviewed/Approved By: \_\_\_\_\_  
*Mark Johnson*  
 Mark Johnson  
 Operations Manager

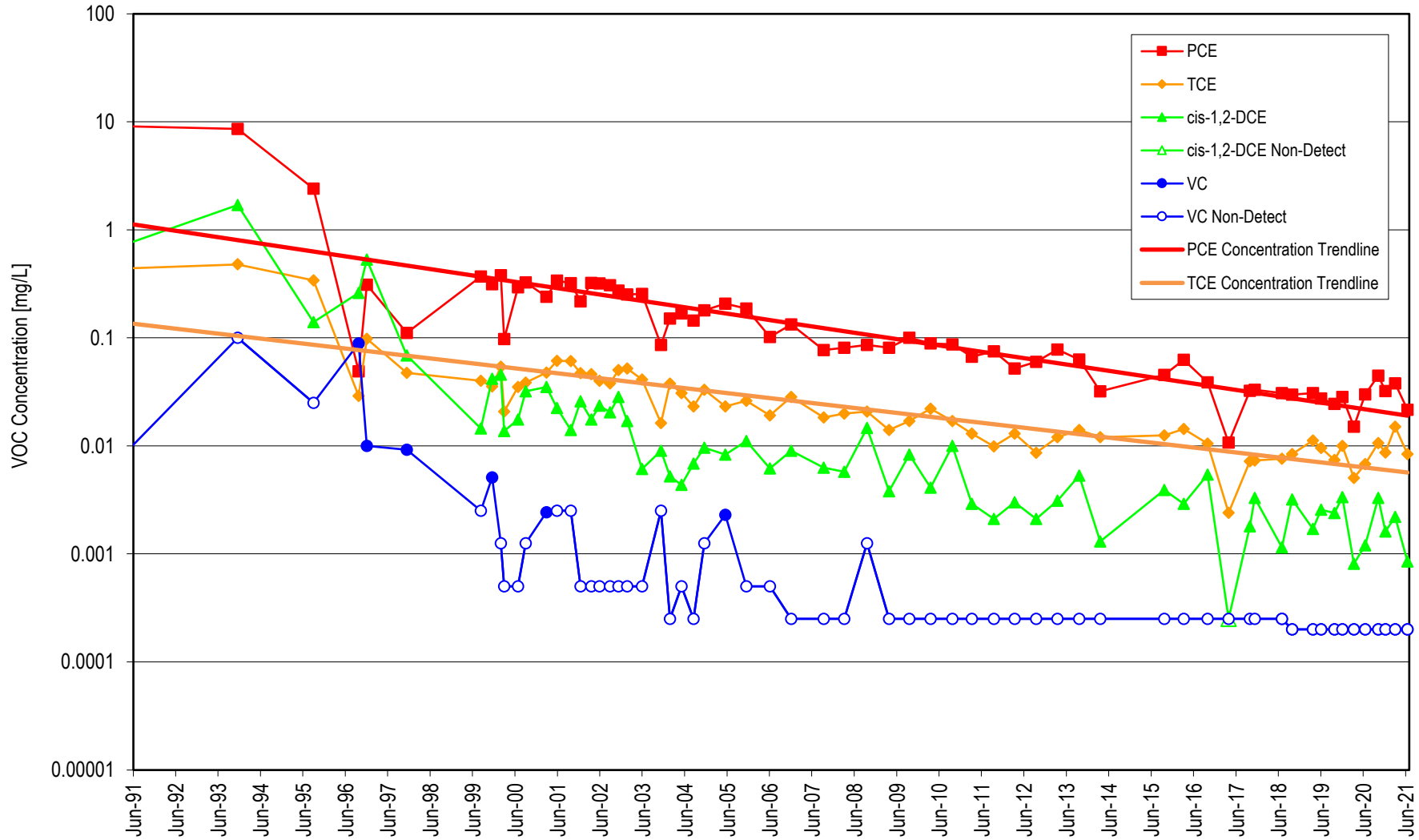
Date: 3/17/21

The cover letter is an integral part of this analytical report



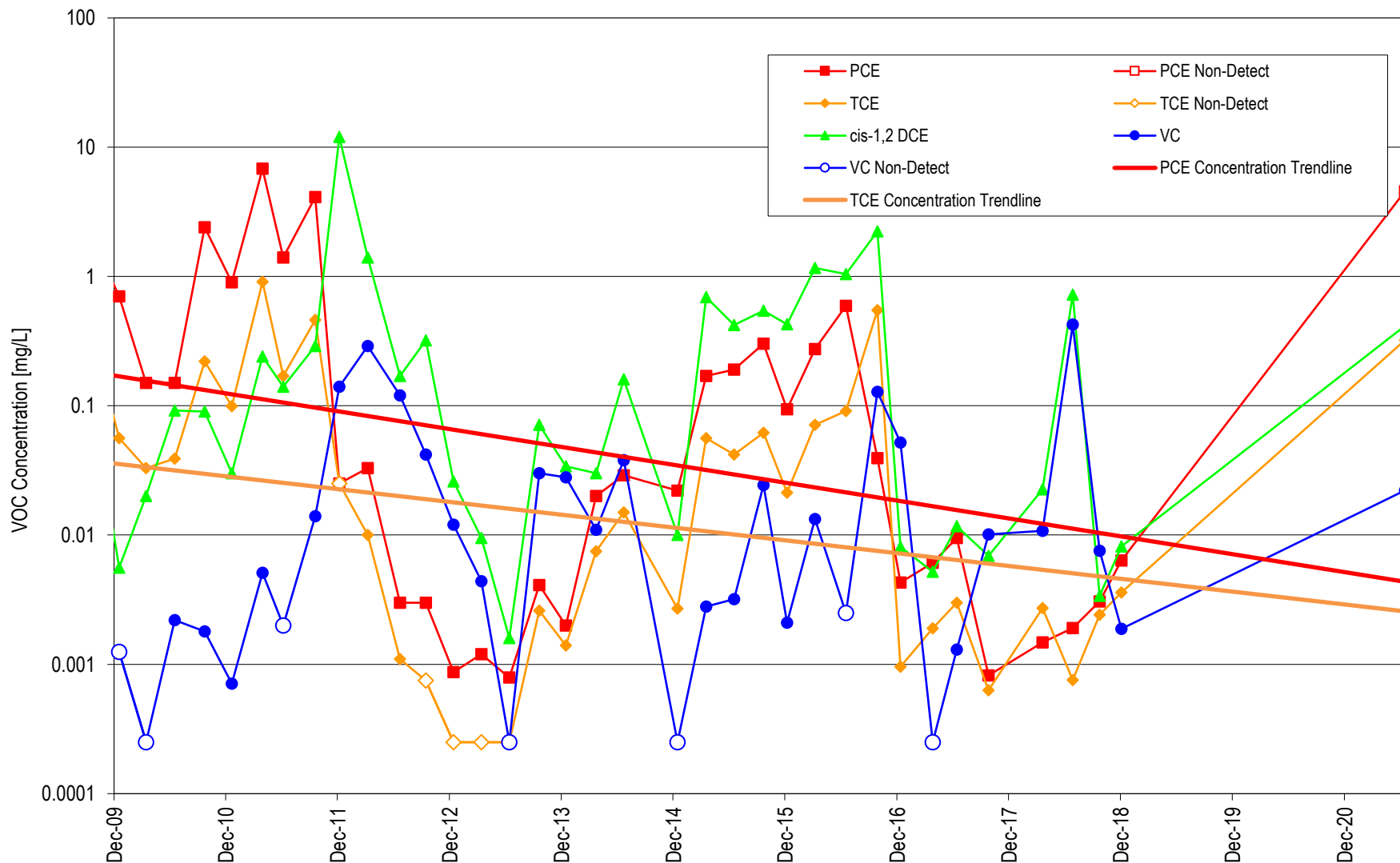
**APPENDIX D**  
**VOC CONCENTRATION TREND PLOTS**

### VOC Concentrations in EW-1



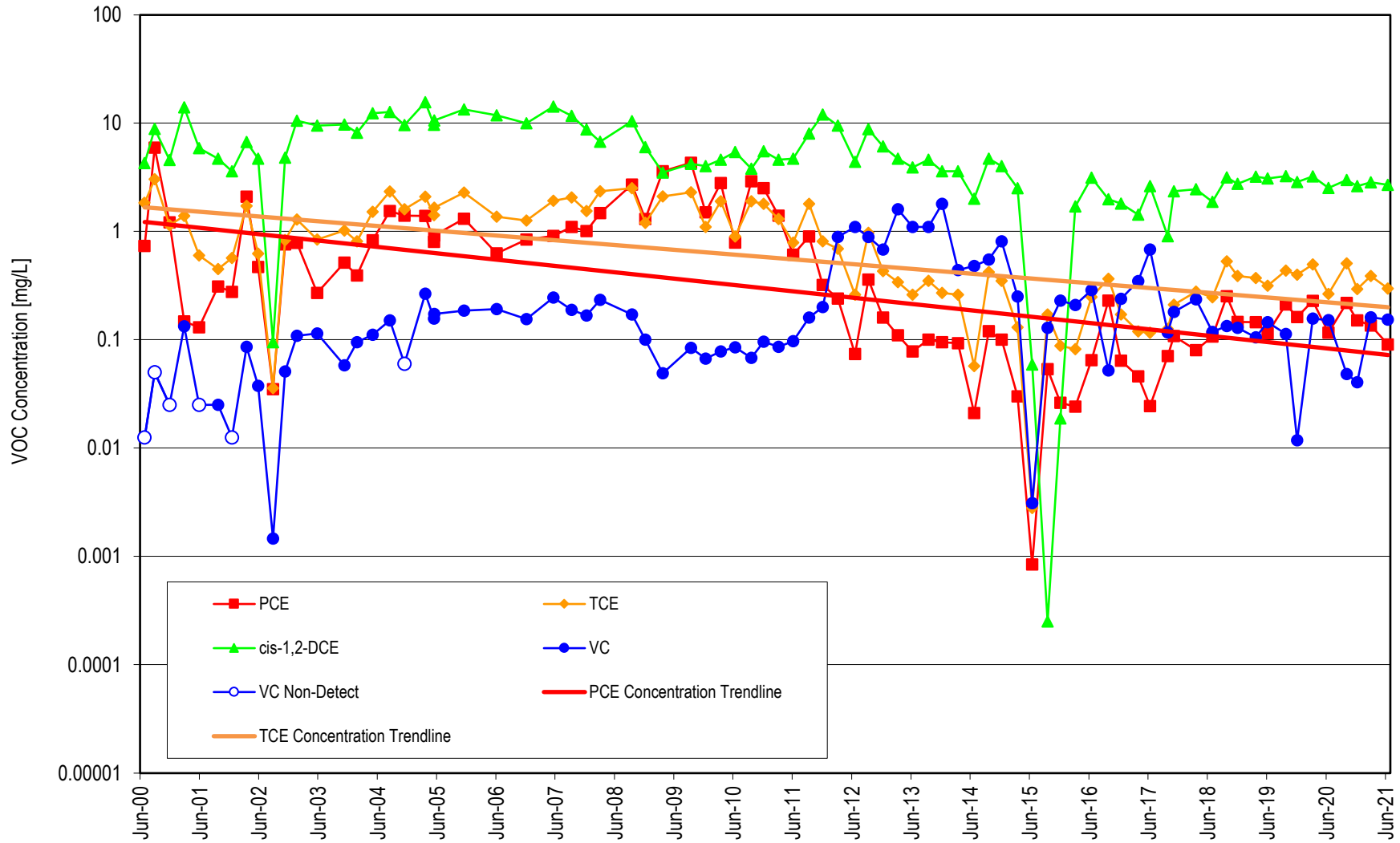
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in EX



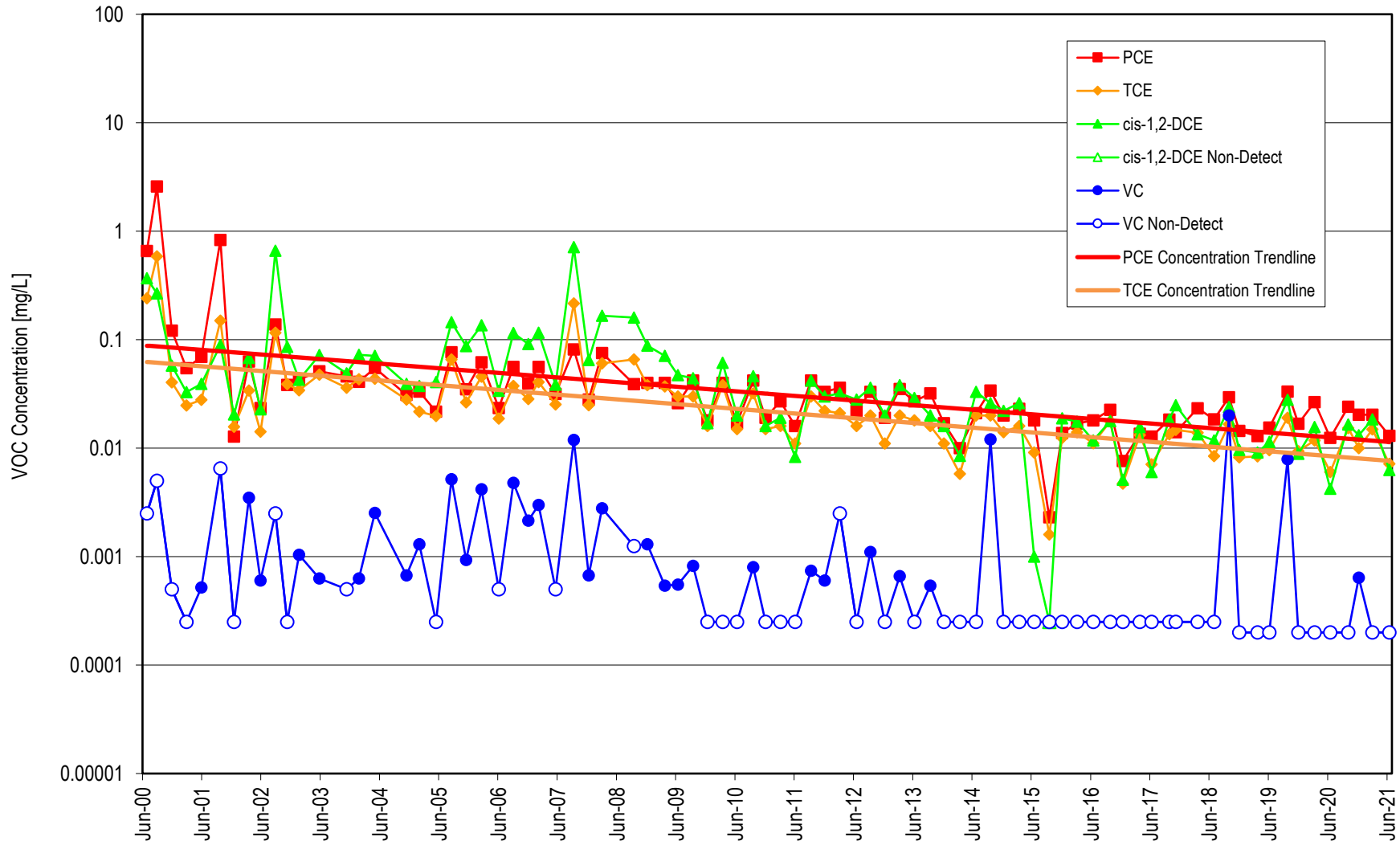
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MGMS1-43



**Note:** Not detected values plotted at 1/2 the reporting limit.

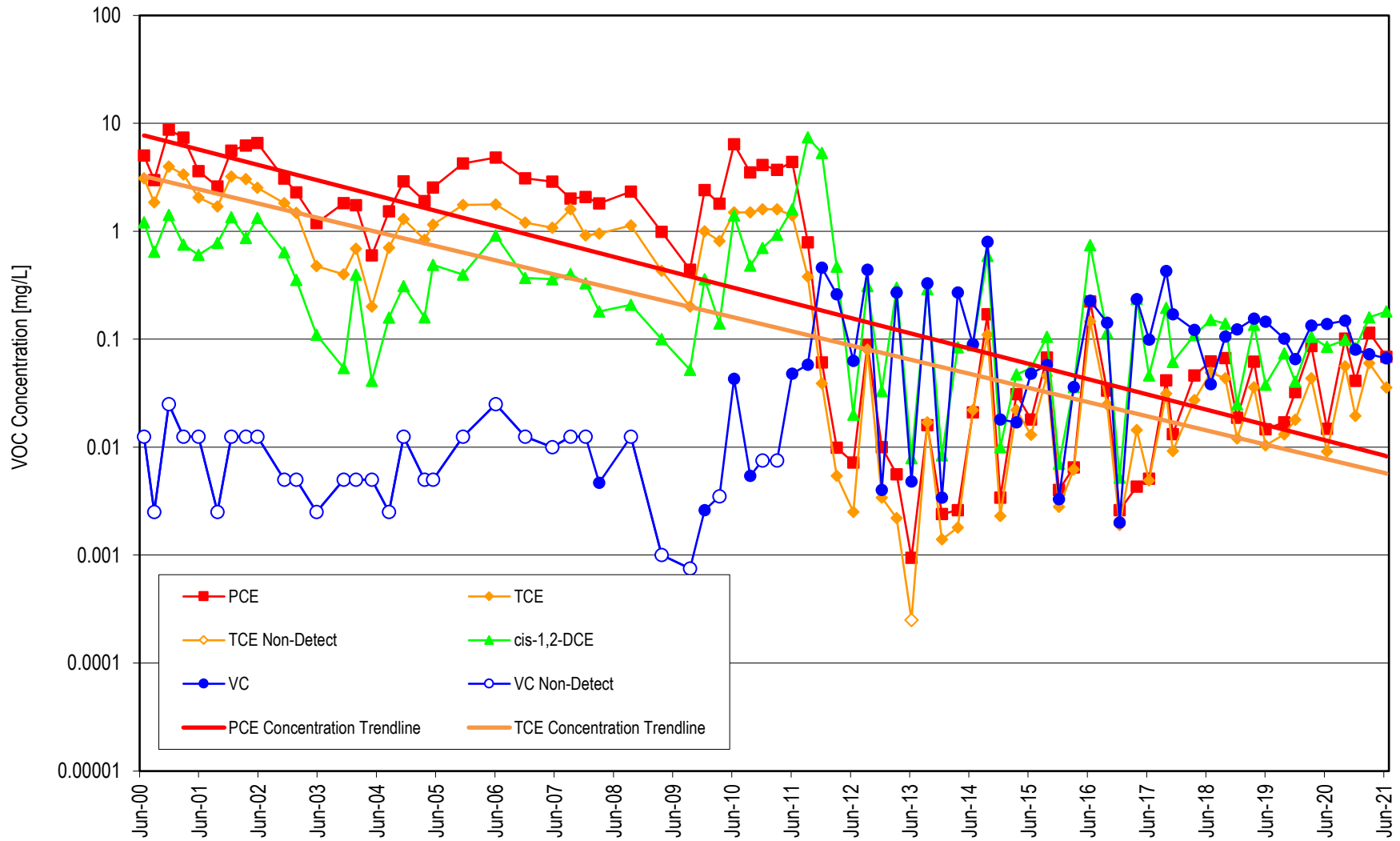
### VOC Concentrations in MGMS1-60



**Note:** Not detected values plotted at 1/2 the reporting limit.

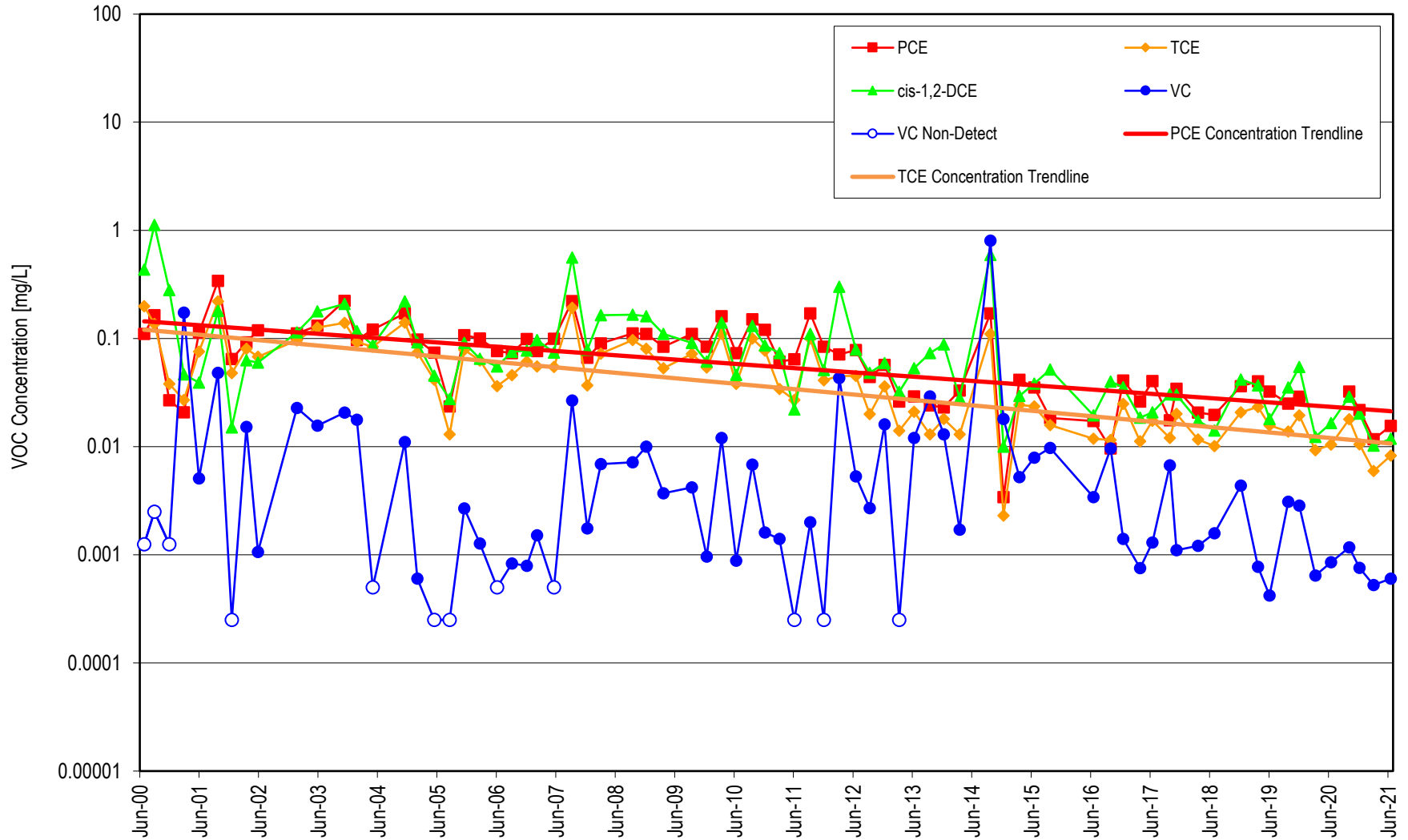


### VOC Concentrations in MGMS2-40



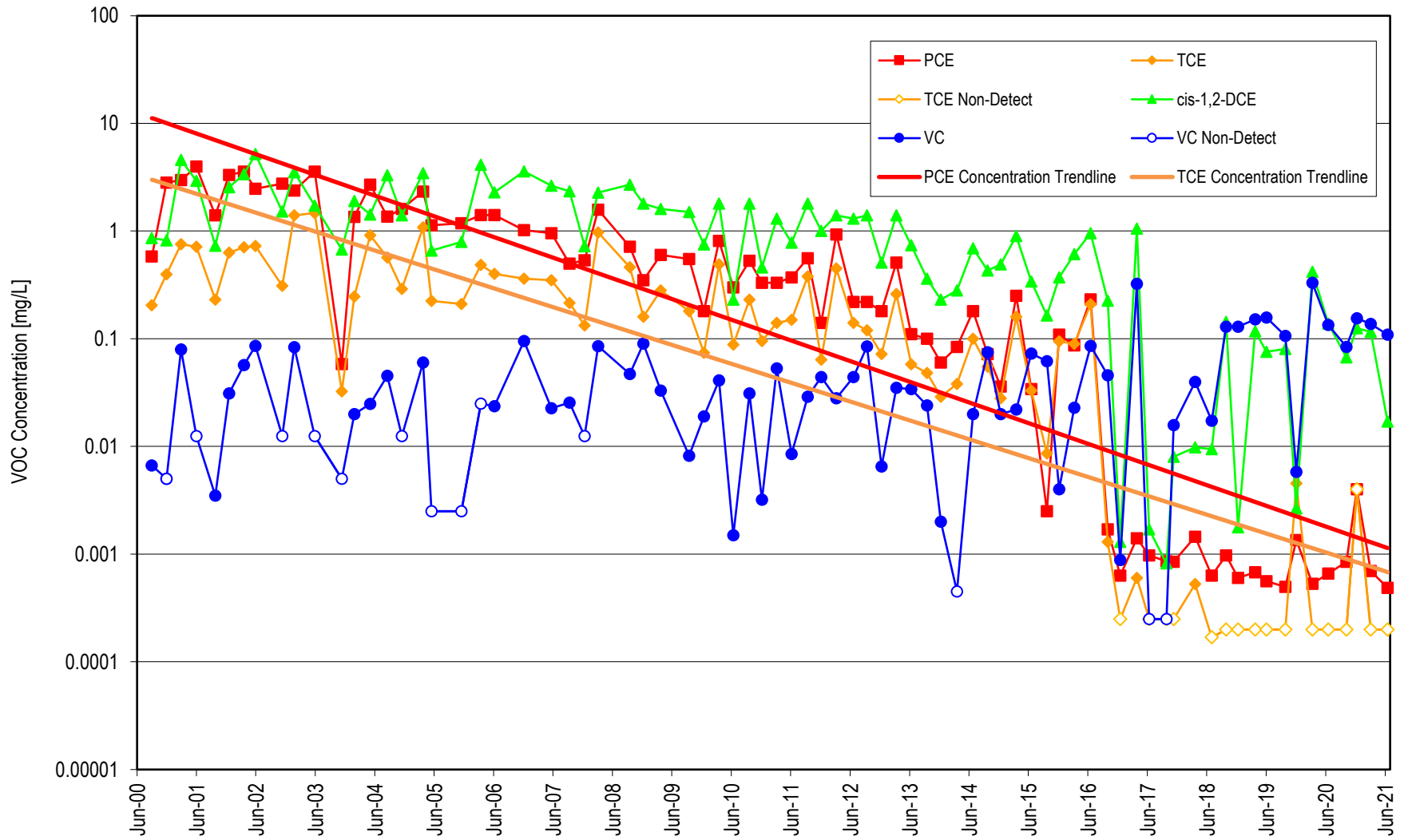
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MGMS2-60



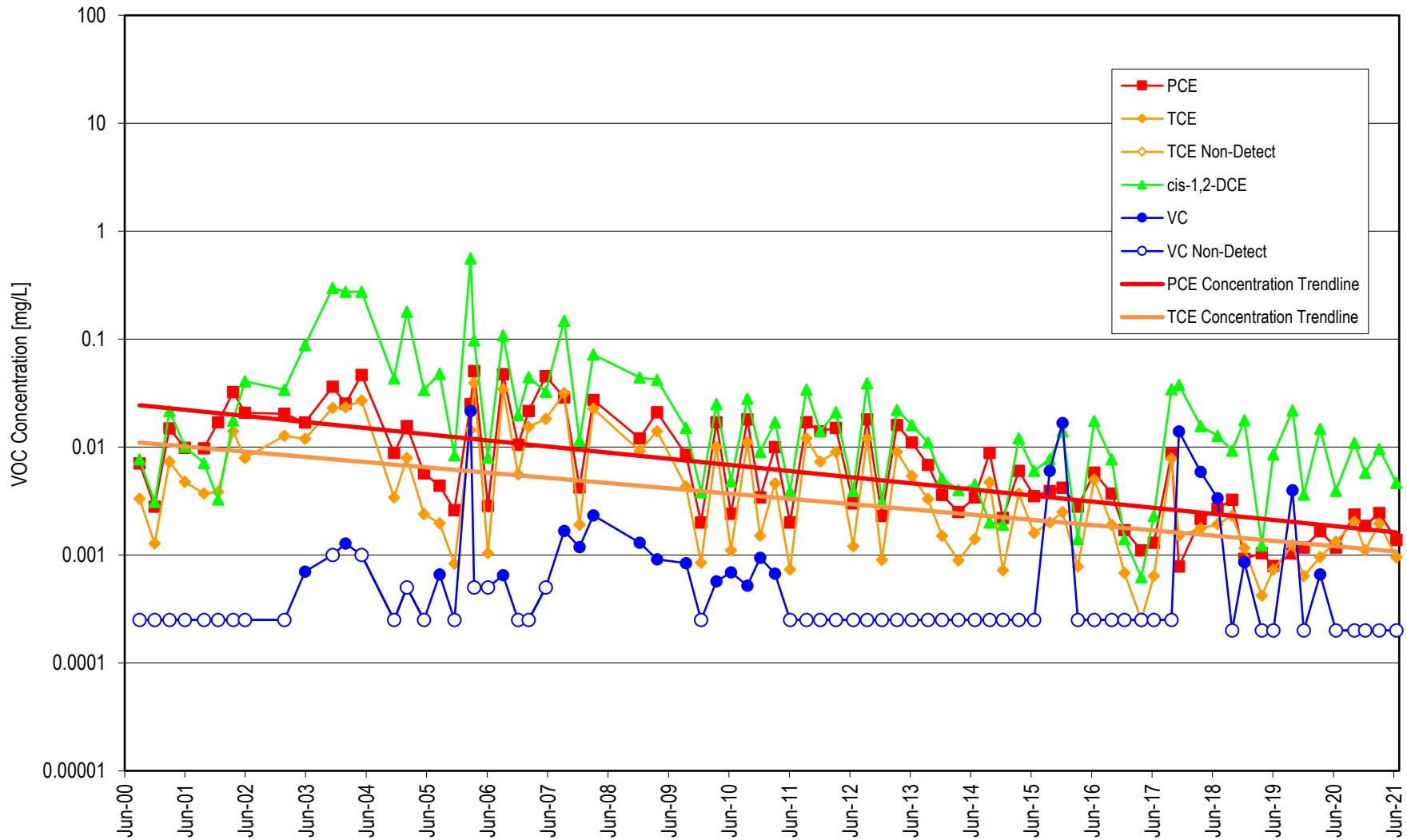
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MGMS3-40



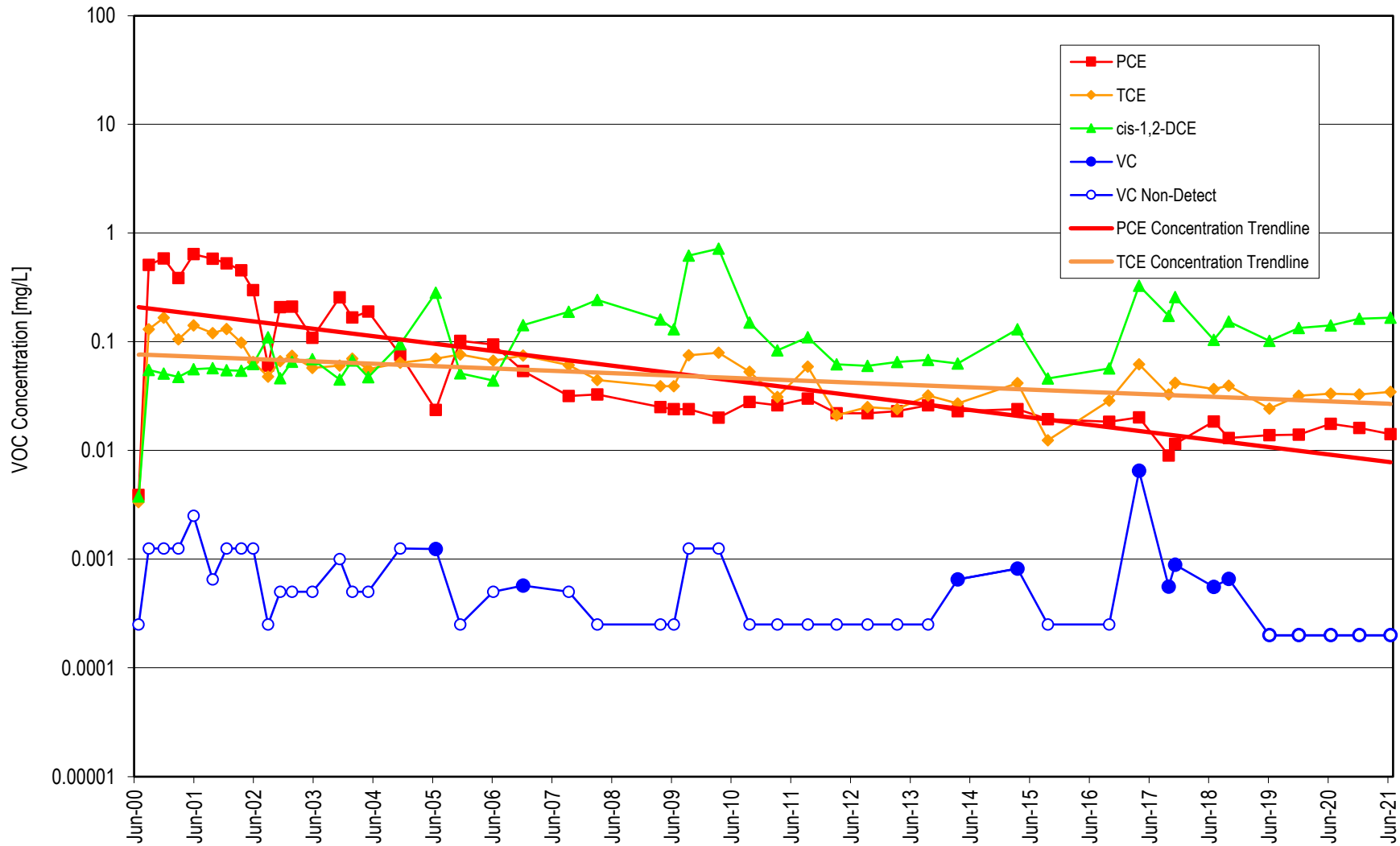
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MGMS3-60



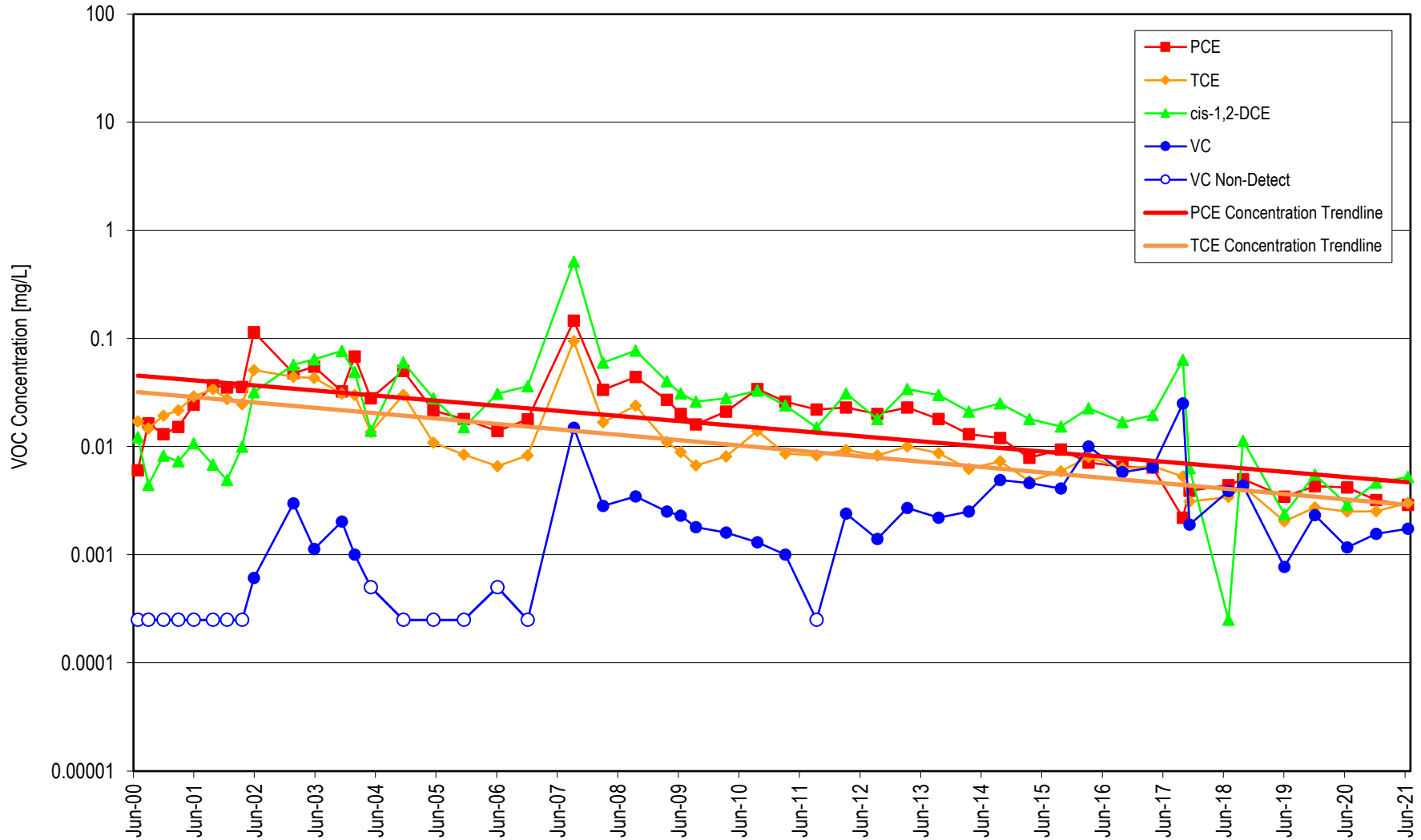
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MGMS1-110



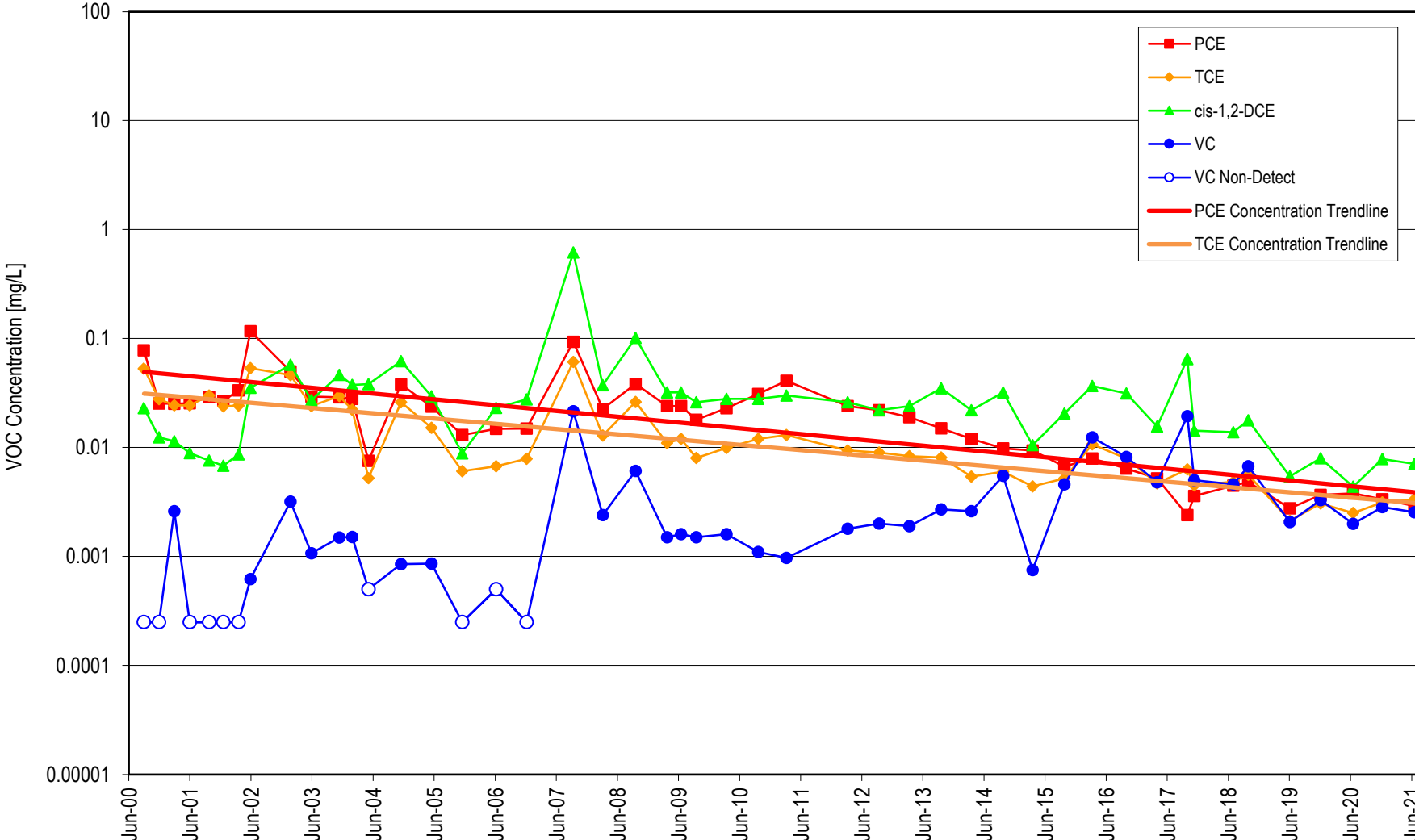
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MGMS2-110



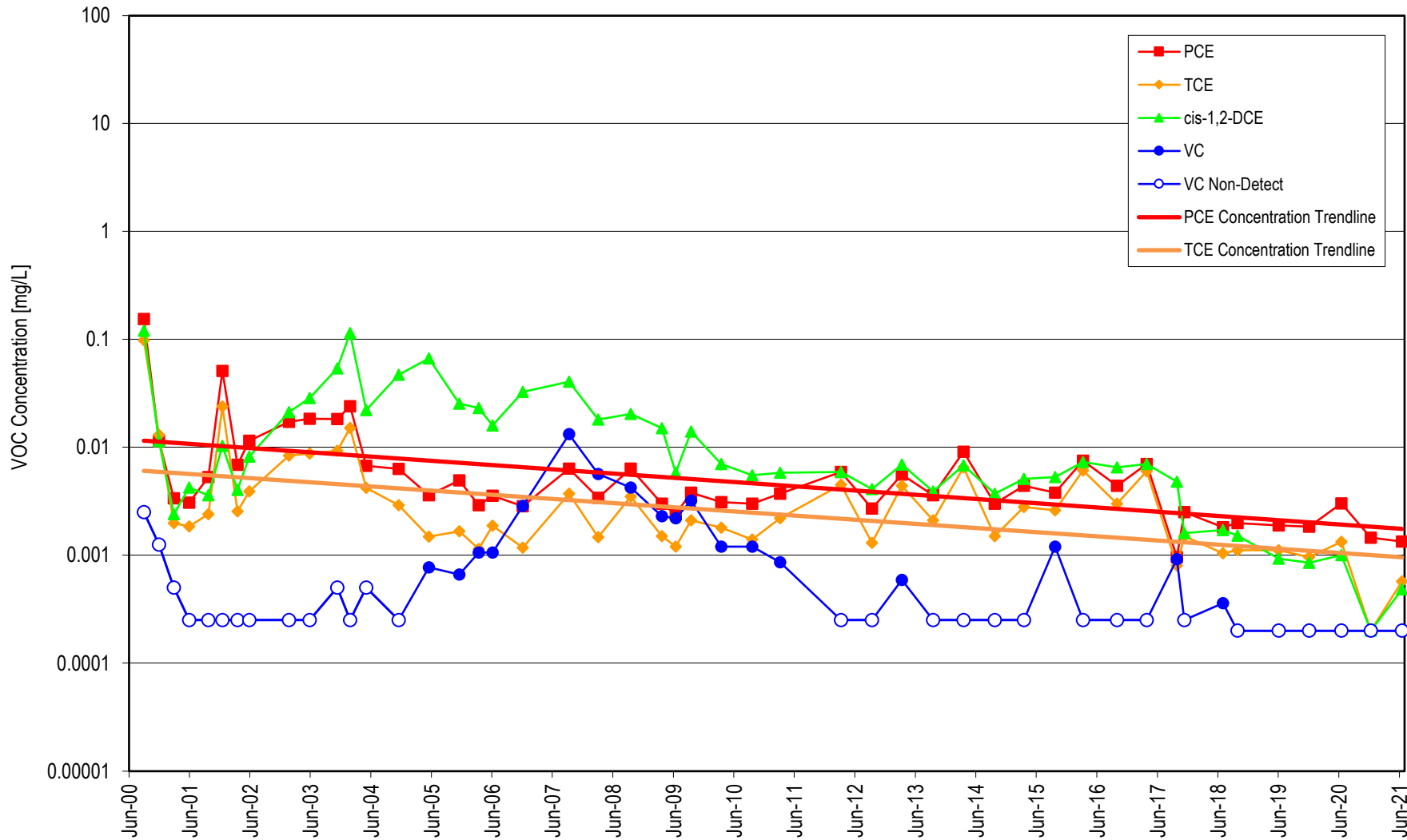
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MGMS2-132



**Note:** Not detected values plotted at 1/2 the reporting limit.

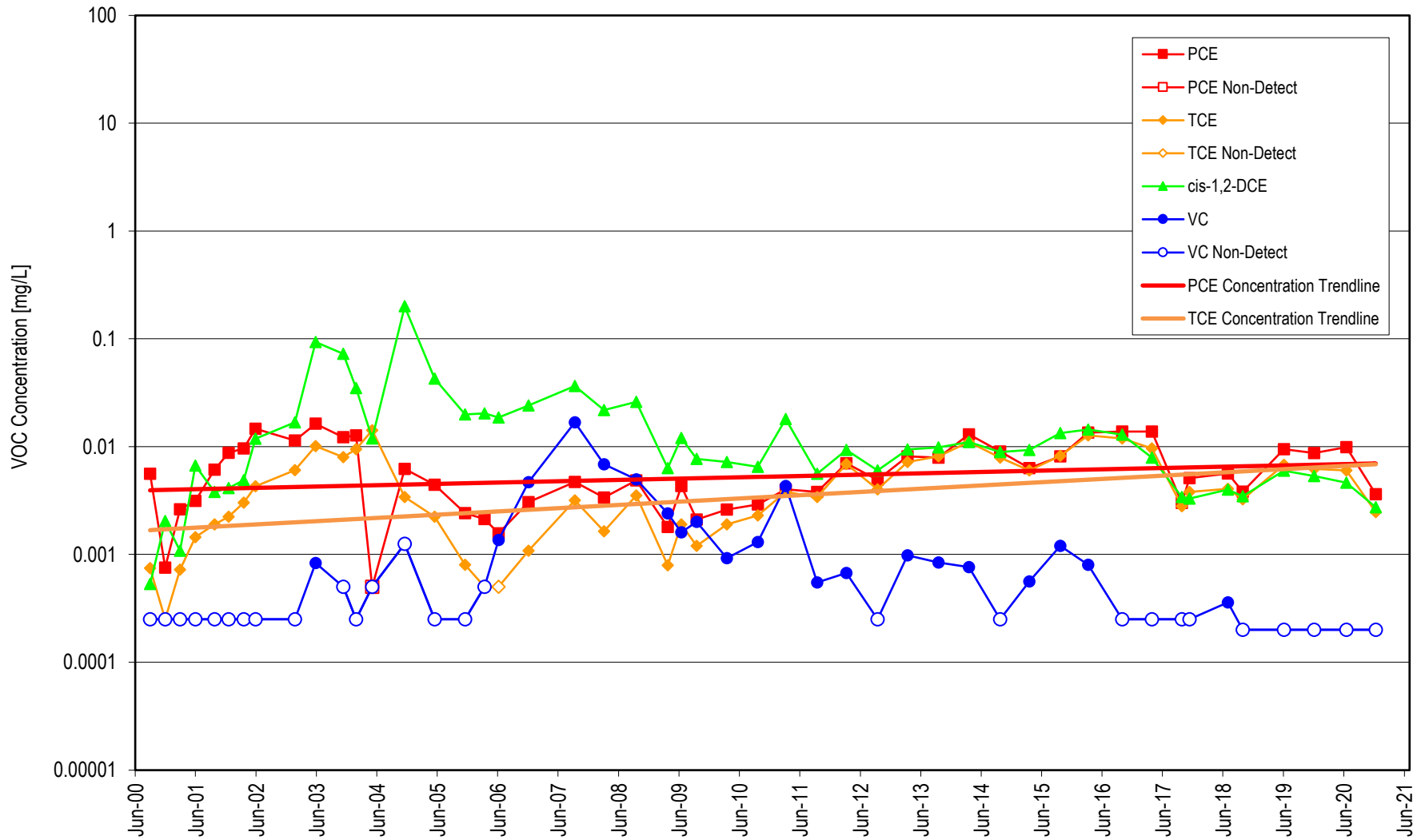
### VOC Concentrations in MGMS3-101



**Note:** Not detected values plotted at 1/2 the reporting limit.

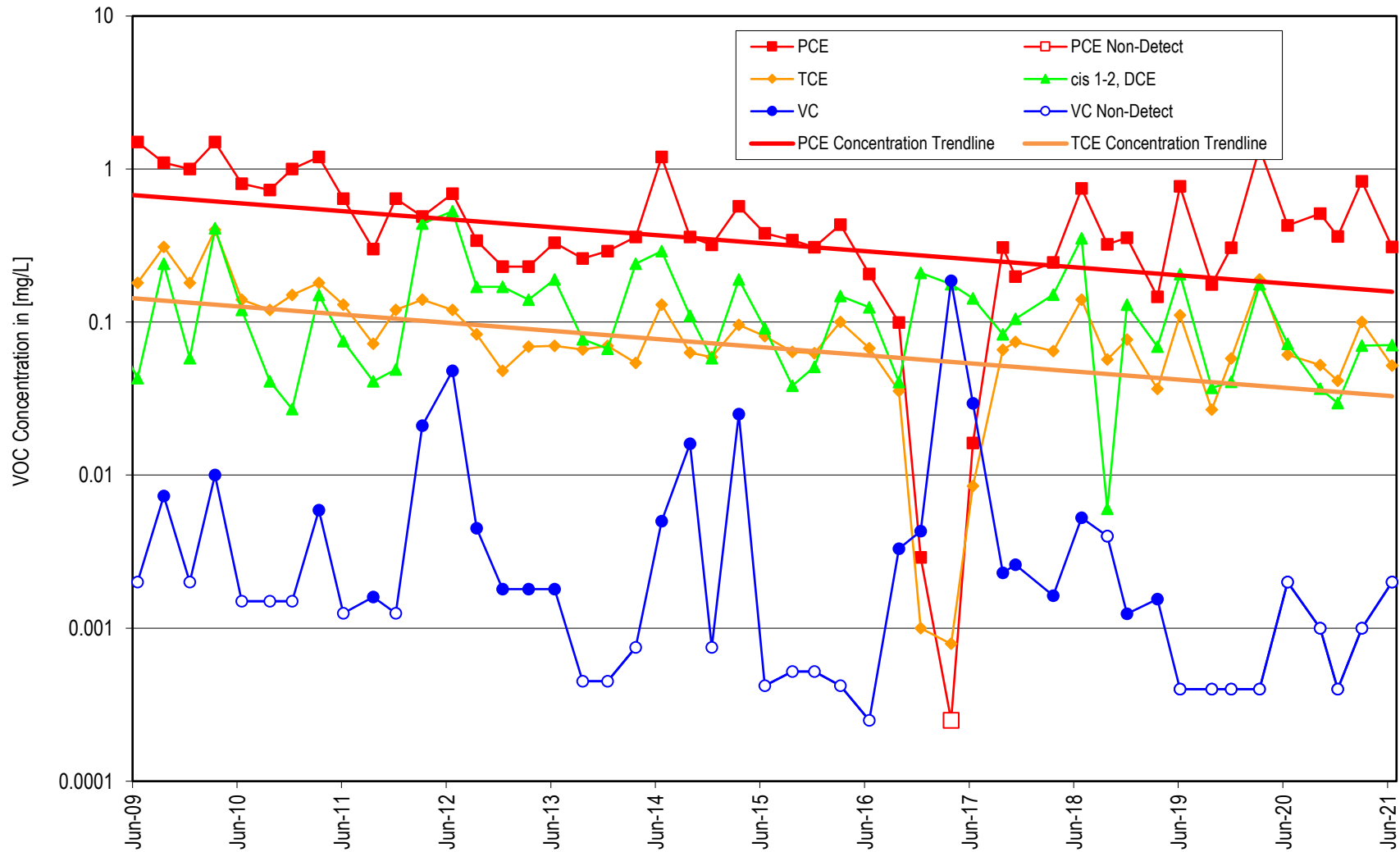


### VOC Concentrations in MGMS3-132



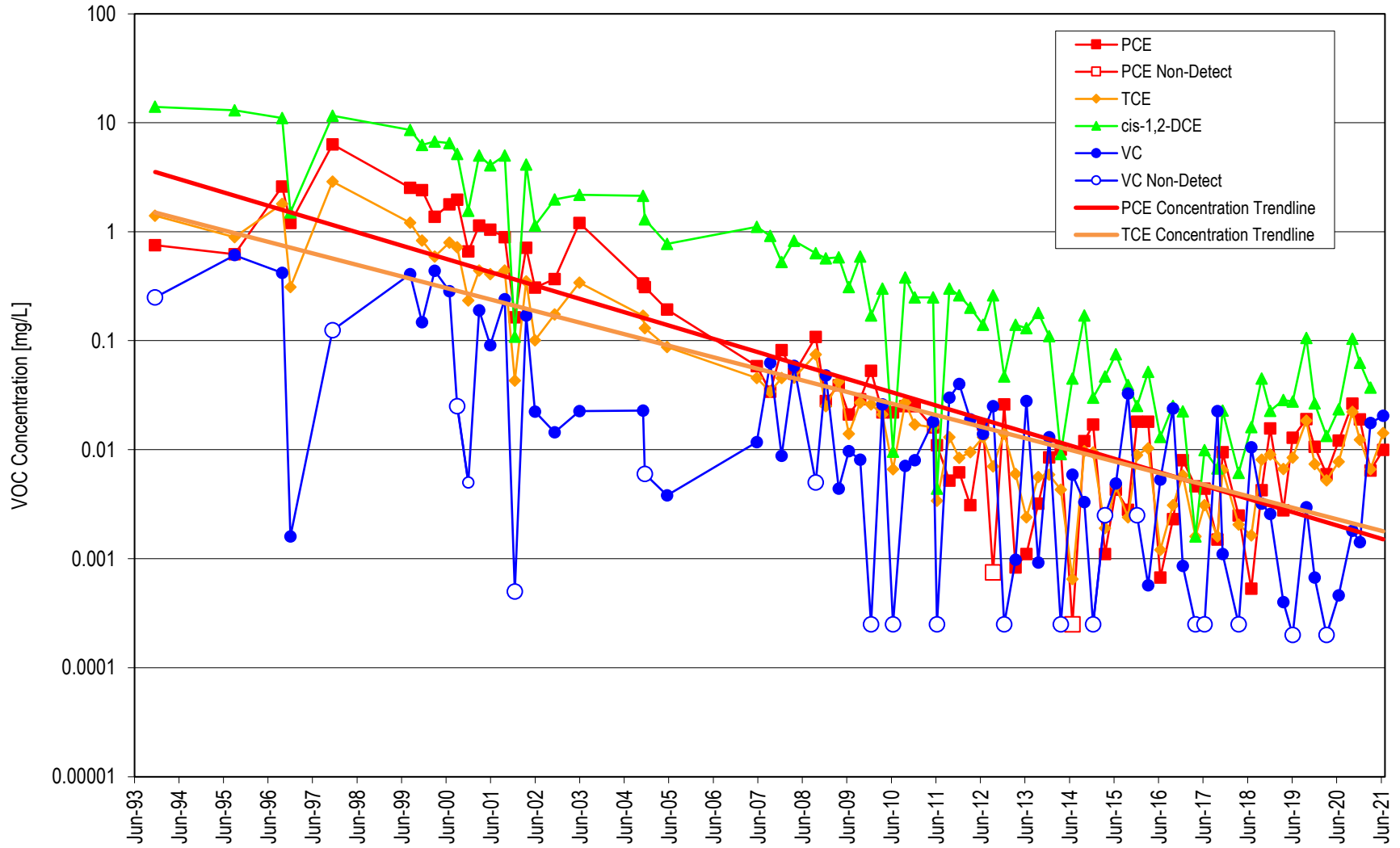
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MP-1



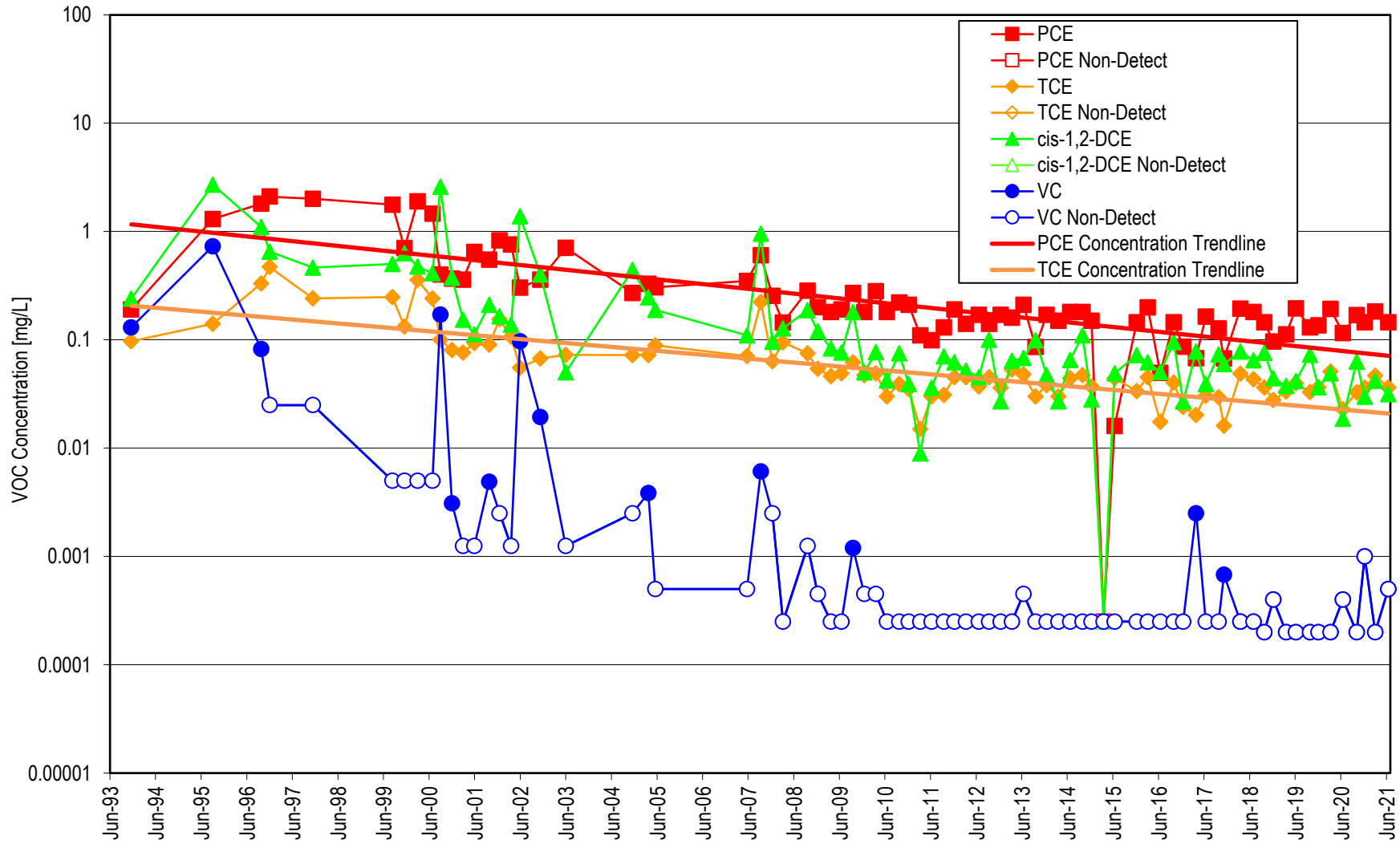
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-1



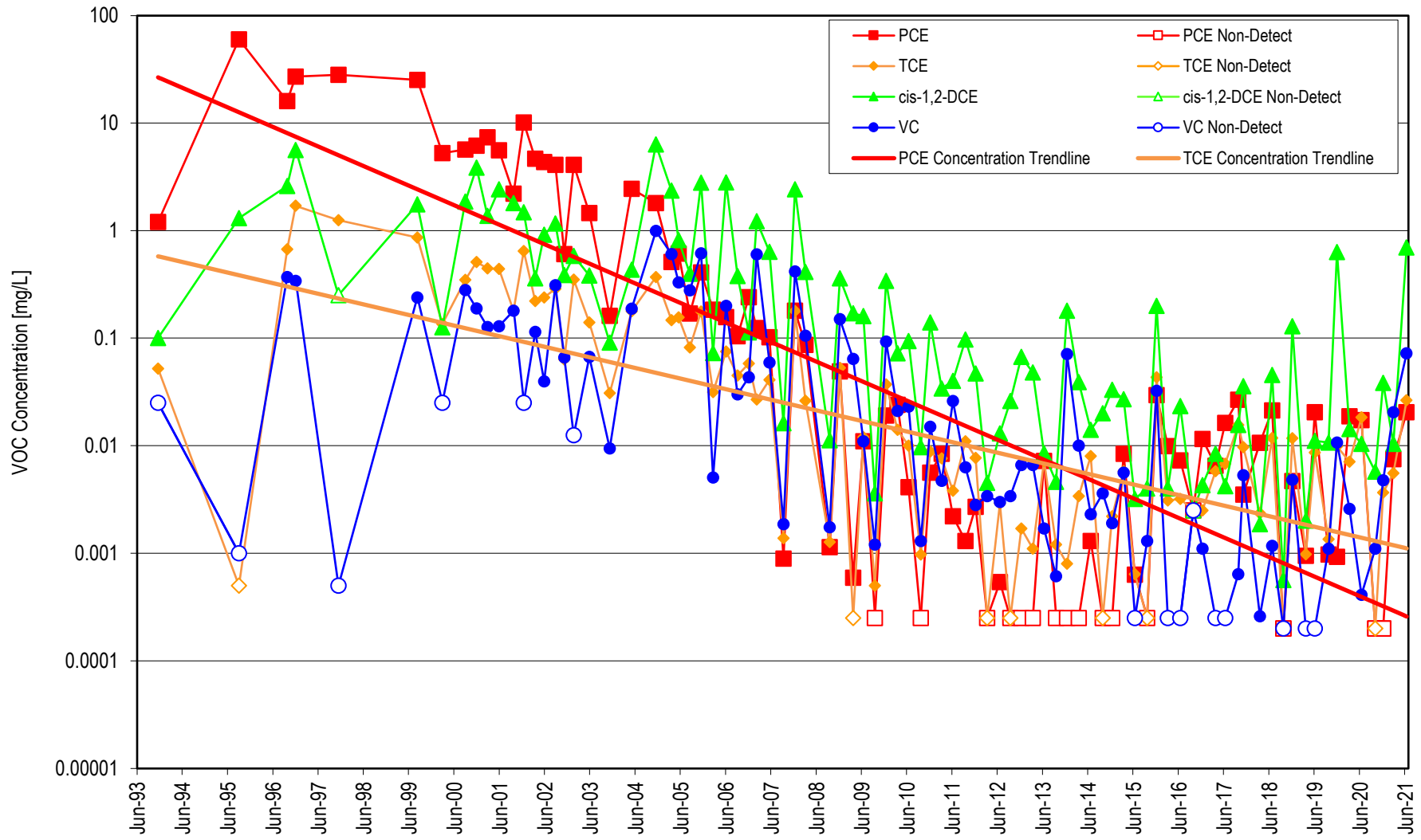
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-3



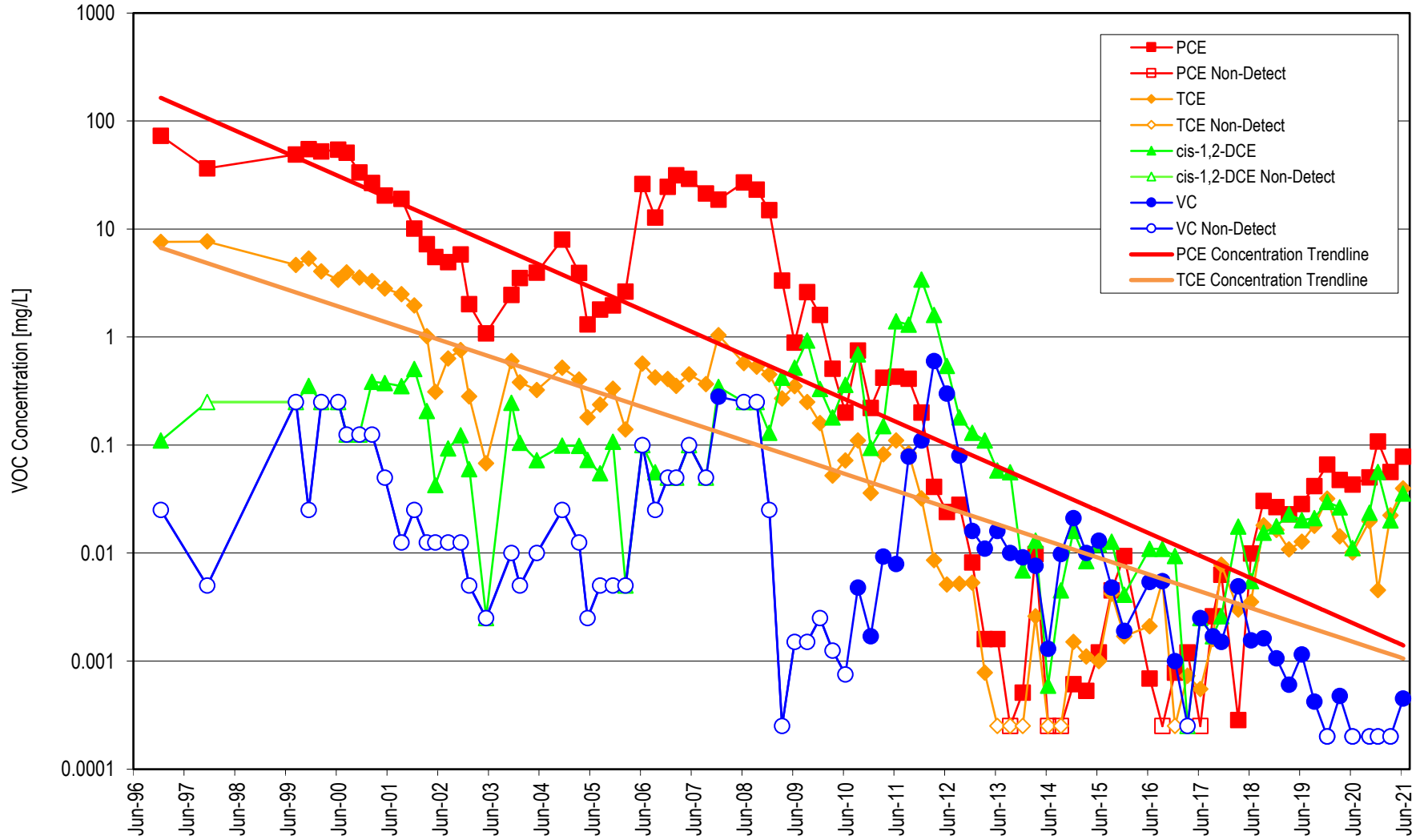
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-5



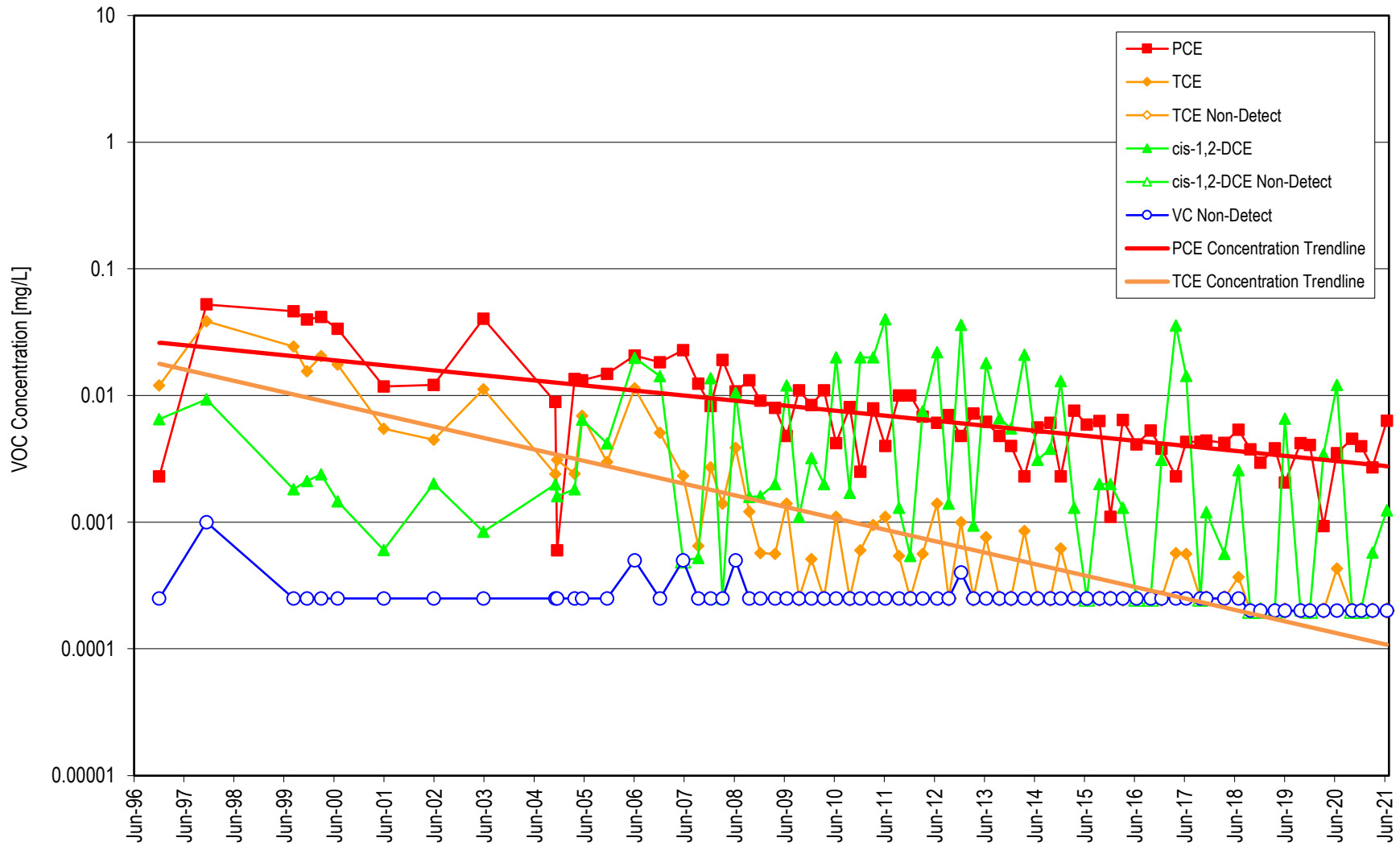
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-7



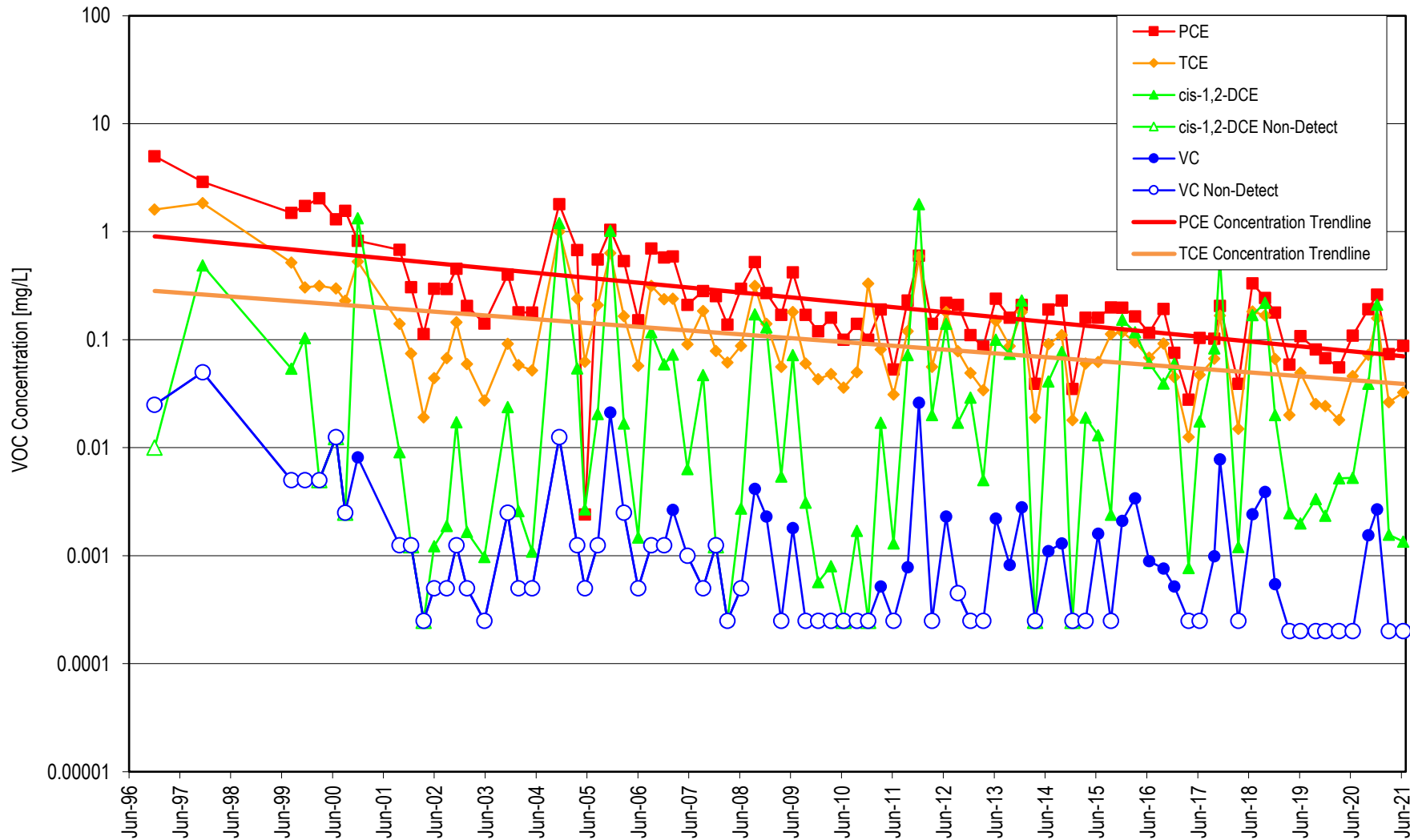
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-8



**Note:** Not detected values plotted at 1/2 the reporting limit.

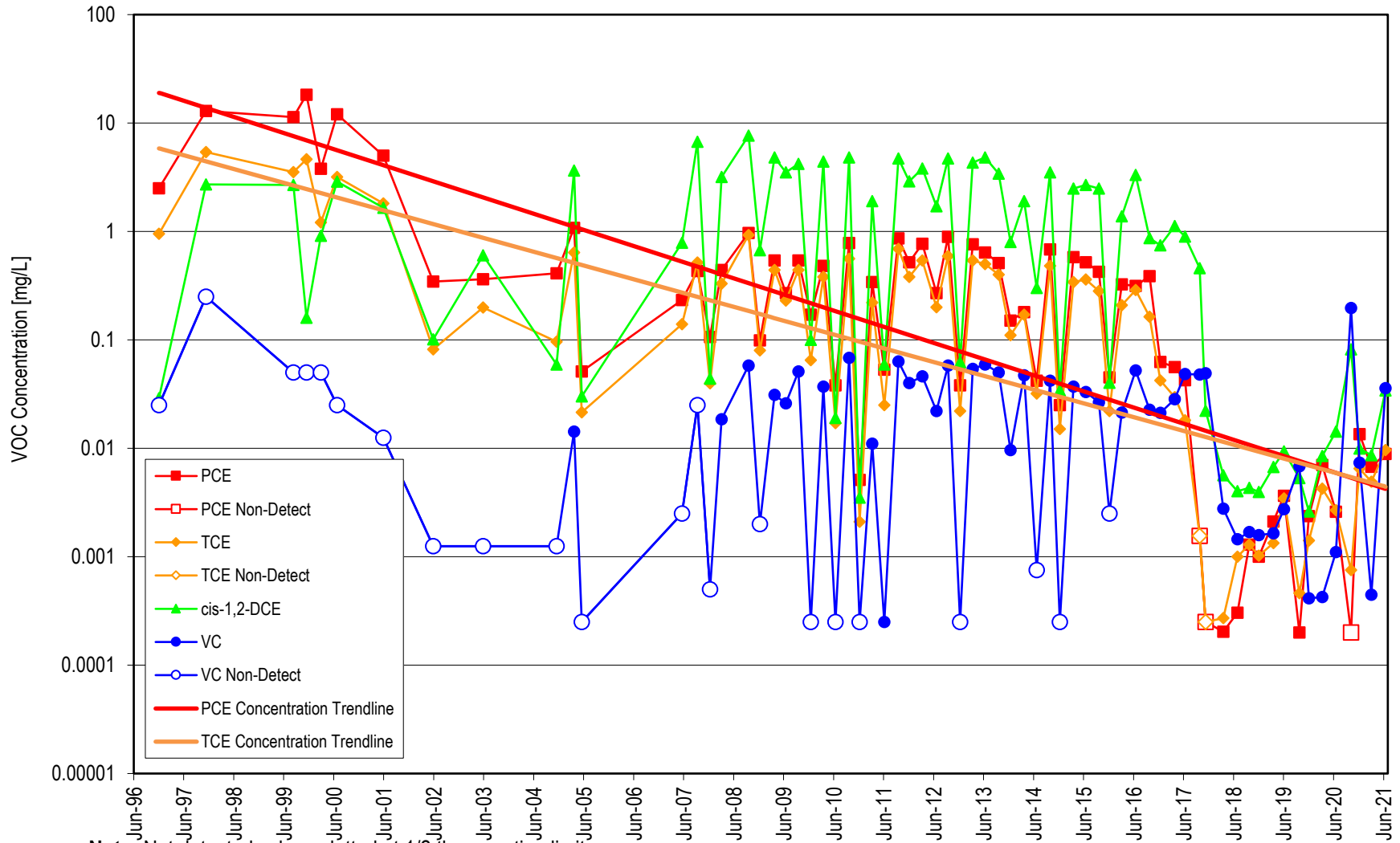
### VOC Concentrations in MW-9



**Note:** Not detected values plotted at 1/2 the reporting limit.

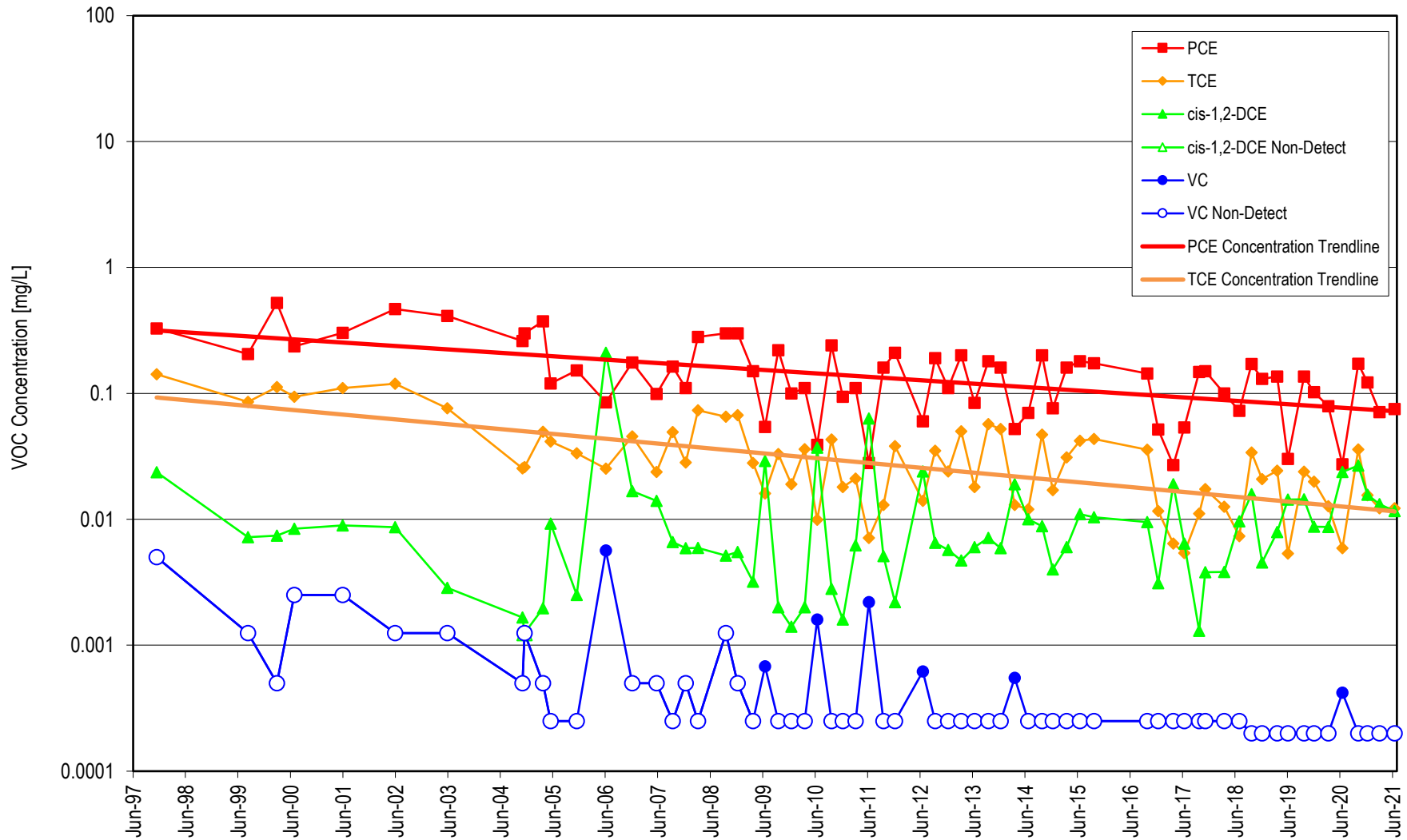


### VOC Concentrations in MW-12



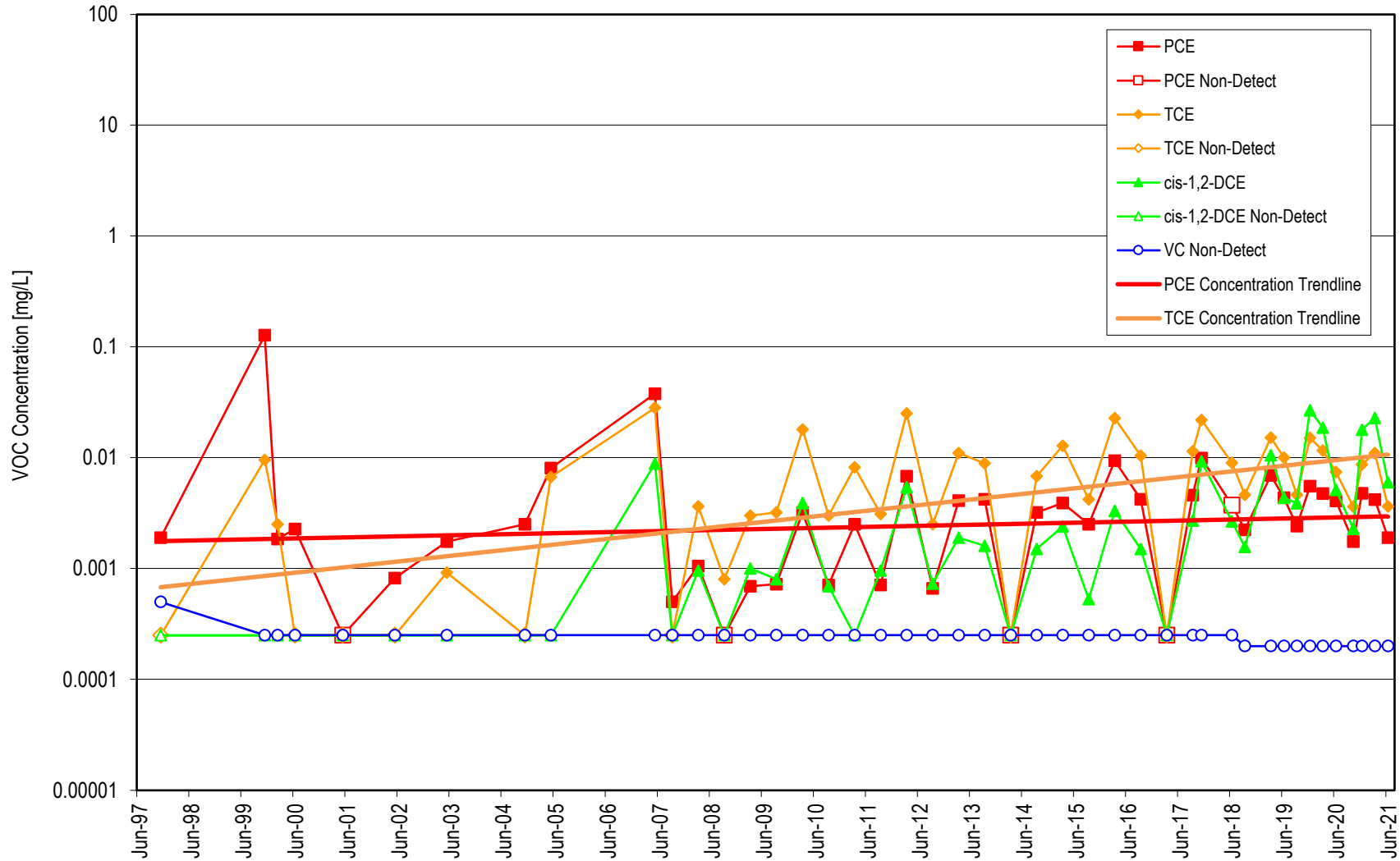
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-16



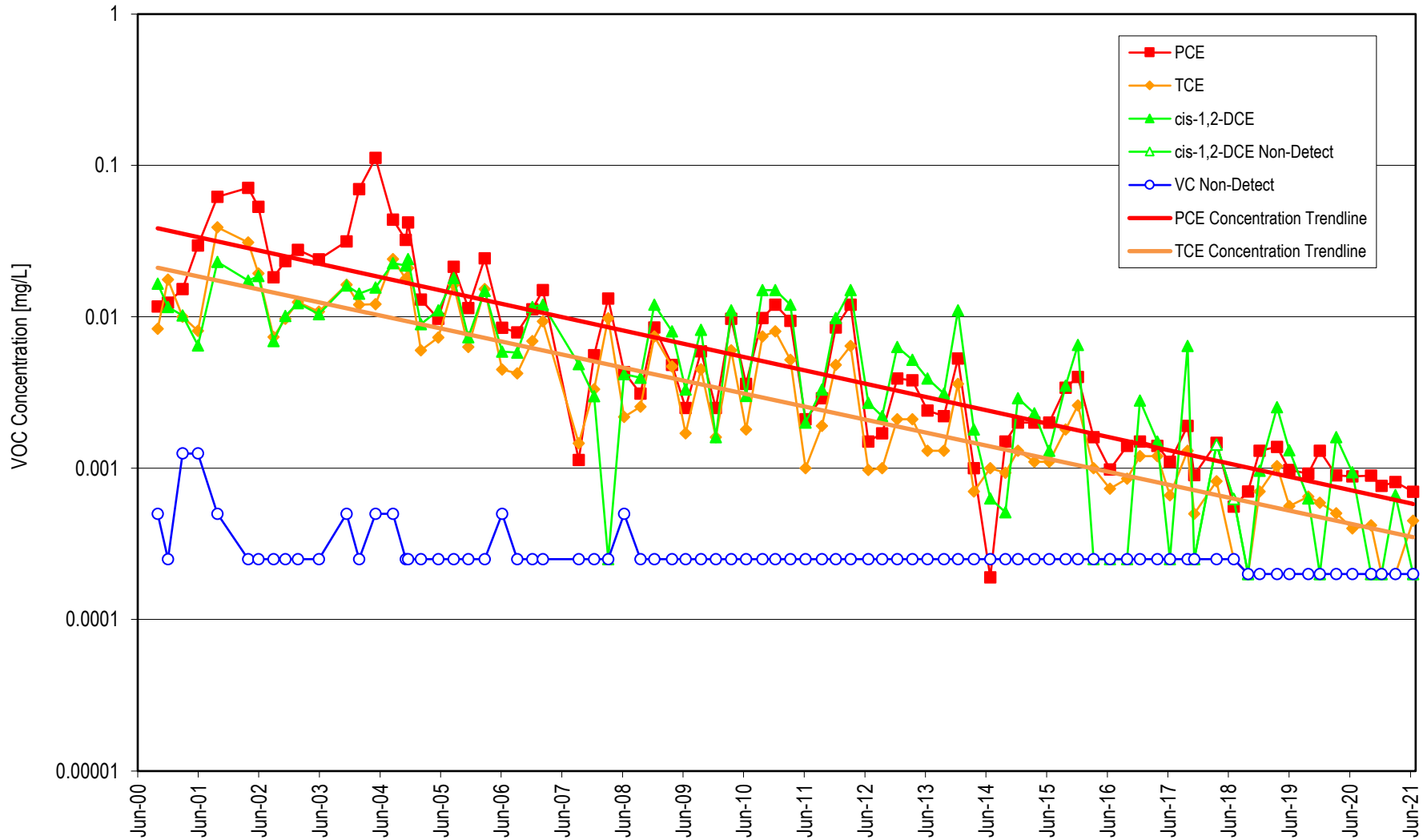
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-17



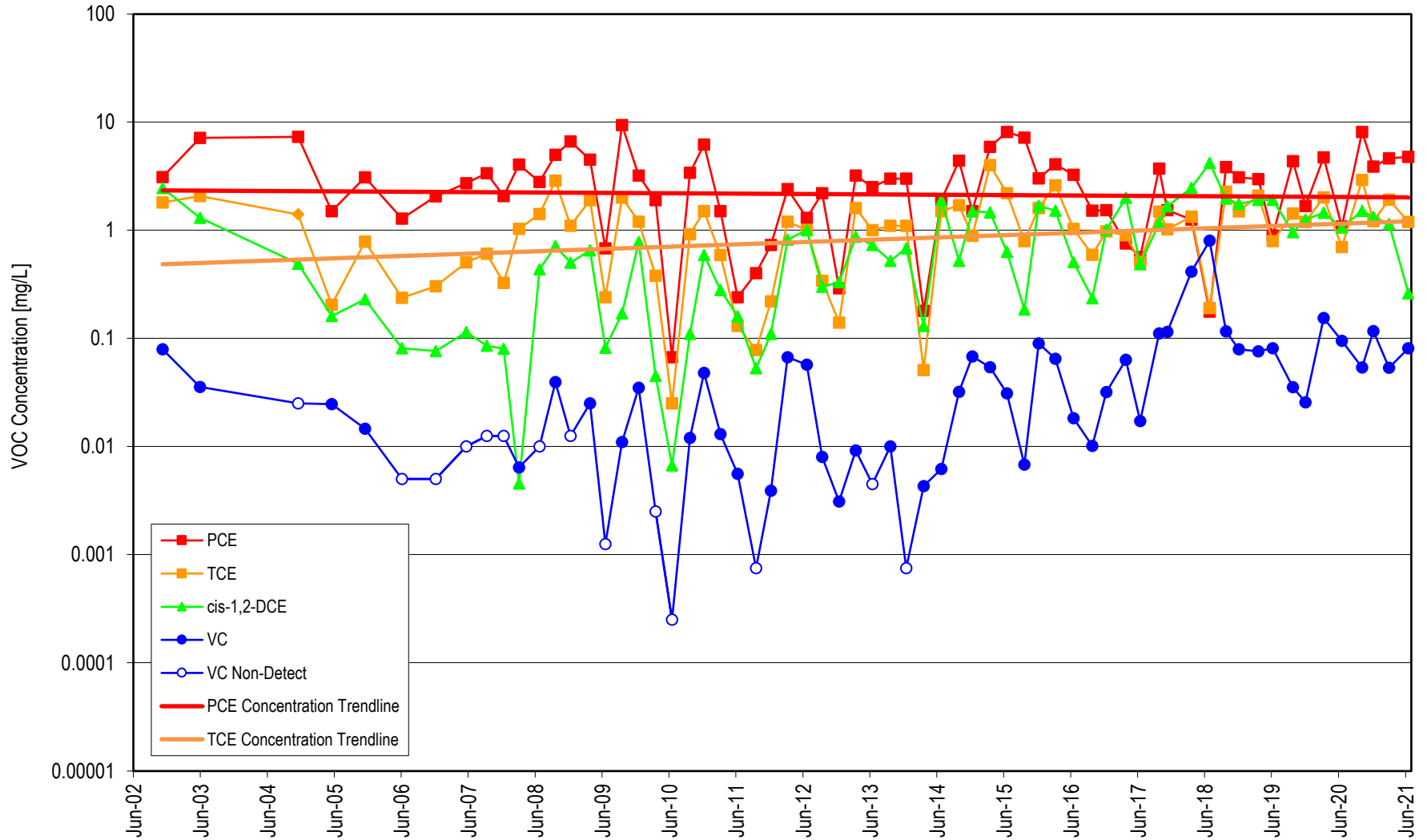
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-18i



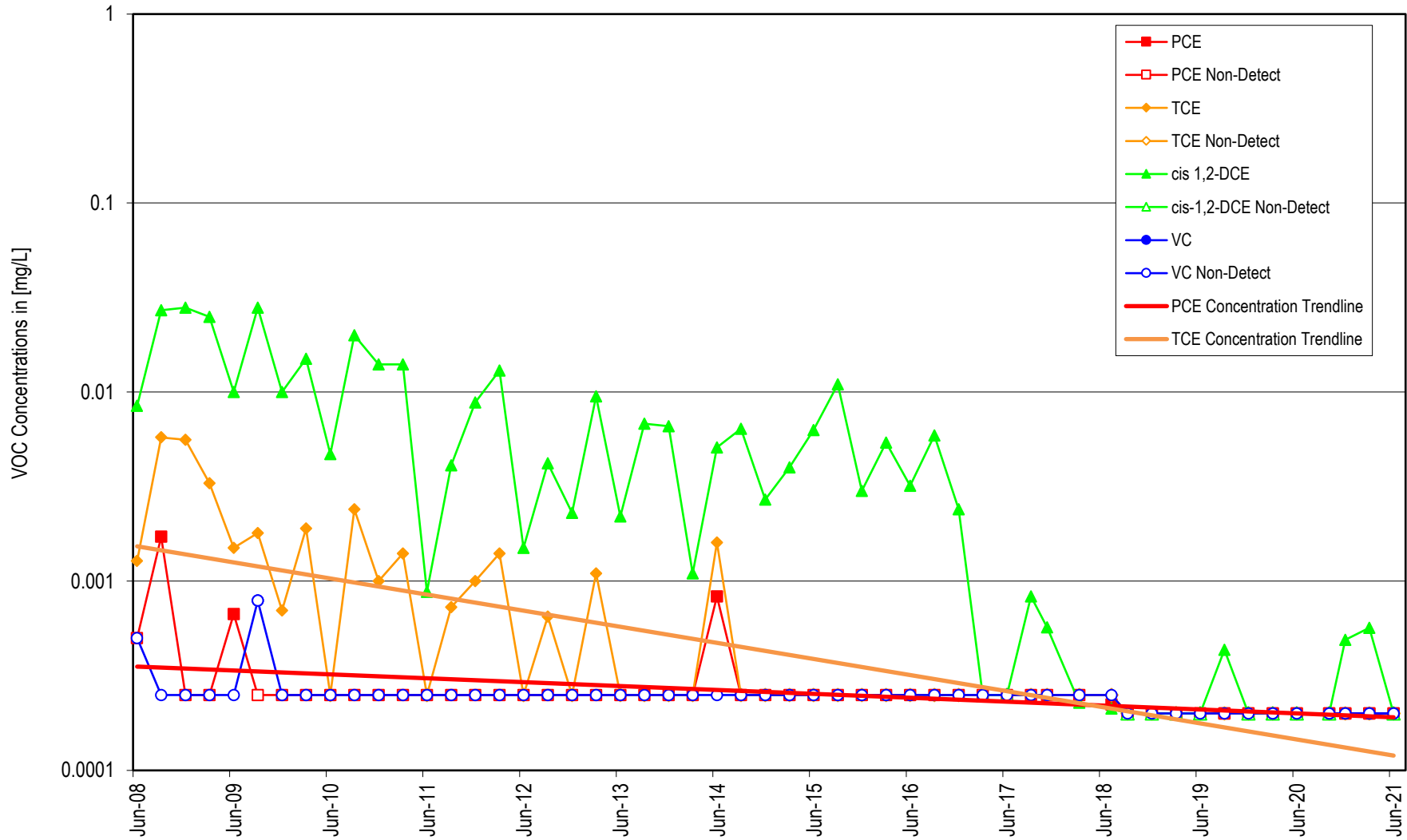
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-19



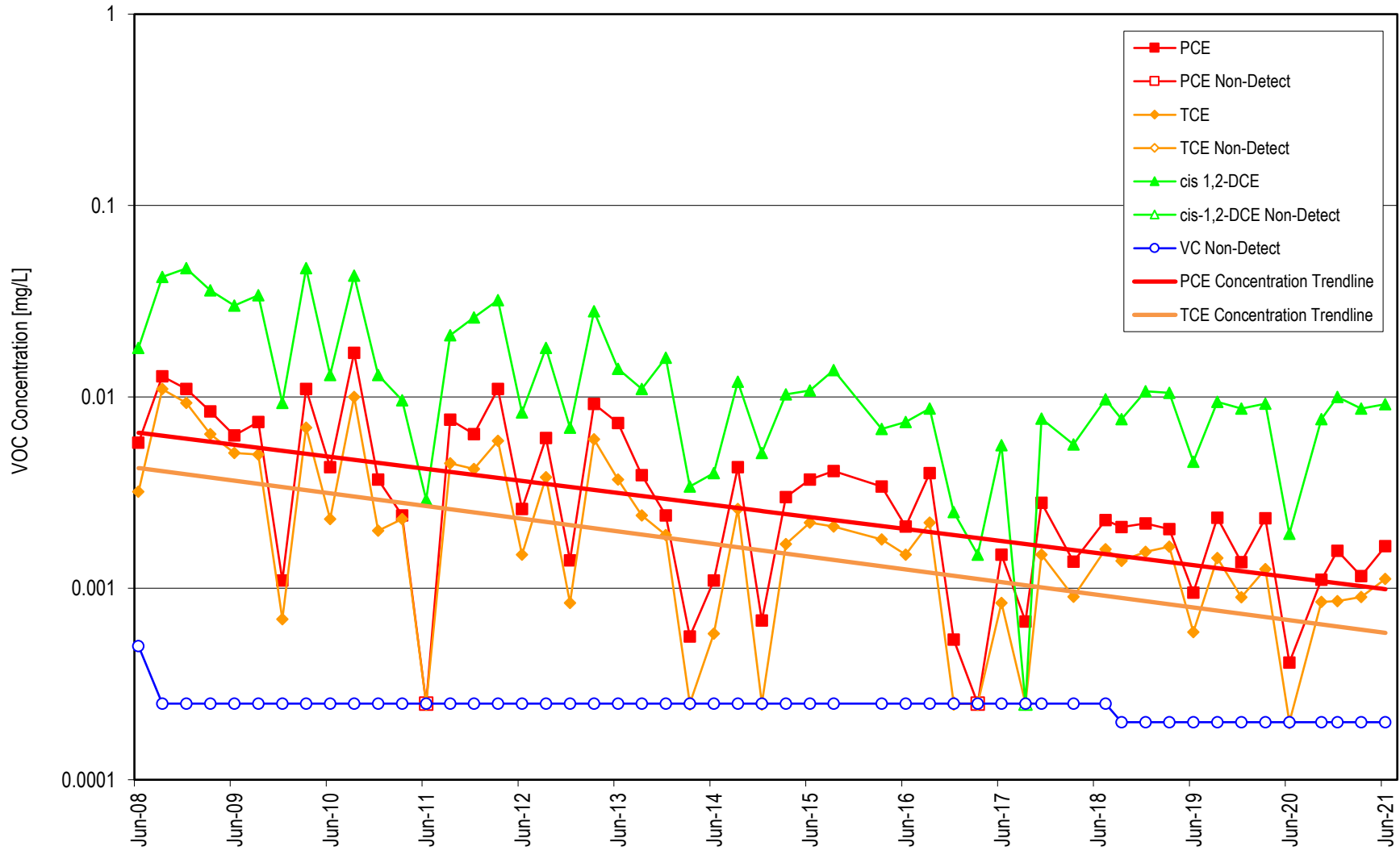
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-19i

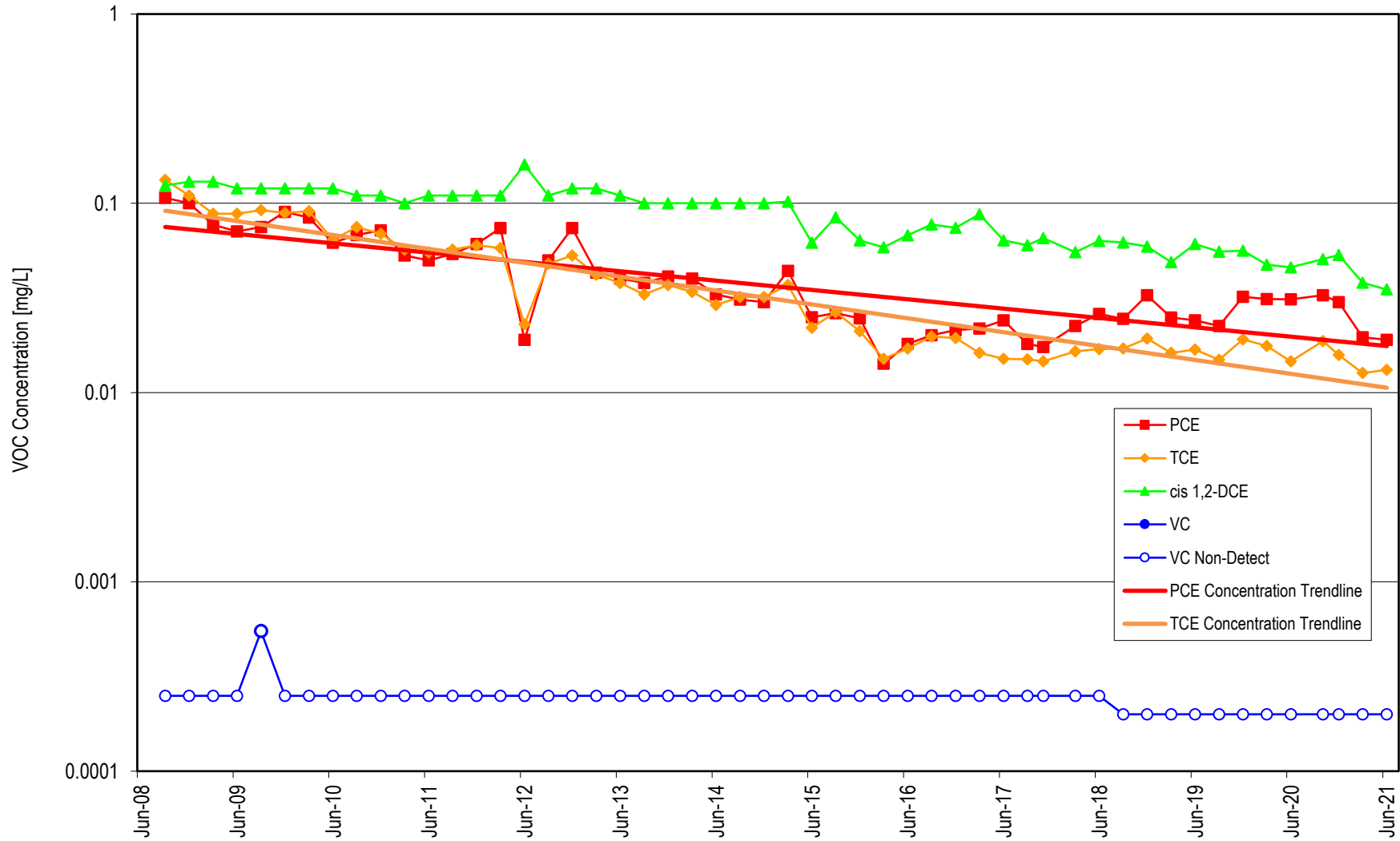


**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-20i



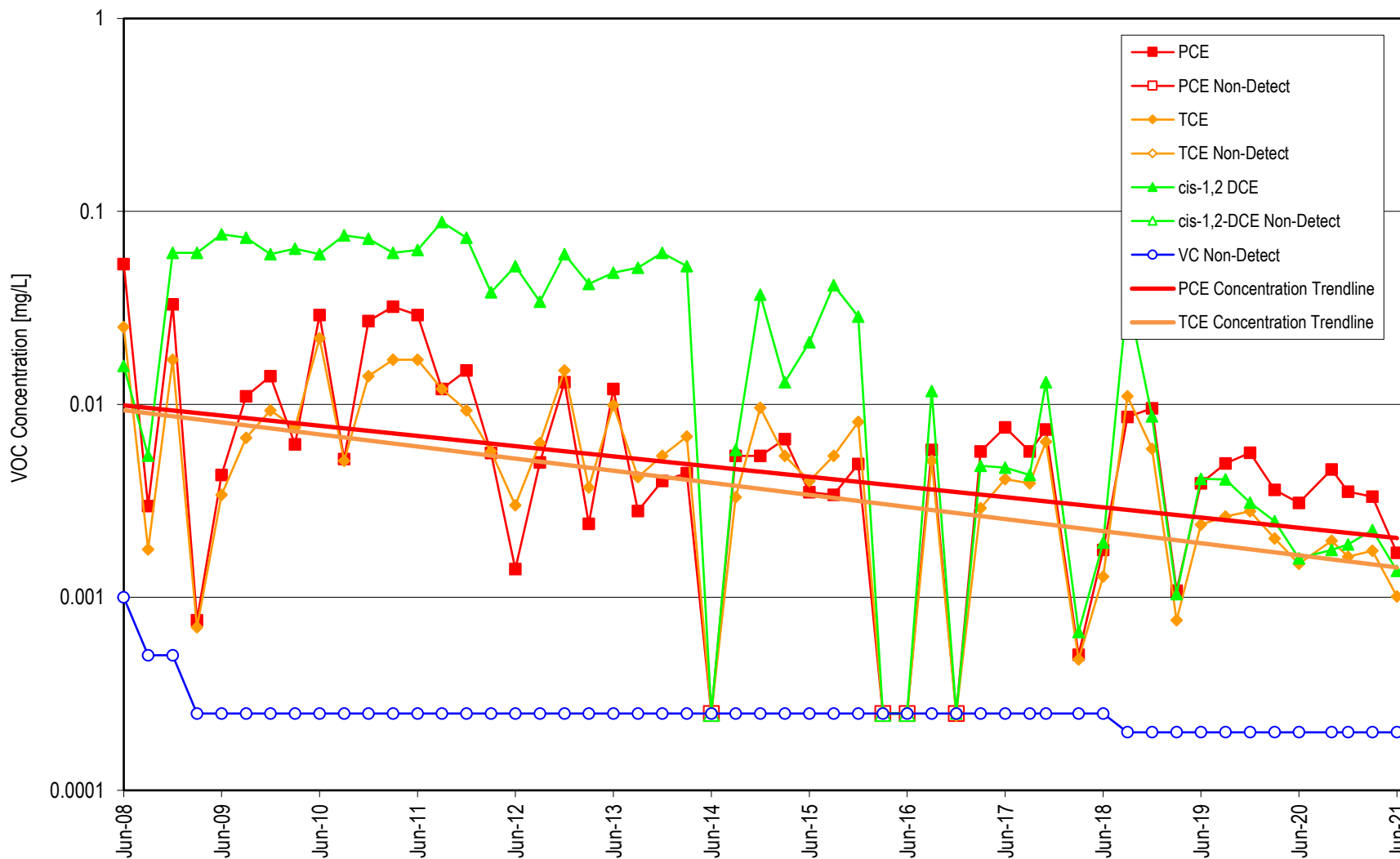
### VOC Concentrations in MW-21i-40



**Note:** Not detected values plotted at 1/2 the reporting limit.

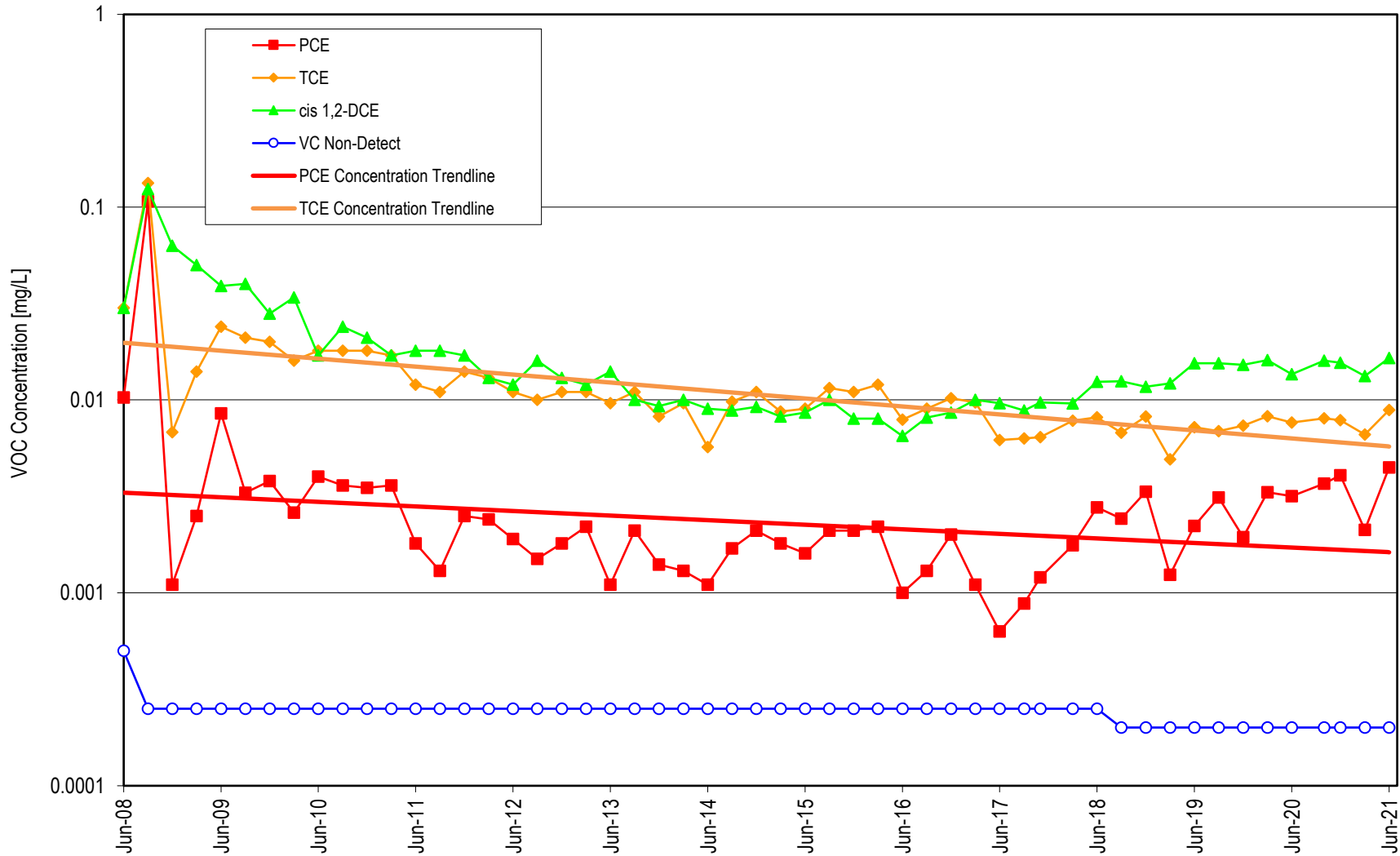


### VOC Concentrations in MW-21i-105



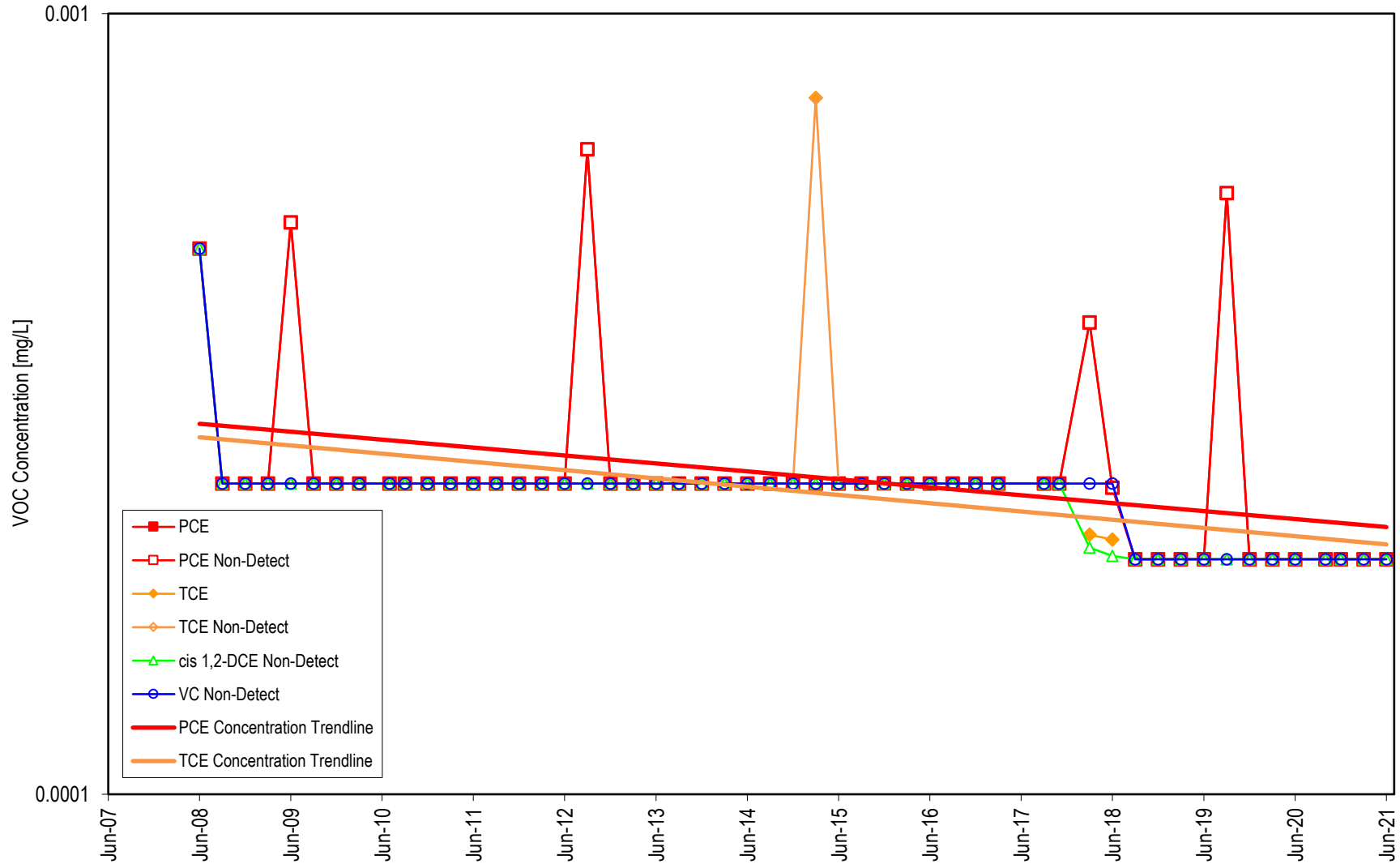
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-22i



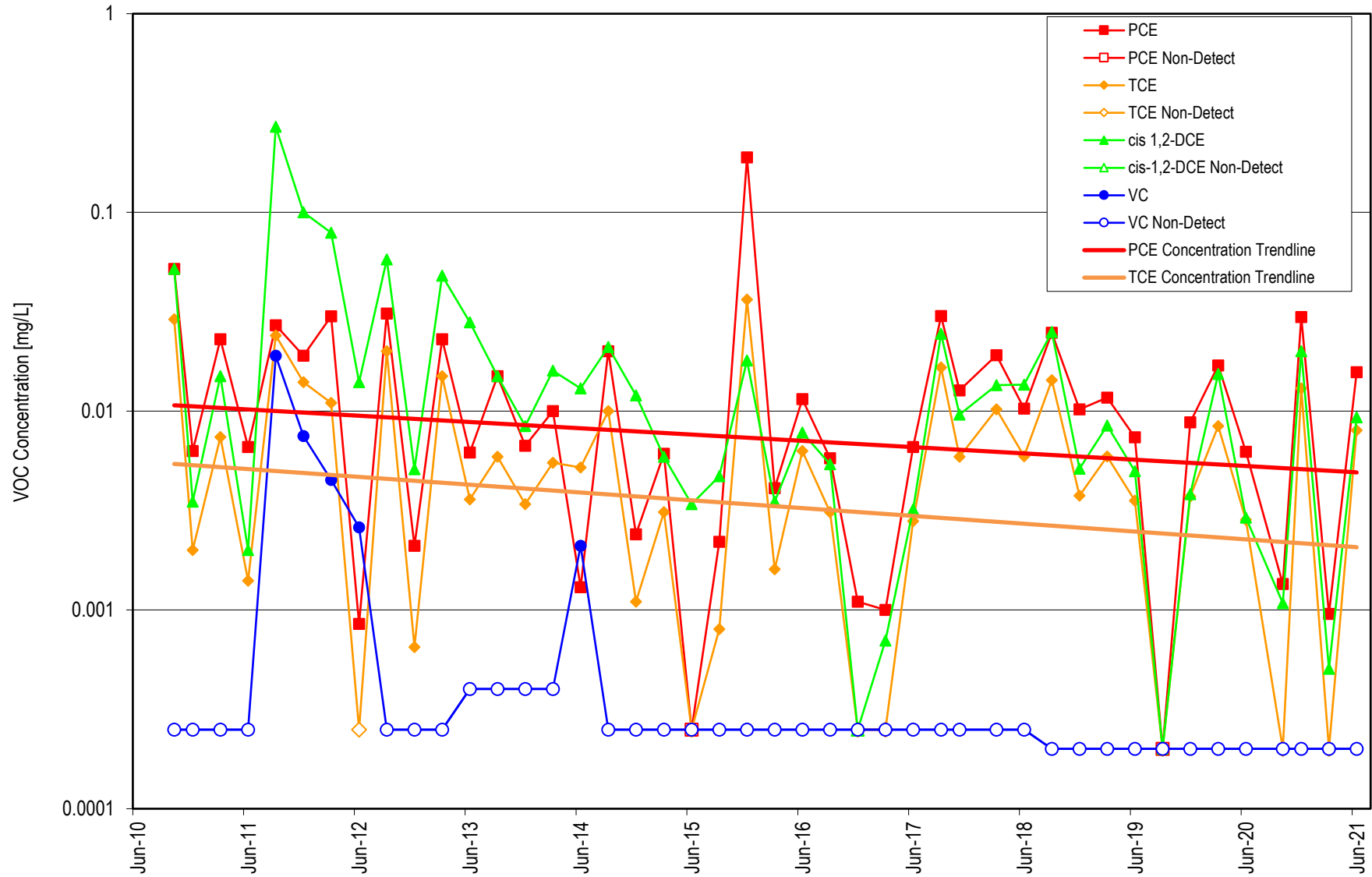
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-23i



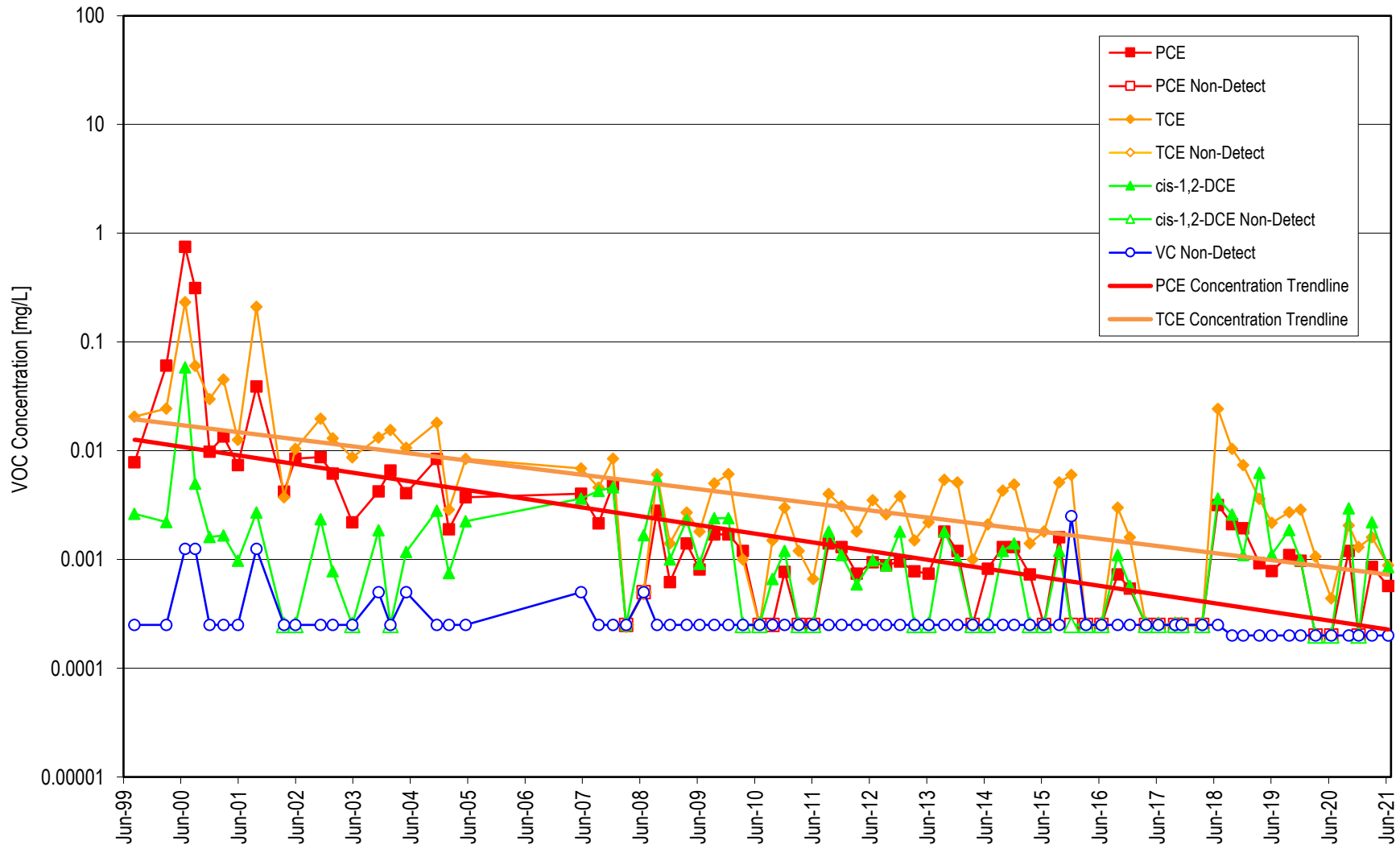
**Note:** Not detected values plotted at 1/2 the reporting limit.

### VOC Concentrations in MW-24i



**Note:** Not detected values plotted at 1/2 the reporting limit.

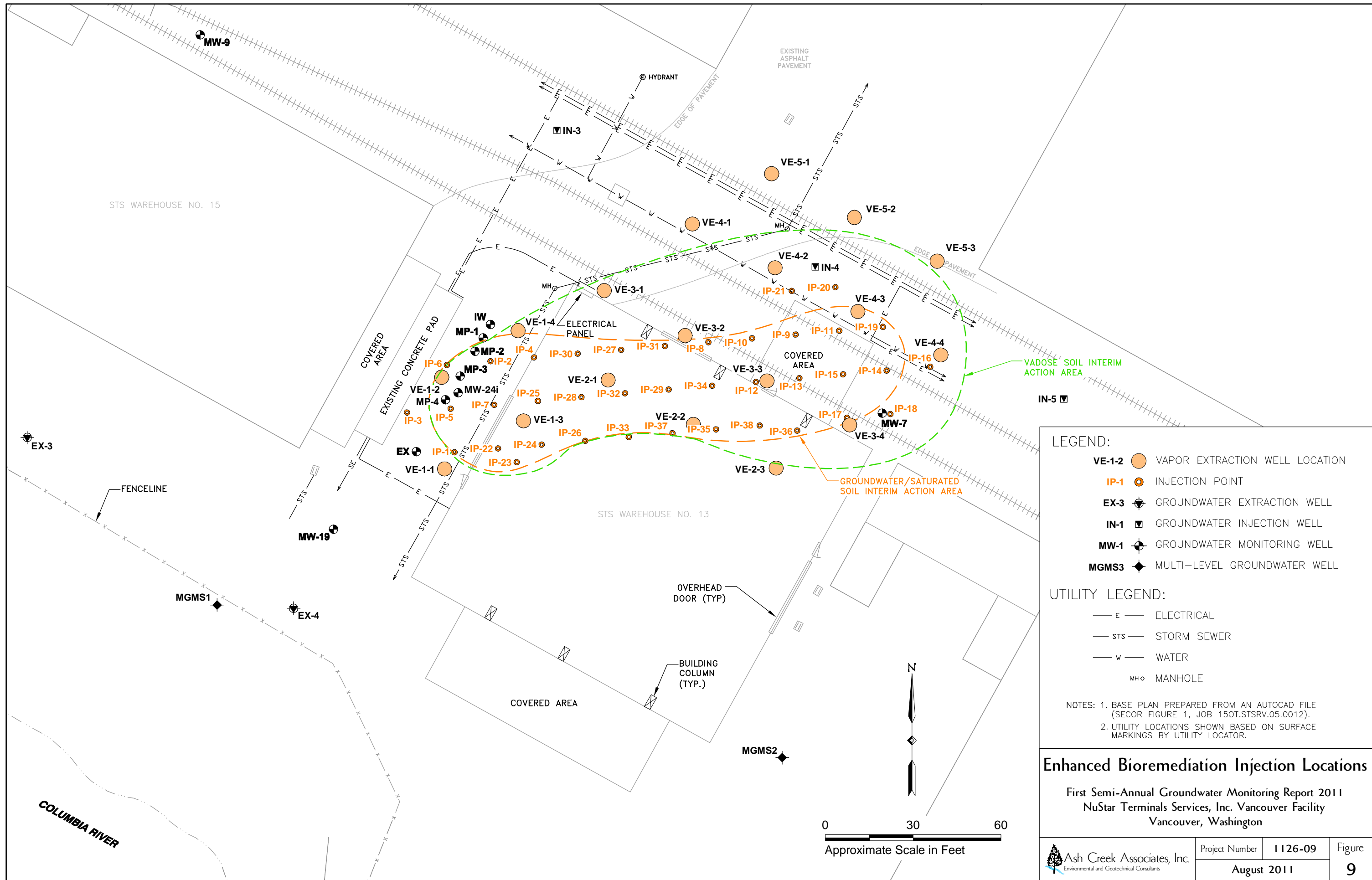
### VOC Concentrations in S-1

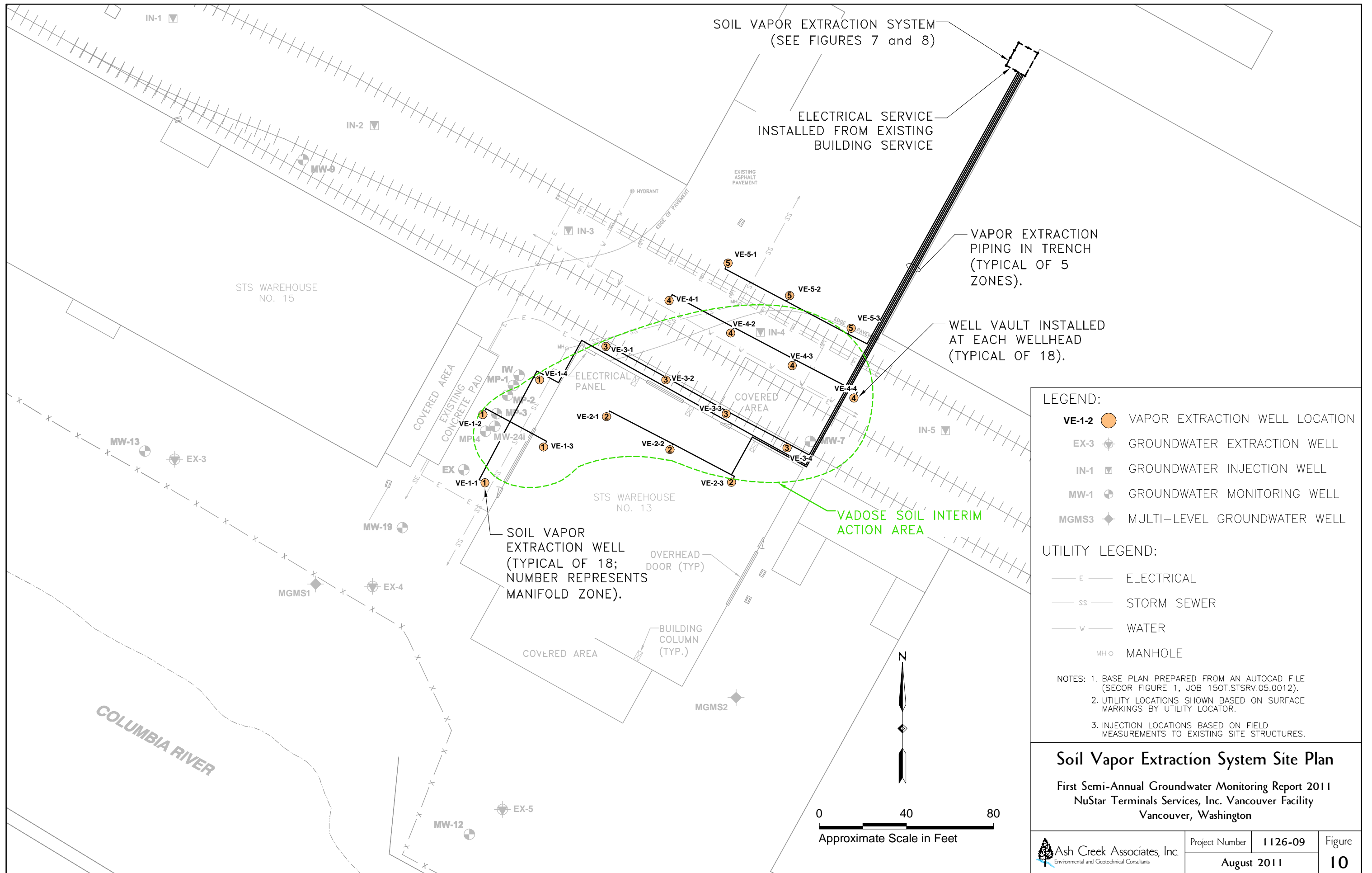


**Note:** Not detected values plotted at 1/2 the reporting limit.

**APPENDIX E**

2008—SVE AND BIOREMEDIATION INJECTION LAYOUT AND  
MASS REMOVAL CHART





**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:**

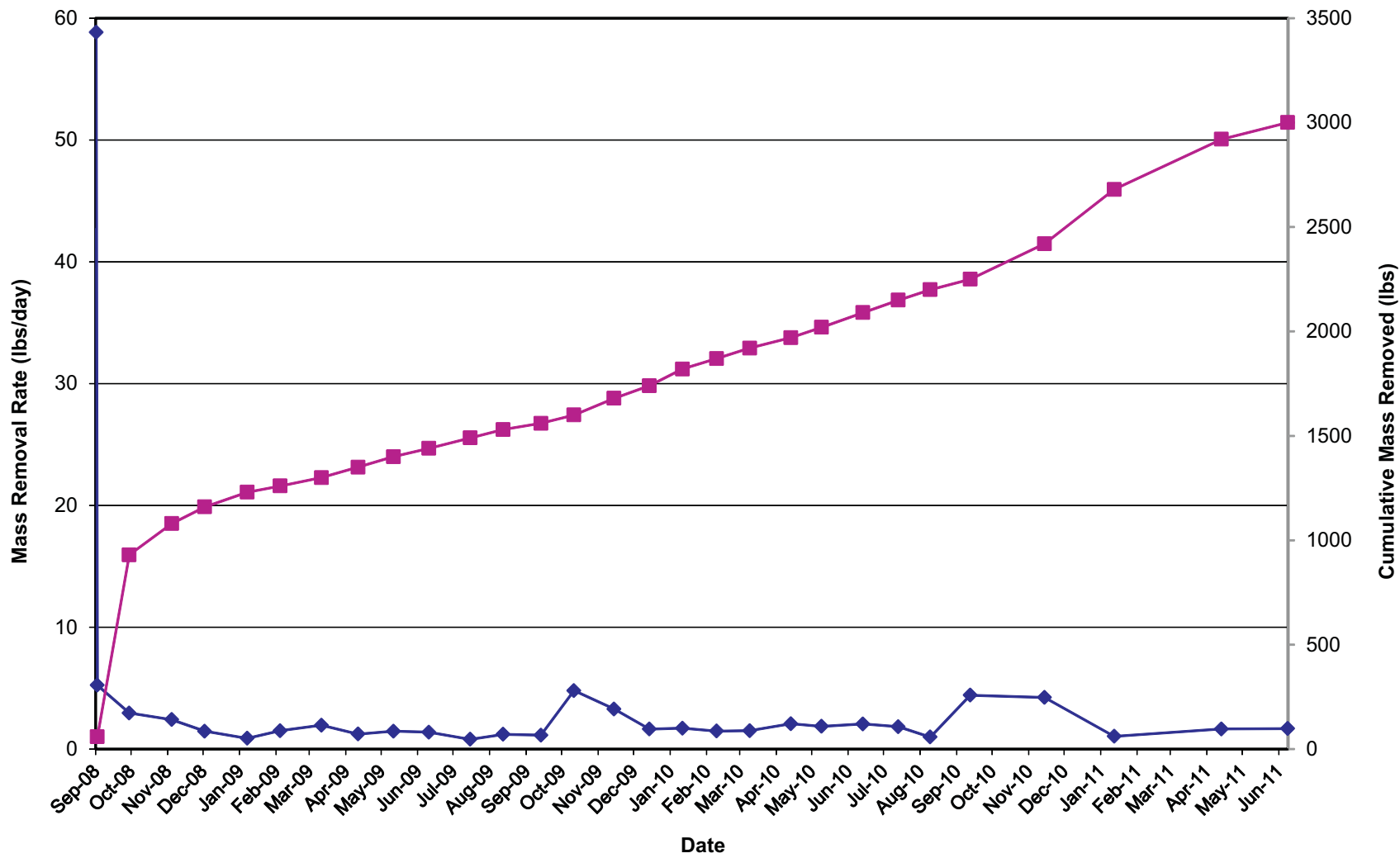
- ELECTRICAL
- STORM SEWER
- WATER
- MANHOLE

**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**

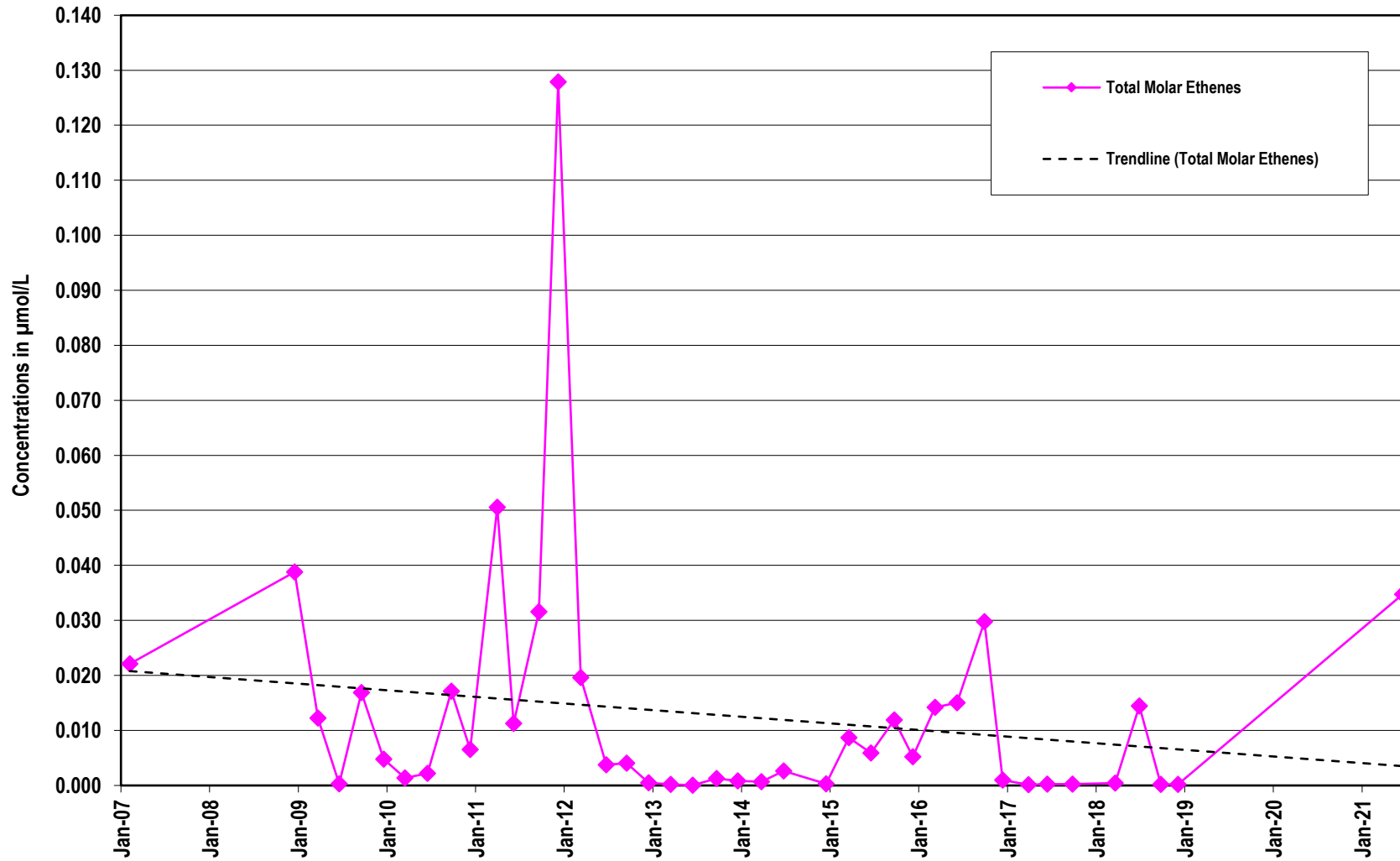
Second Semi-Annual Groundwater Monitoring Report 2011  
 NuStar Terminals Services, Inc. Vancouver Facility  
 Vancouver, Washington



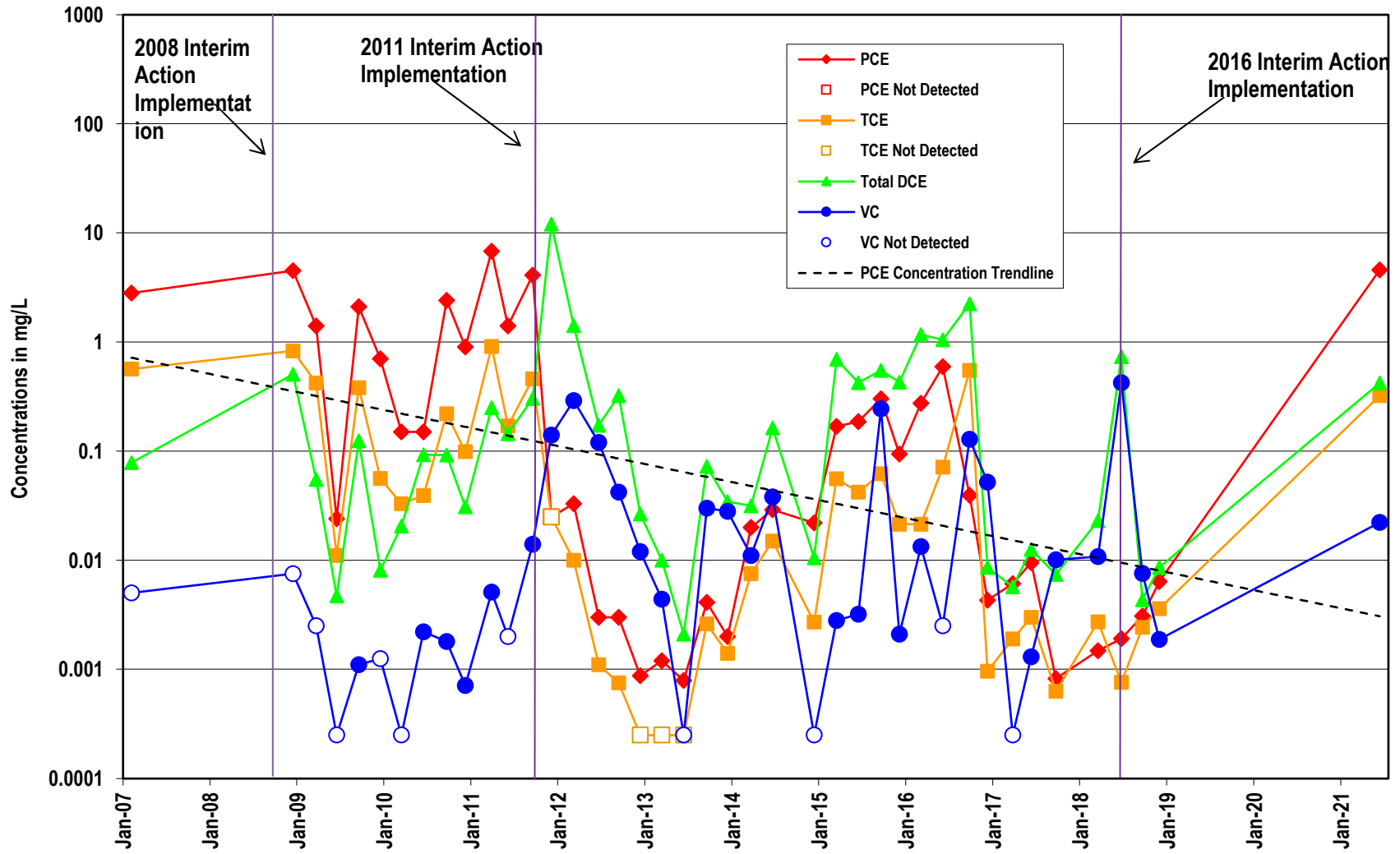
Project Number	1126-09	Figure <b>11</b>
January 2012		

**APPENDIX F**  
MOLAR CONCENTRATION TREND  
PLOTS—INTERIM ACTION WELLS

### Total Molar Ethenes in EX

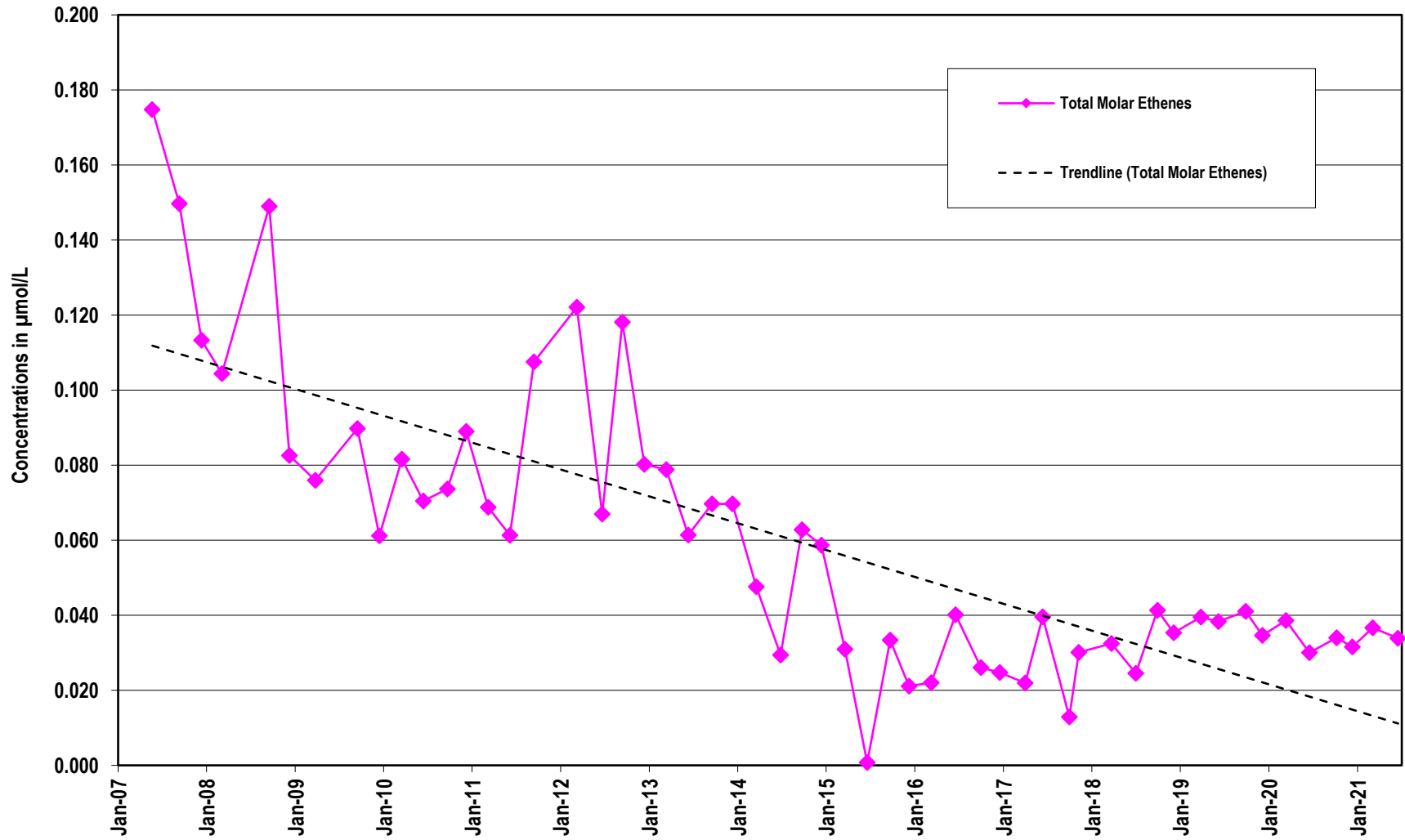


### Interim Action Area - VOC Trends: EX

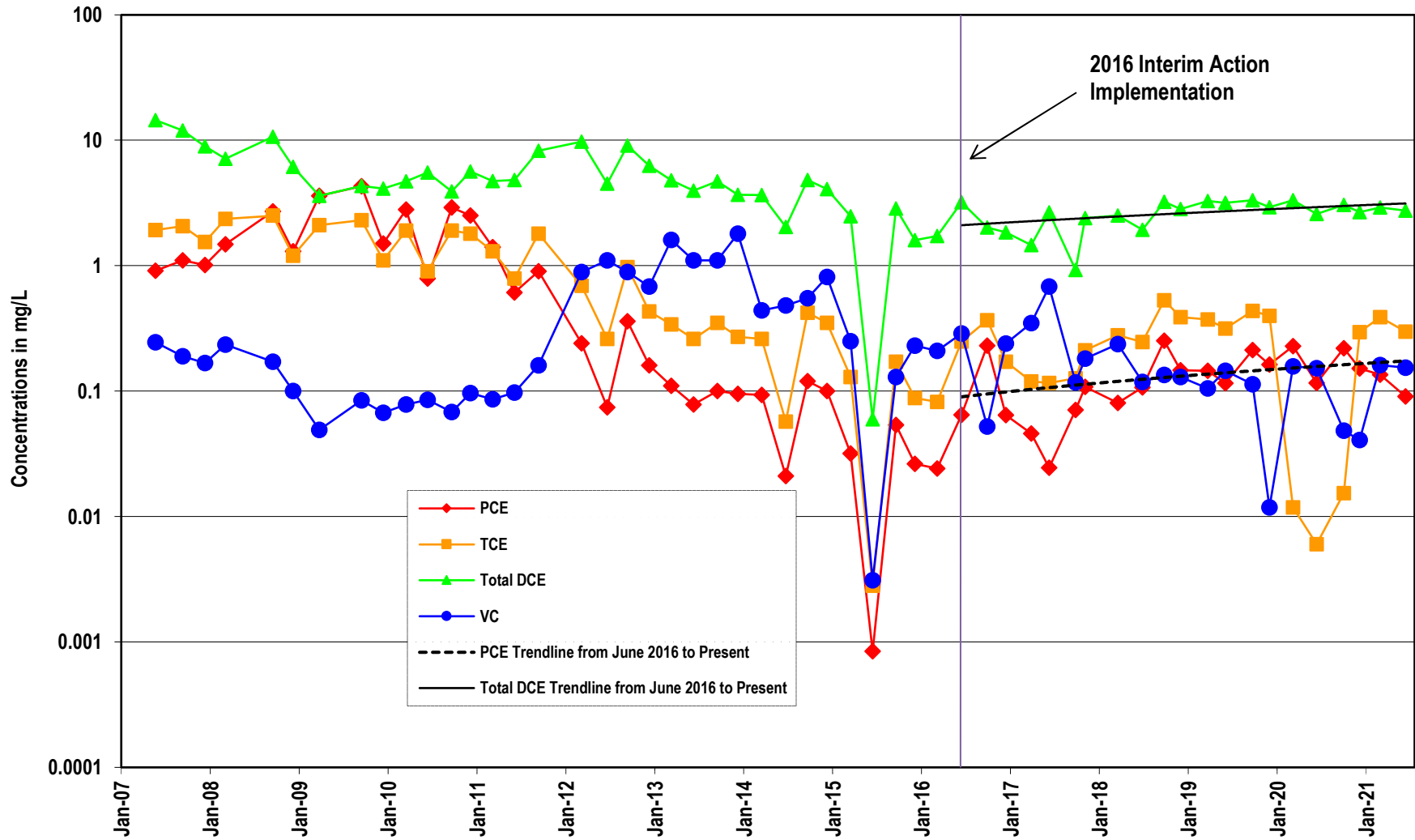


**Note:** Not detected values plotted at 1/2 the reporting limit.

### Total Molar Ethenes in MGMTS1-43

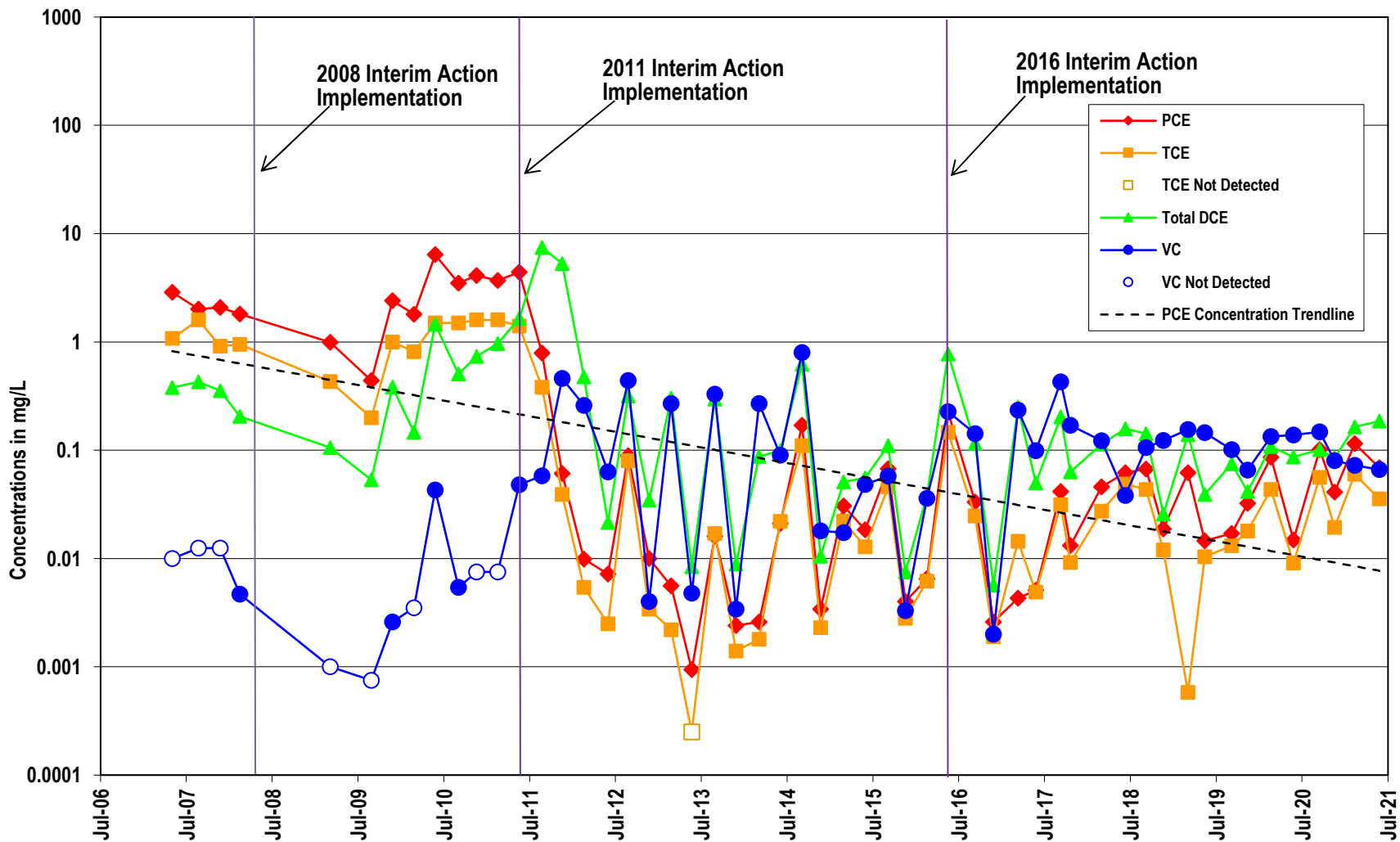


### Interim Action Area - VOC Trends: MGMS1-43



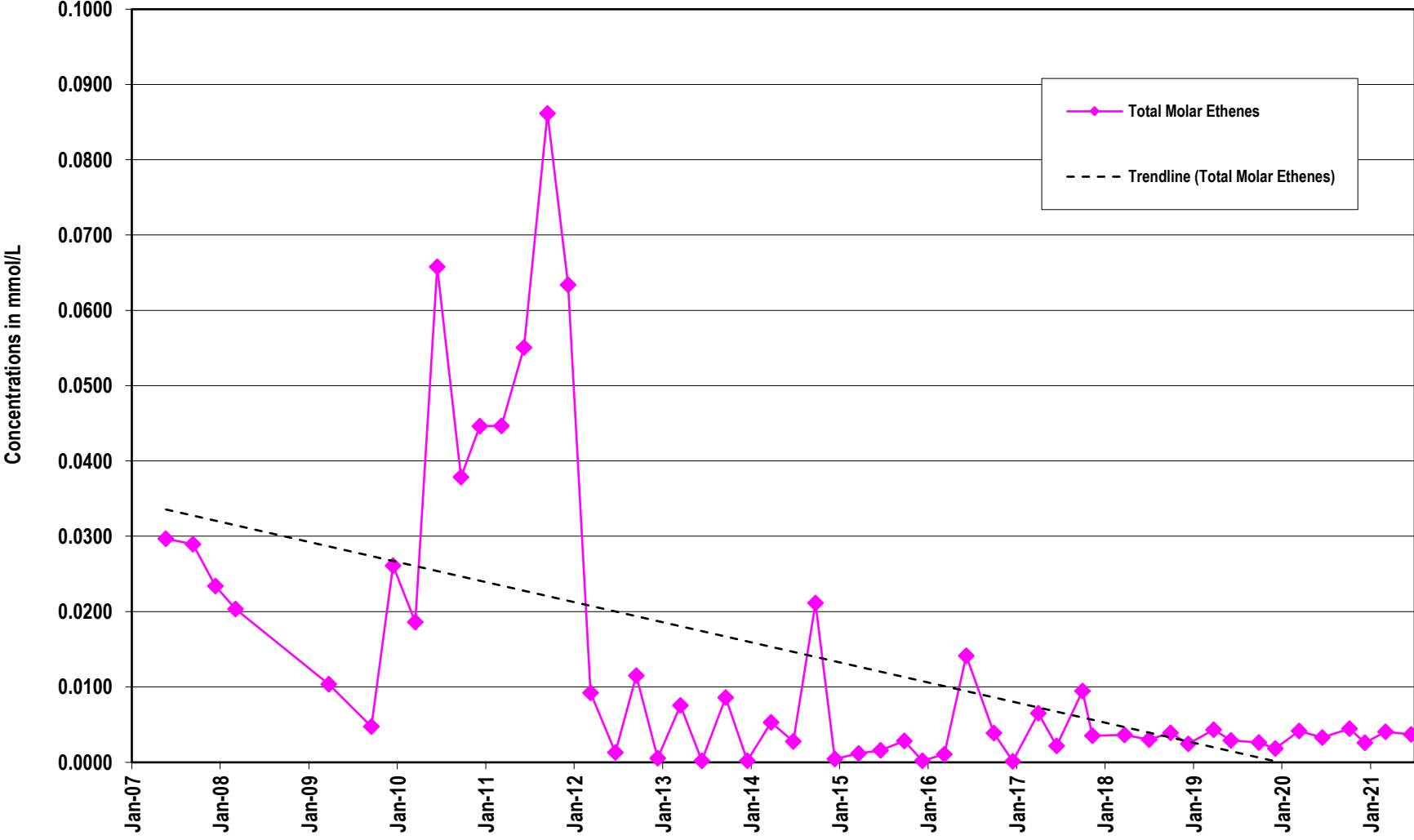
Note: Not detected values plotted at 1/2 the reporting limit.

### Interim Action Area - VOC Trends: MGMS2-40



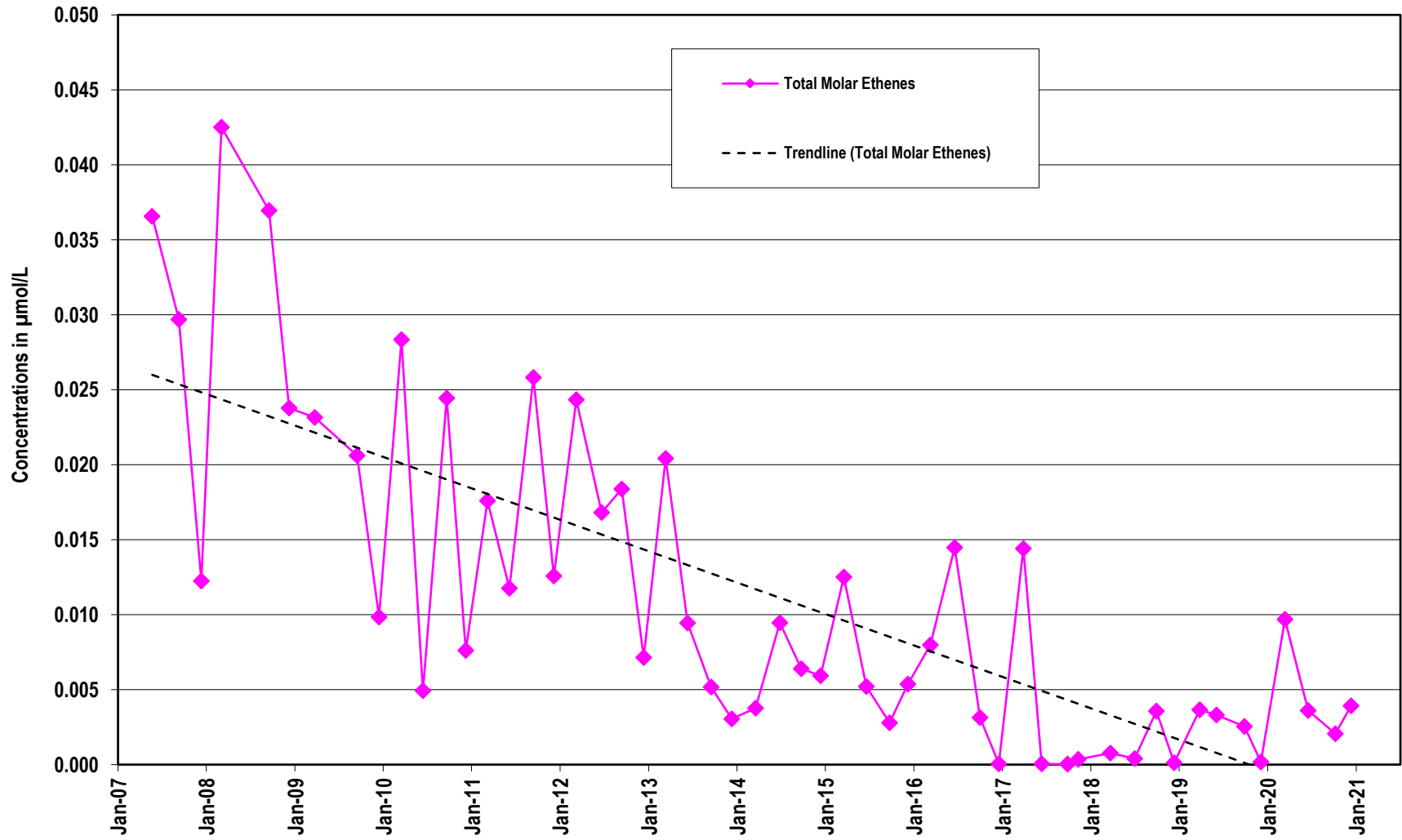
**Note:** Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MGMS2-40

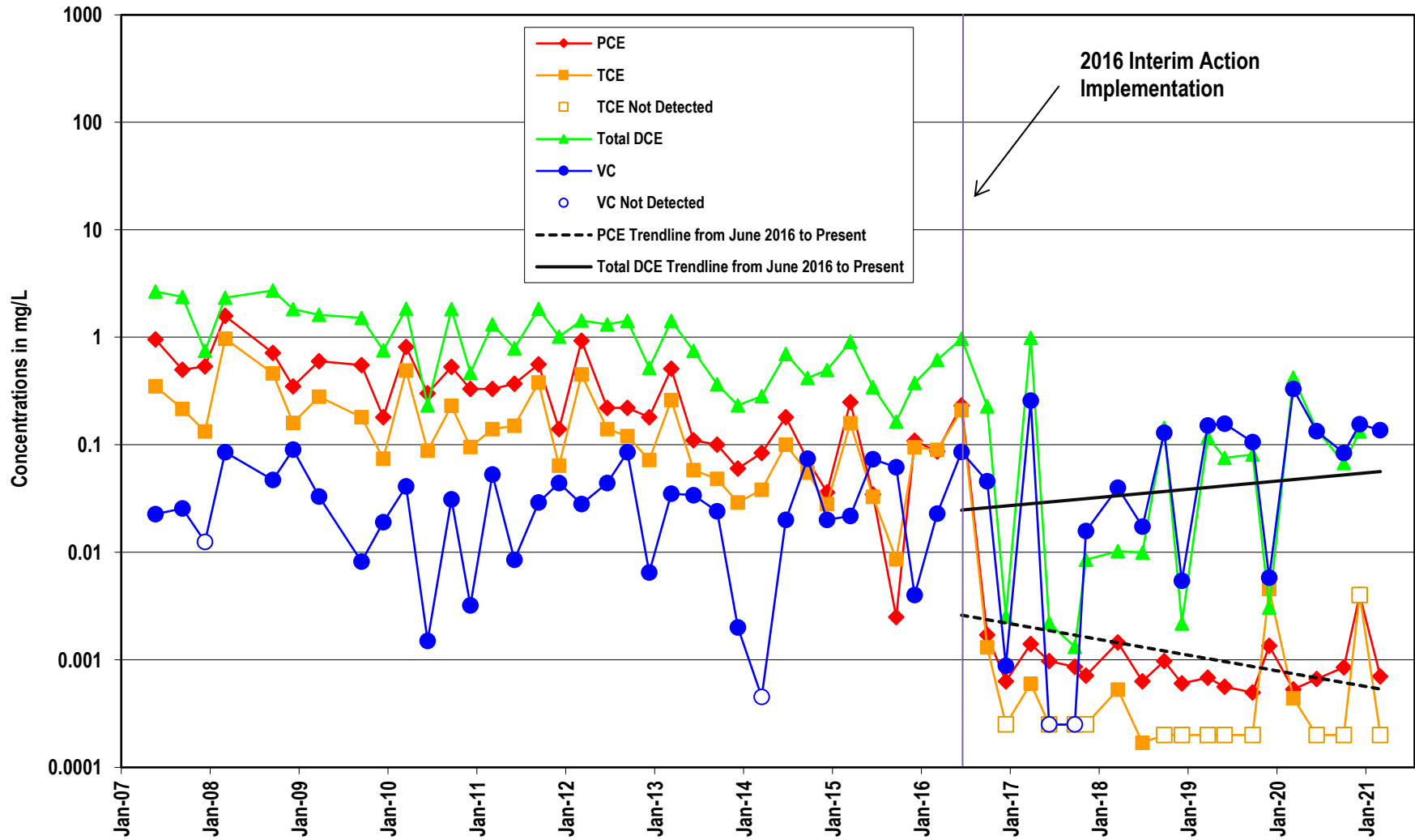




Total Molar Ethenes in MGMS3-40

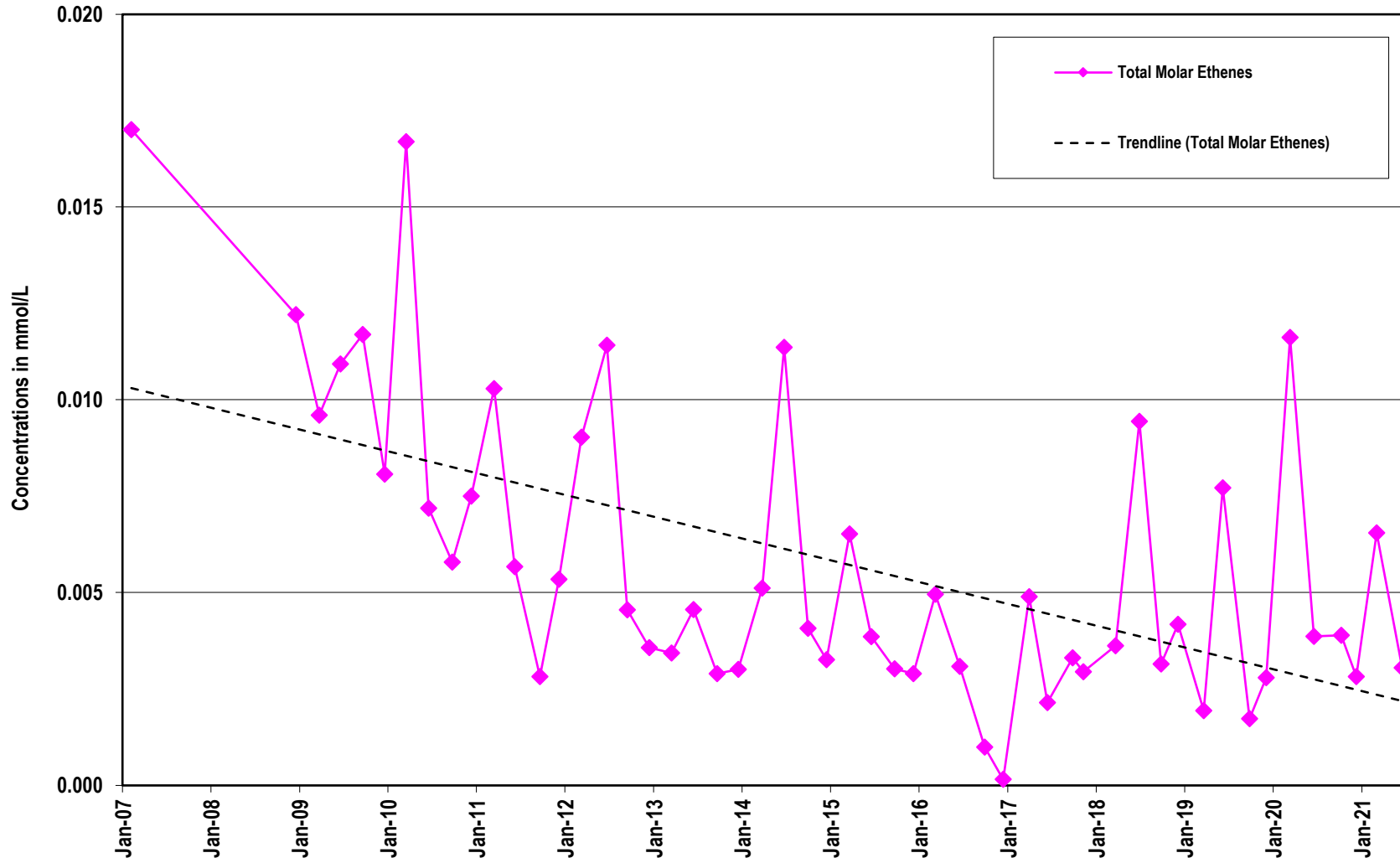


### Interim Action Area - VOC Trends: MGMS3-40

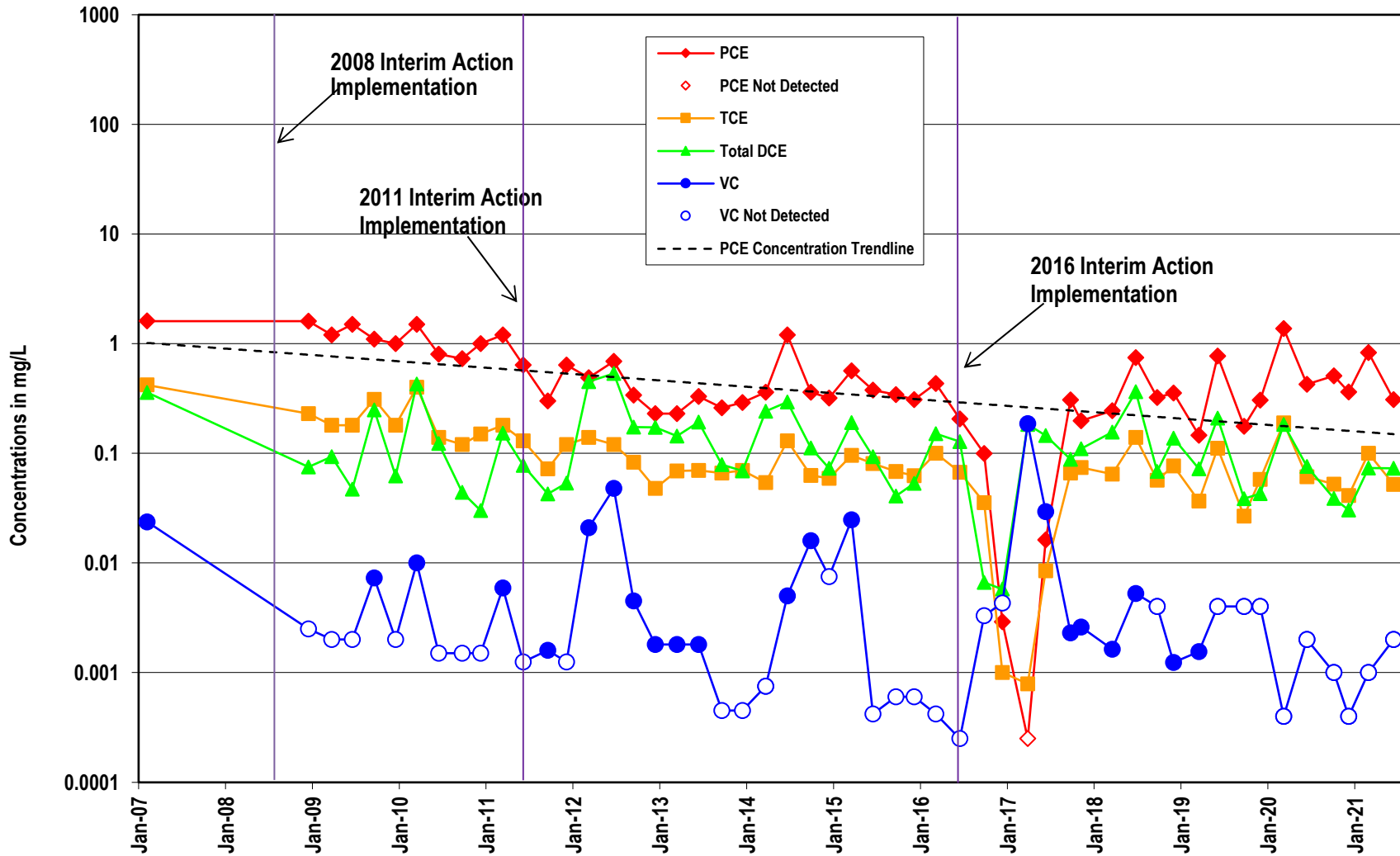


**Note:** Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MP-1

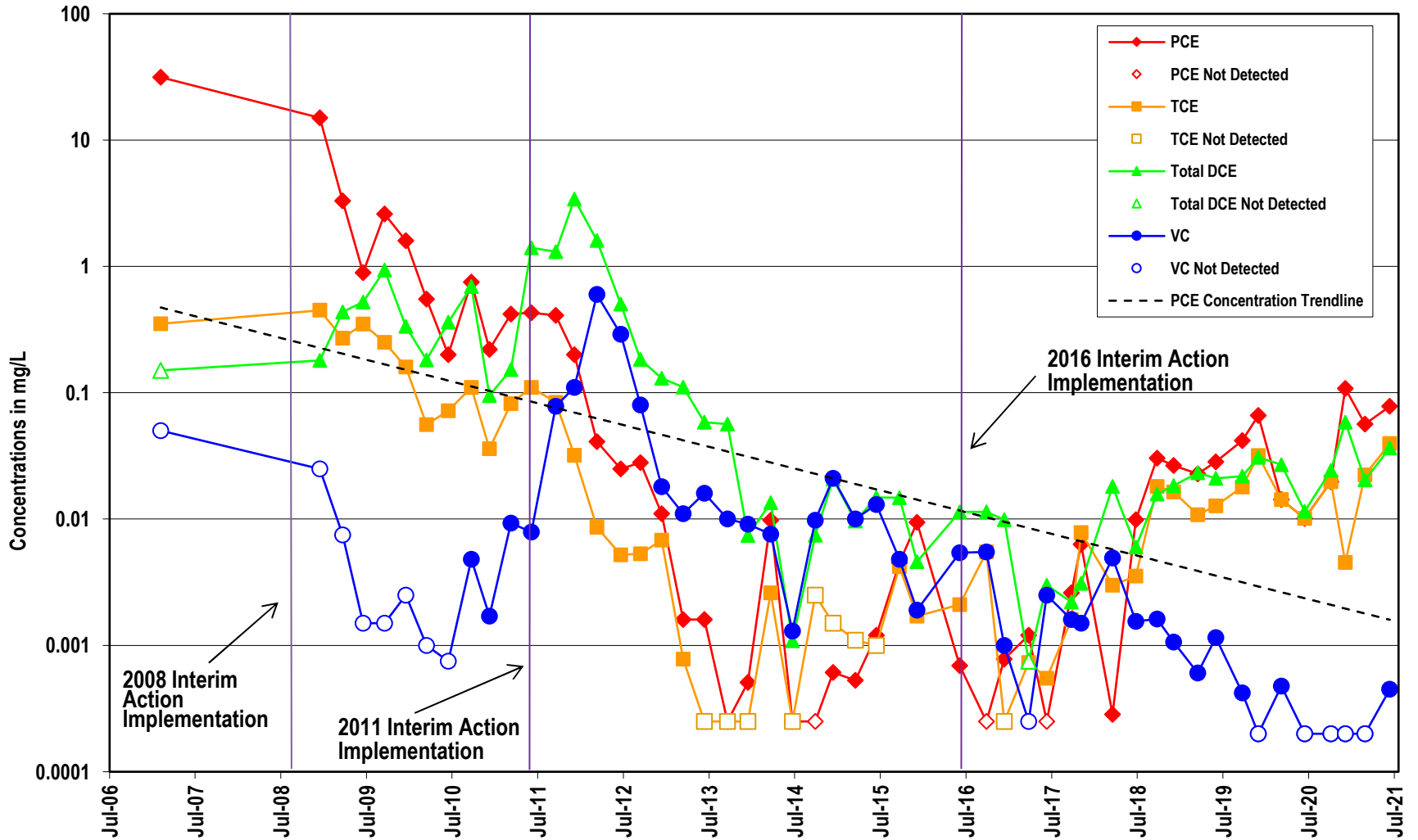


### Interim Action Area - VOC Trends: MP-1



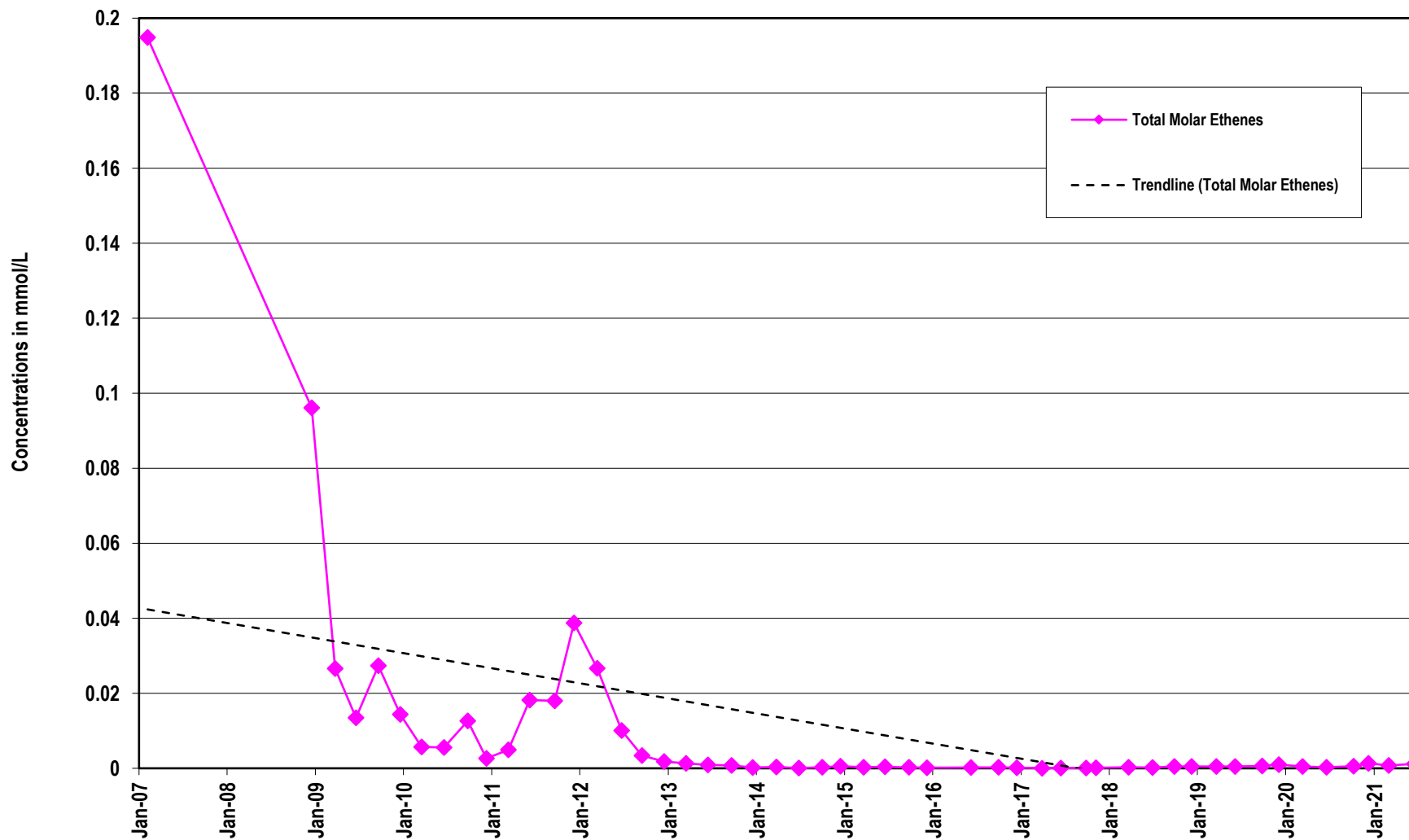
Note: Not detected values plotted at 1/2 the reporting limit.

### Interim Action Area - VOC Trends: MW-7

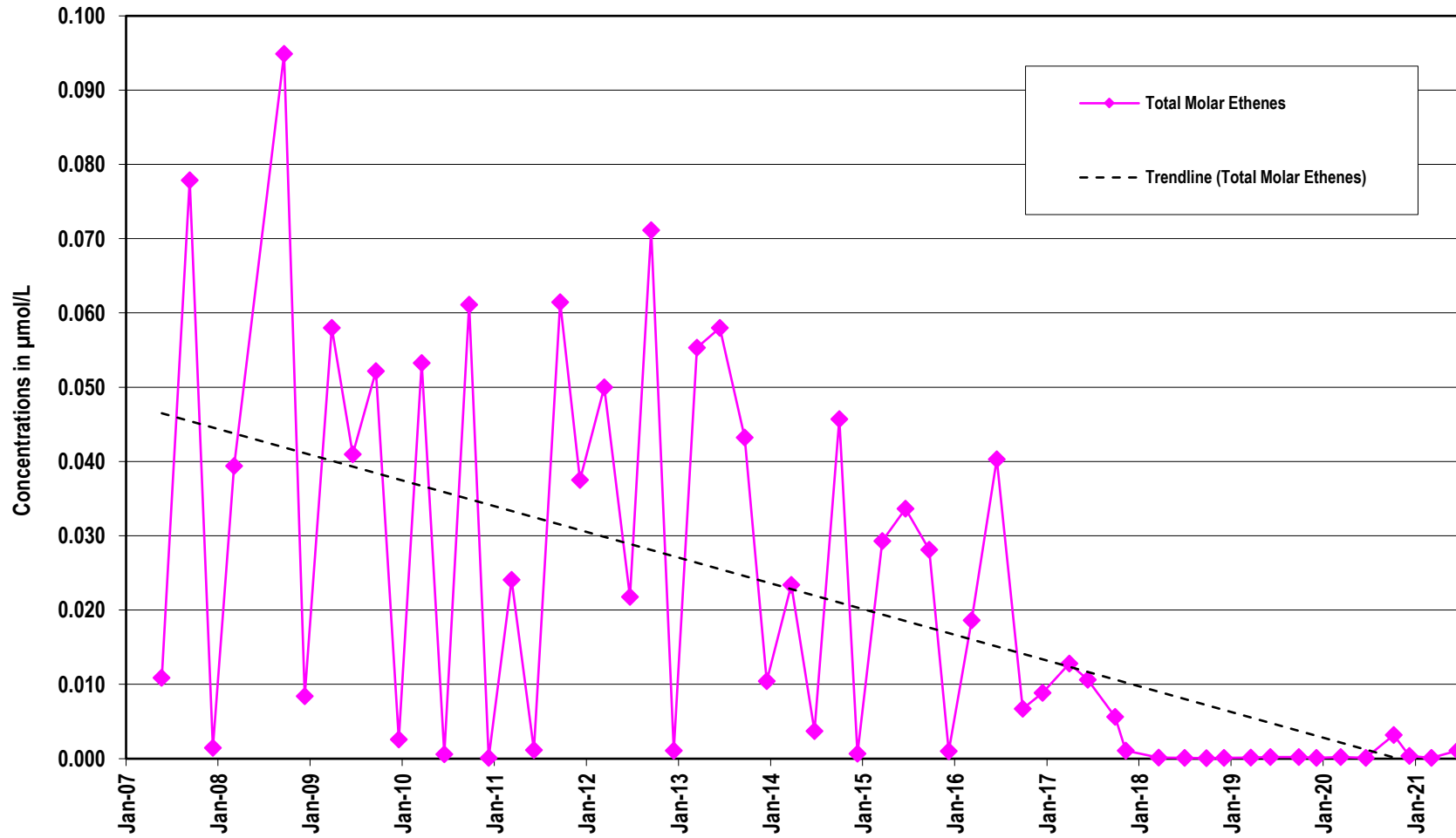


**Notes:** Not detected values plotted at 1/2 the reporting limit.

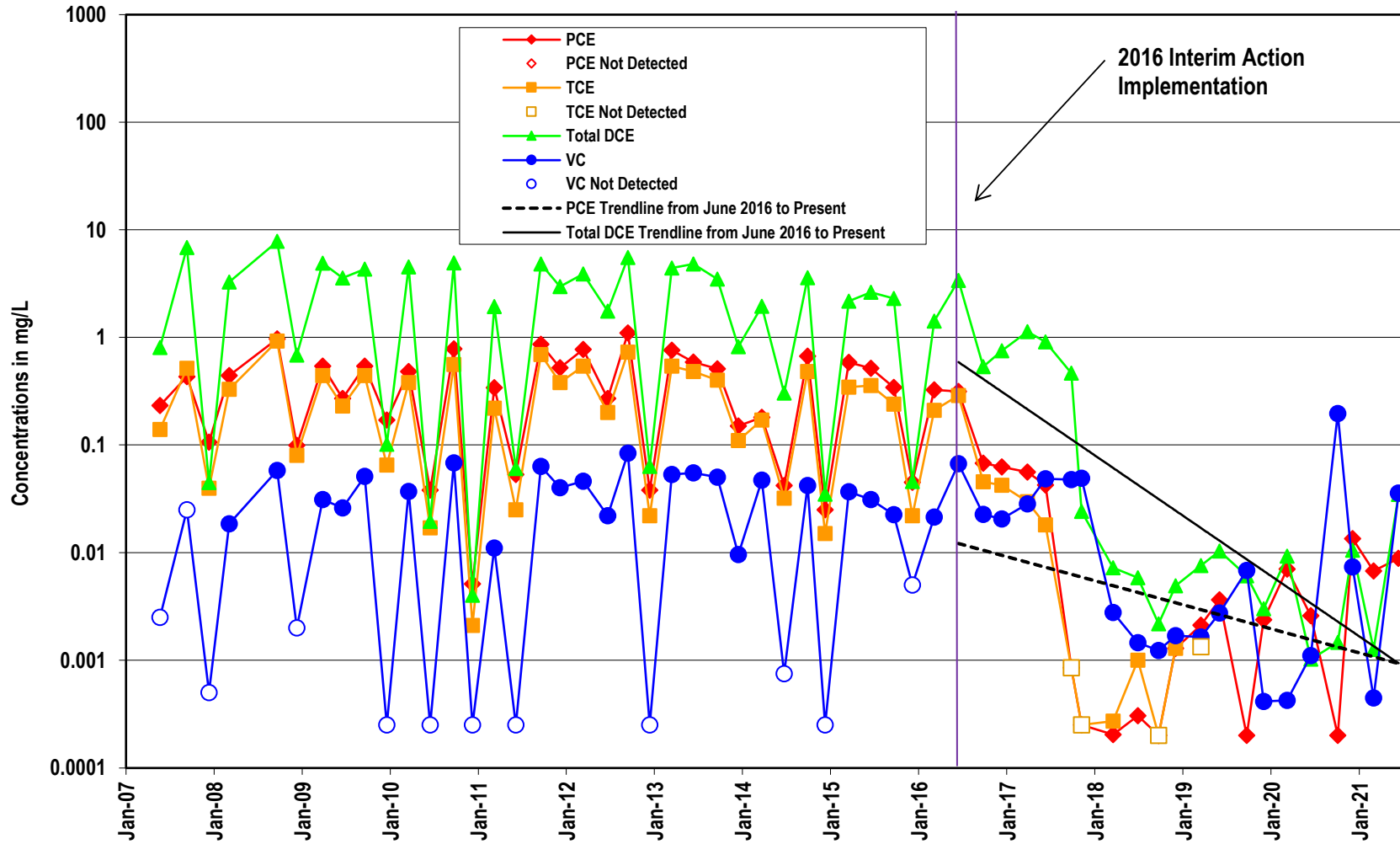
Total Molar Ethenes in MW-7



Total Molar Ethenes in MW-12



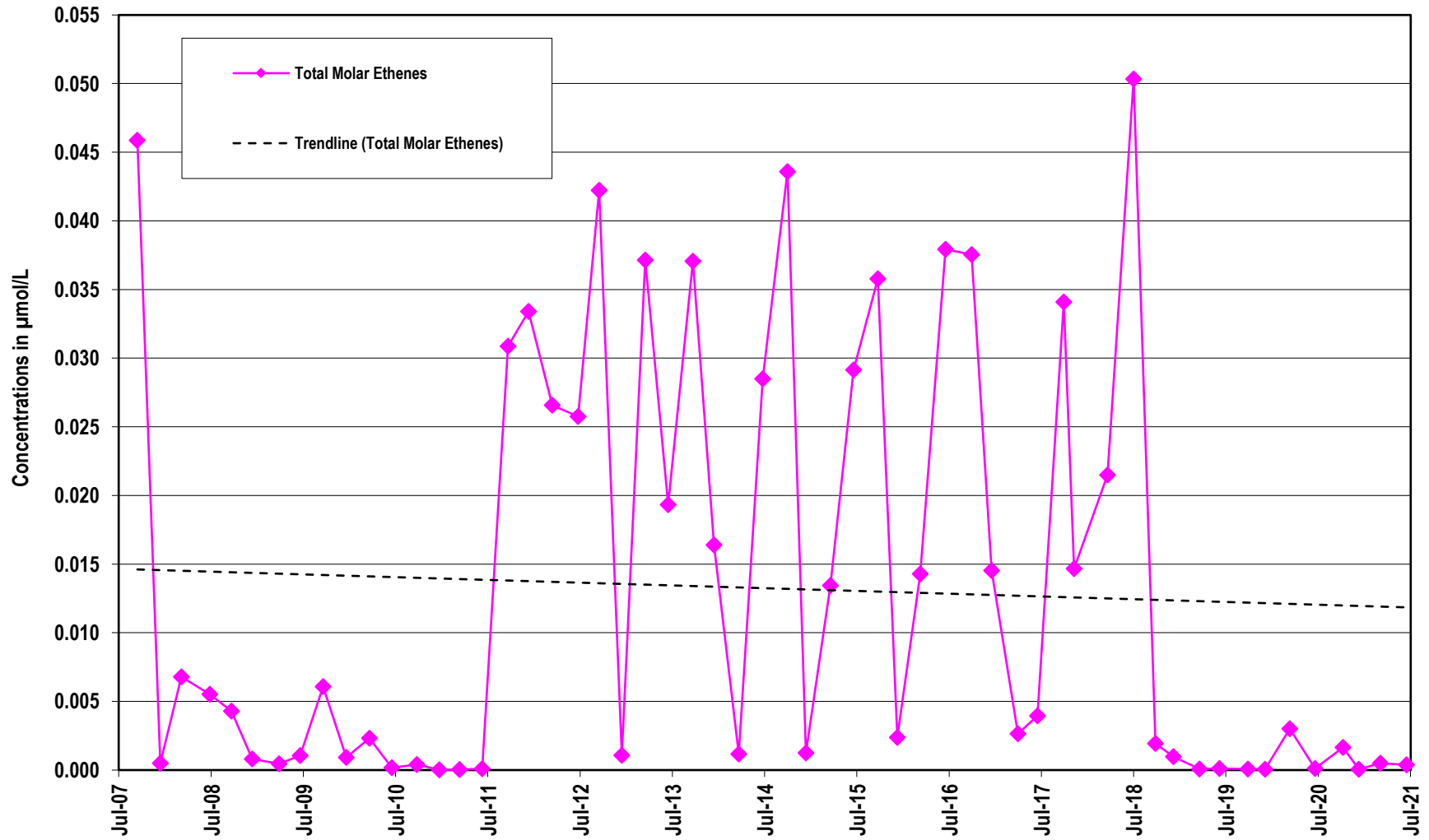
### Interim Action Area - VOC Trends: MW-12



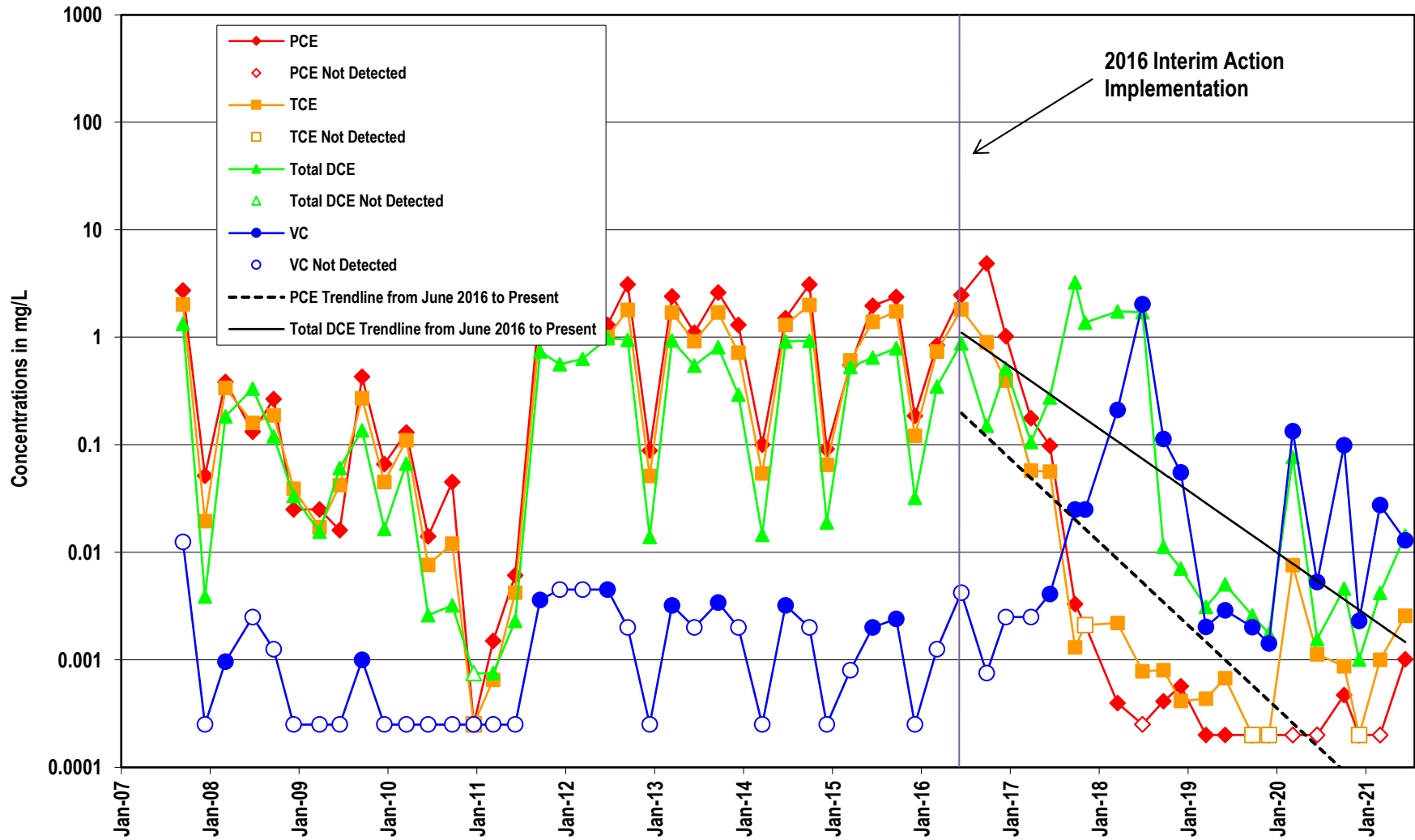
**Note:** Not detected values plotted at 1/2 the reporting limit.



Total Molar Ethenes in MW-13

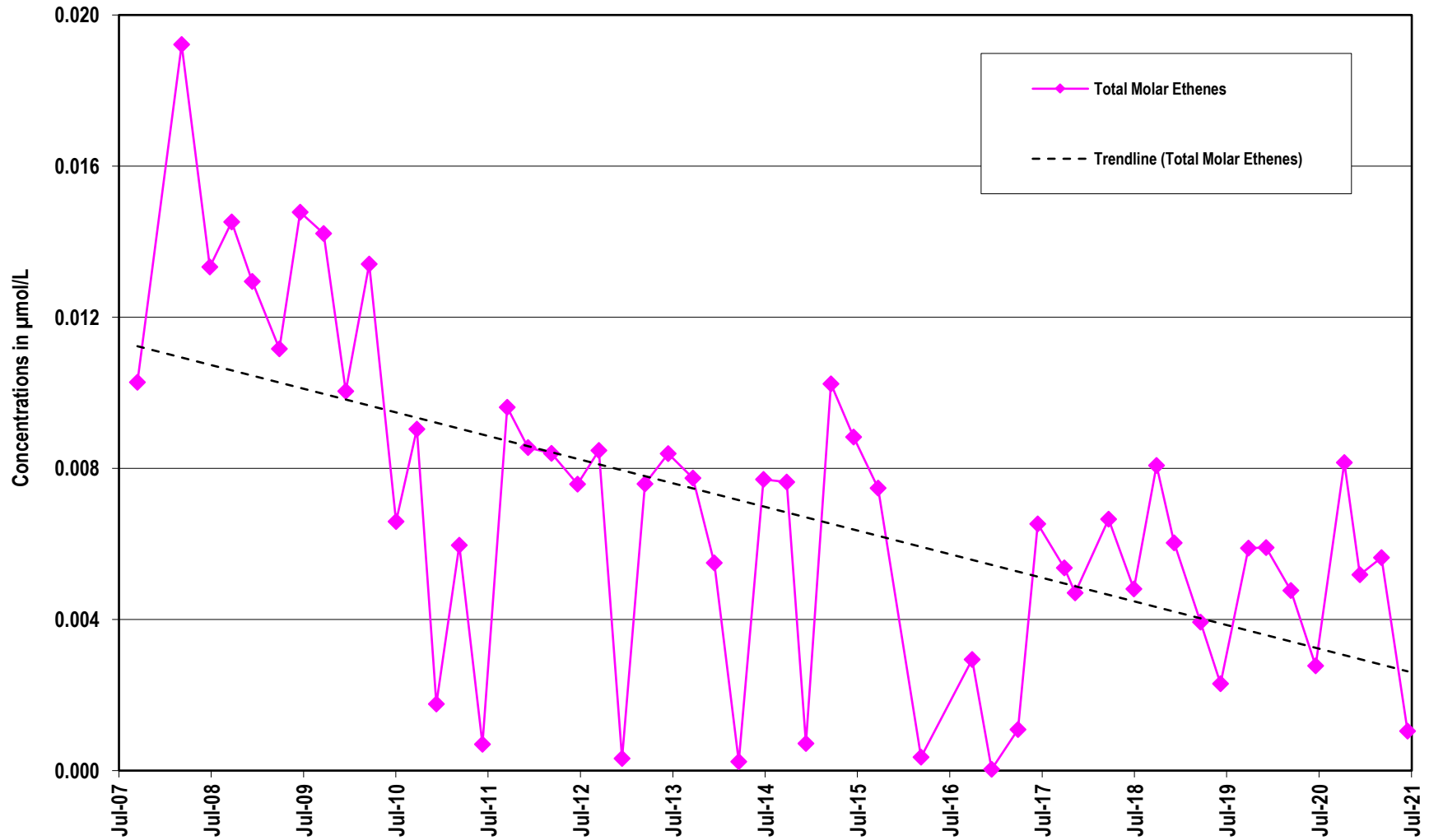


### Interim Action Area - VOC Trends: MW-13

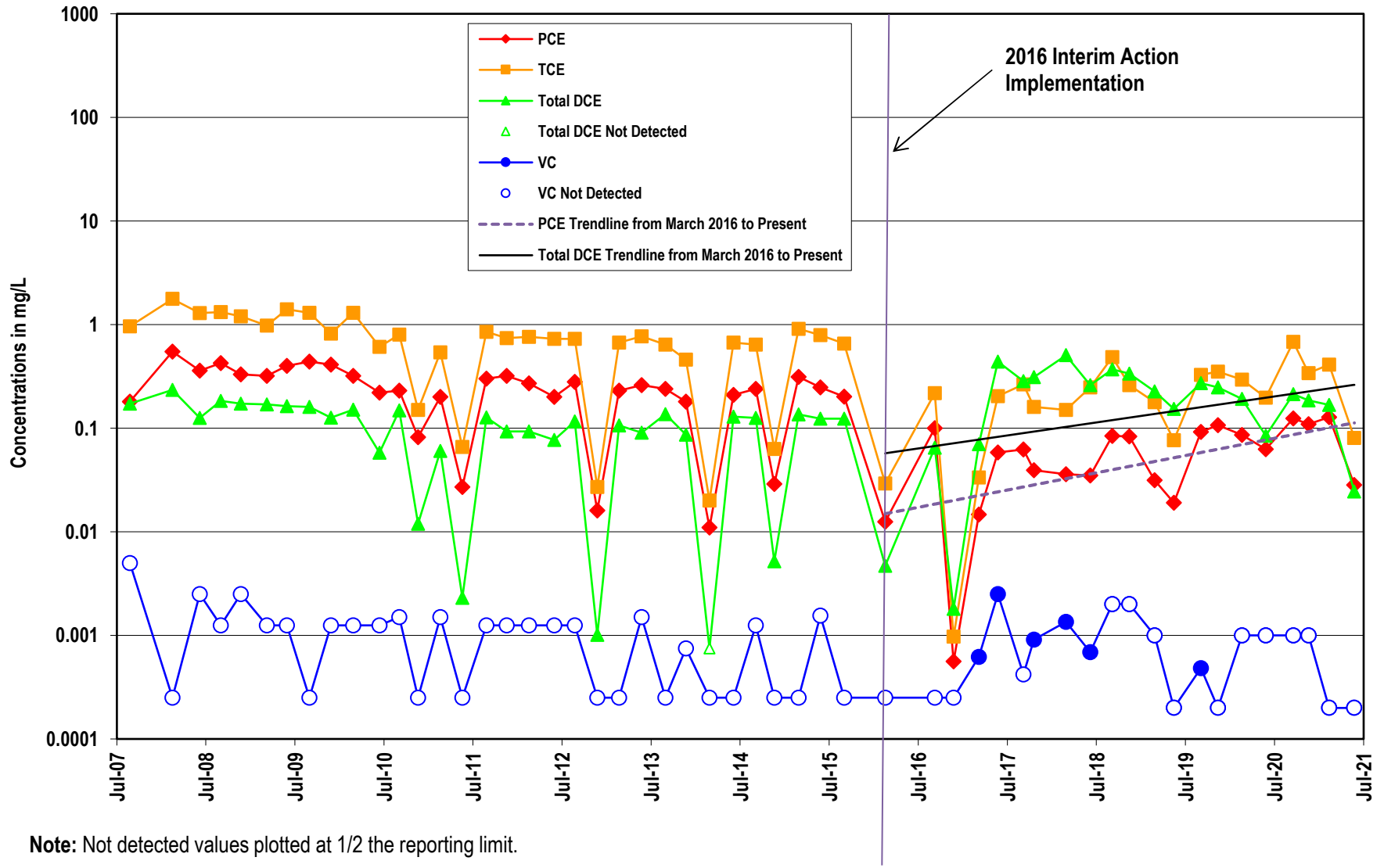


**Note:** Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MW-14

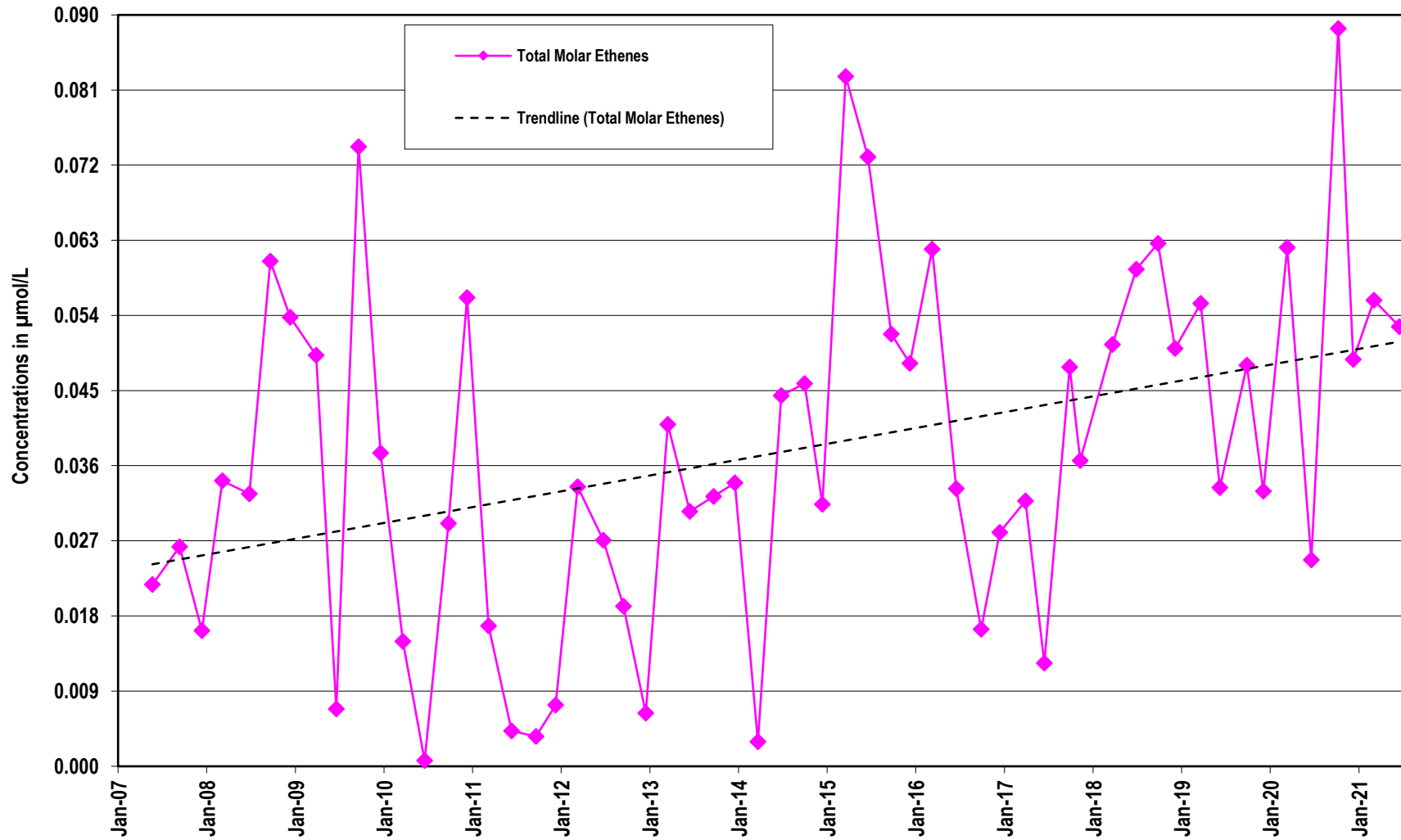


### Interim Action Area - VOC Trends: MW-14

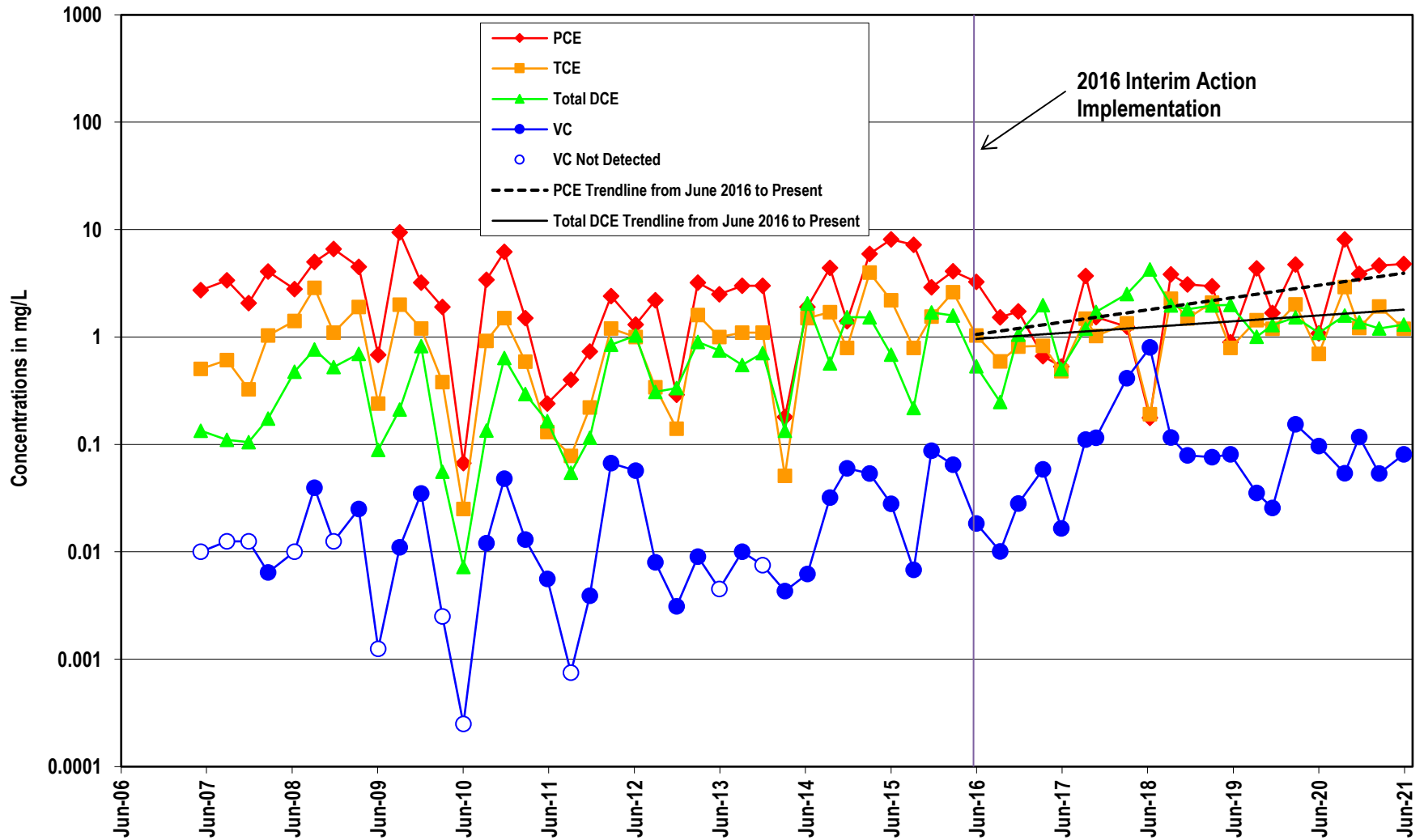


Note: Not detected values plotted at 1/2 the reporting limit.

### Total Molar Ethenes in MW-19

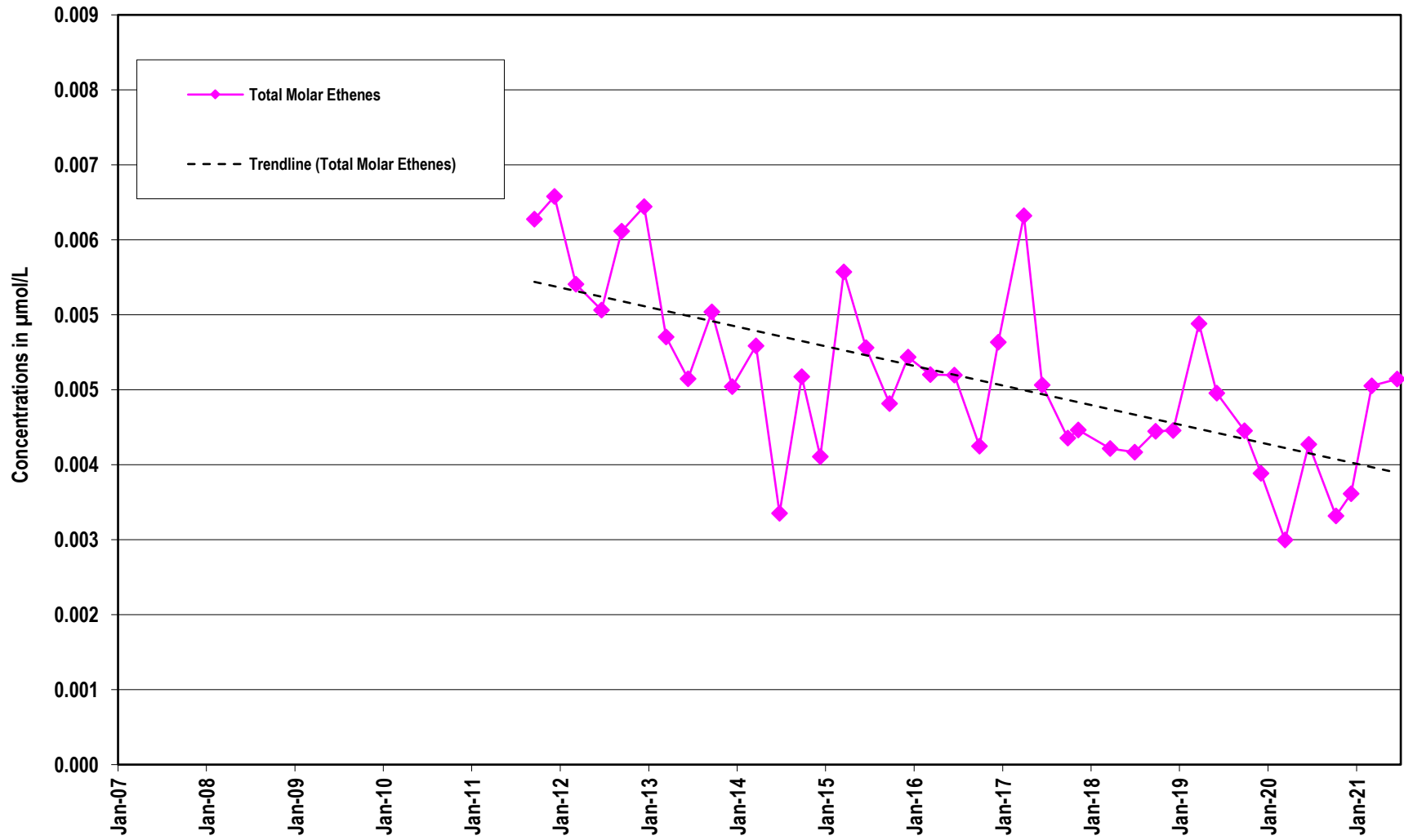


### Interim Action Area - VOC Trends: MW-19

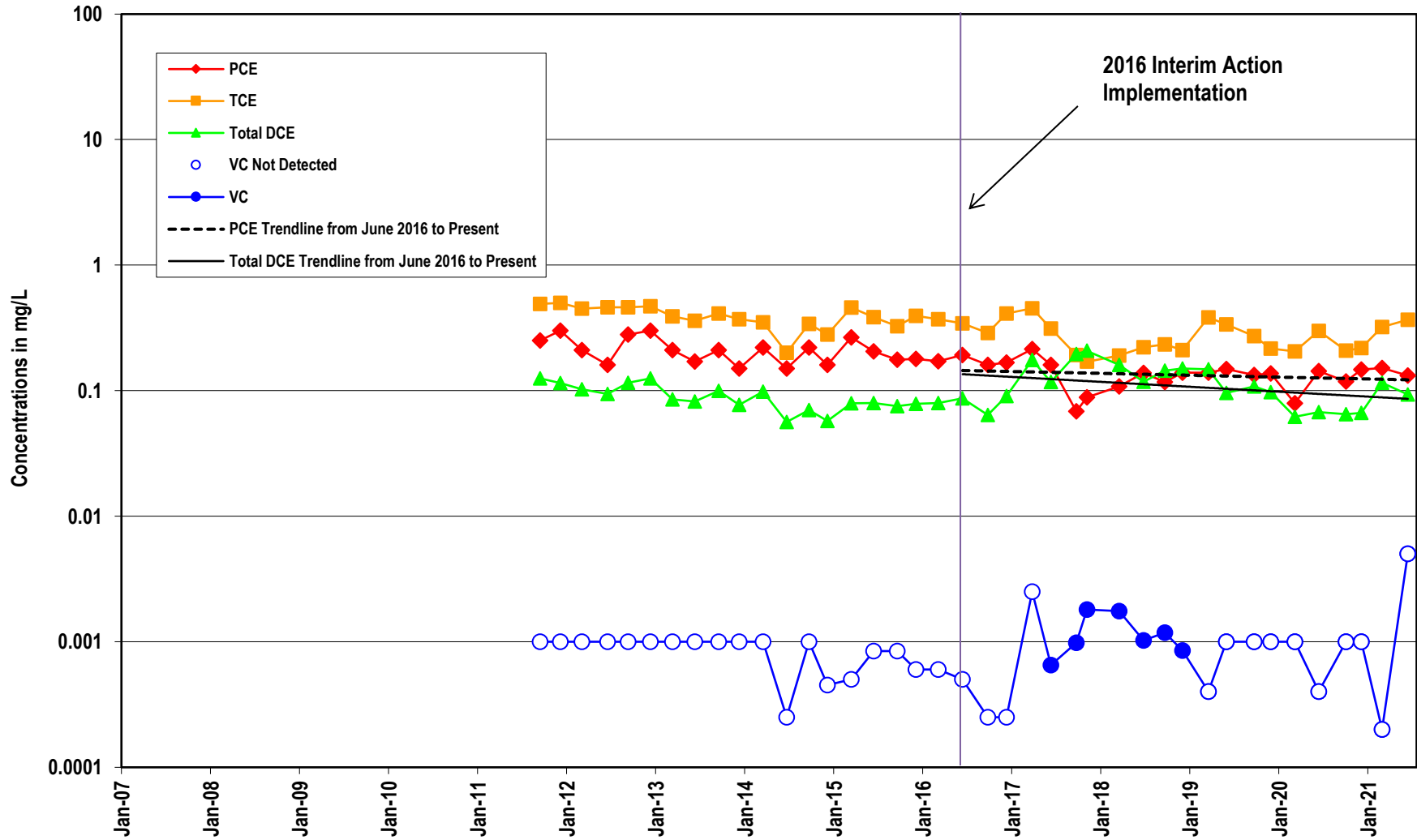


**Note:** Not detected values plotted at 1/2 the reporting limit.

Total Molar Ethenes in MW-26



### Interim Action Area - VOC Trends: MW-26



Note: Not detected values plotted at 1/2 the reporting limit.



## **APPENDIX G**

Well Log for EX



PROJECT: <b>Monitoring Well EX replacement</b>	Boring ID: <b>EX</b>	
LOCATION: <b>NuStar Terminal, Vancouver WA</b>	Well ID: <b>EX</b>	
DRILLING CONTRACTOR: <b>Cascade Environmental</b>	NORTHING: <b>118526.78</b>	EASTING: <b>1076393.817</b>
DRILLING EQUIPMENT: <b>Geoprobe 3230 DT</b>	SURFACE ELEV. (NGVD29C47): <b>33.89</b>	TOC ELEVATION: <b>33.24</b>
DRILLING METHOD: <b>Direct-push/air knife</b>	TOTAL DEPTH (feet): <b>45</b>	DEPTH TO WATER (feet): <b>28.3</b>
LOGGED BY: <b>JW</b>	SAMPLING METHOD: <b>5' push probe sleeve</b>	DATE STARTED: <b>4/15/2021</b>
		DATE COMPLETED: <b>4/15/2021</b>

Feet bgs	USCS	Graphic Log	Description	Driven/Rec. (ft.)	Headspace Vapor (ppm)	Sheen	Well Construction Diagram
0			0-8 foot interval cleared with air knife/vac truck	5.0/5.0			<p>6" concrete top with manhole lid            Locking well cap            Concrete vault with 1-1/4" minus gravel            2" diameter PVC casing            Cement Collar            Bentonite</p>
2							
4							
6							
8	SP		Medium-grained SAND, brown to gray, dry, loose	5.0/5.0	<5	NS	
10			No Recovery				
12				5.0/0.0			
14							
16	SP		Medium-grained SAND with trace sub-rounded gravel, brown, slightly moist, loose	5.0/4.0	<5	NS	
18					<5	NS	
20							
22			Increasing gravel to 10%, sub-rounded to 0.5" diameter	5.0/5.0	<5	NS	
24					<5	NS	

NOTES: Well completed at 44 feet below ground surface (bgs). Screened interval from 29-44' bgs. Well surveyed on June 4, 2021 by MacKay Sposito. Elevations based on Port of Vancouver Benchmark 108 surveyed and documented in the amended record of surveys Book 89 of surveys at Page 179.



PROJECT: <b>Monitoring Well EX replacement</b>		Boring ID: <b>EX</b>	
LOCATION: <b>NuStar Terminal, Vancouver WA</b>		Well ID: <b>EX</b>	
DRILLING CONTRACTOR: <b>Cascade Environmental</b>		NORTHING: <b>118526.78</b>	EASTING: <b>1076393.817</b>
DRILLING EQUIPMENT: <b>Geoprobe 3230 DT</b>		SURFACE ELEV. (NGVD29C47): <b>33.89</b>	TOC ELEVATION: <b>33.24</b>
DRILLING METHOD: <b>Direct-push/air knife</b>		TOTAL DEPTH (feet): <b>45</b>	DEPTH TO WATER (feet): <b>28.3</b>
LOGGED BY: <b>JW</b>	SAMPLING METHOD: <b>5' push probe sleeve</b>	DATE STARTED: <b>4/15/2021</b>	DATE COMPLETED: <b>4/15/2021</b>

Feet bgs	USCS	Graphic Log	Description	Driven/Rec. (ft.)	Headspace Vapor (ppm)	Sheen	Well Construction Diagram
26			Becomes moist		<5	NS	
28				5.0/5.0	<5	NS	
30	SP		Coarse to medium-grained SAND, red-brown to gray, wet, medium dense, trace quartz and mica		<5	NS	
32				5.0/5.0	<5	NS	
34					<5	NS	
36	SP		Fine SAND with trace silt and mica, brown, wet, medium dense		<5	NS	
38				5.0/5.0	44.1	NS	
40			Becomes gray with no silt		22.7	NS	
42	ML		SILT with fine sand, brown, wet, medium stiff		16.5	NS	
44				5.0/5.0	6.1	NS	
					8.4	NS	
					16.5	NS	

NOTES: Well completed at 44 feet below ground surface (bgs). Screened interval from 29-44' bgs. Well surveyed on June 4, 2021 by MacKay Sposito. Elevations based on Port of Vancouver Benchmark 108 surveyed and documented in the amended record of surveys Book 89 of surveys at Page 179.

## **Appendix H**

### 2021 Well Survey

VANCOUVER OFFICE

1325 SE Tech Center Drive, Suite 140 ▪ Vancouver, WA 98683  
360.695.3411 ▪ info@mackaysposito.com

June 4, 2021

MONITORING WELL SURVEY DATA  
FOR  
CASCADIA ASSOCIATES

NUSTAR FACILITY, PORT OF VANCOUVER, CLARK COUNTY, WASHINGTON

WELL	NORTHING	EASTING	RIM	TOP OF PVC
MW-15	118348.456	1077251.919	N/A	39.22
MW-F	118394.548	1077370.087	34.47	34.11
EW-1	118033.583	1076885.178	31.74	31.07
EX	118526.78	1076393.817	33.89	33.24
MP-1	118549.862	1076410.584	34.19	33.30
S-2	118751.206	1076068.565	33.48	33.18
S-1	118746.153	1076065.341	33.39	32.72
MW-14	118848.328	1075999.191	34.01	33.79
MW-10	118982.502	1076301.302	35.09	34.50

SURVEYOR'S NOTES:

1. SURVEY DATA WAS COLLECTED ON 6/2/2021.
2. RANDOM ELEVATION CHEKS WERE ALSO PERFORMED ON WELLS MW-6, MW-8, MW-12, AND MW-17; THEY CHECKED SATISFACTORILY WITH PUBLISHED DATA PER BLUEDOT GROUP MAP DATED JULY 1, 2010.
3. ELEVATIONS ARE BASED ON PORT OF VANCOUVER BENCHMARK 108 SURVEYED BY MACKAY SPOSITO AND DOCUMENTED IN THE AMENDED RECORD OF SURVEY FILED IN BOOK 59 OF SURVEYS AT PAGE 179. ELEVATION = 31.52 NGVD29. THE RECORDED NGVD29 ELEVATIONS WERE THEN ADJUSTED UP 0.44 FEET TO THE NGVD29(47) DATUM USED BY CLARK COUNTY. THE WSDOT BENCHMARK #6219 - DESIGNATED "PEPSI" - USED IN PREVIOUS MONITORING WELL SURVEYS WAS DESTROYED BY RECENT SIDEWALK DEMOLITION.
4. HORIZONTAL COORDINATES ARE WASINGTON STATE PLANE OF 1983 (2011), SOUTH ZONE, EXPRESSED IN UNITS OF U.S. SURVEY FEET (3837 U.S. SURVEY FEET = 1200 METERS). COORDINATES WERE DERIVED FROM A GPS STATIC SESSION ON MSI CONTROL POINT 1, ESTABLISHED DURING THIS SURVEY.



6-4-21



**Cascadia**  
Associates, LLC