February 12, 2021

Andrew Smith, Site Manager
Department of Ecology
PO Box 47775
Olympia, Washington 98504-7775

Subject: **2020 Groundwater Monitoring Report**
NuStar Vancouver Annex Facility
5420 NW Fruit Valley Road
Vancouver, Washington
0060-001-005

Dear Mr. Smith:

Enclosed, please find the *2020 Groundwater Monitoring Report* that has been prepared on behalf of NuStar Terminals Operations Partnership, L.P. (NuStar) by Cascadia Associates, LLC. (Cascadia). The enclosed report presents the results of four quarters of groundwater monitoring conducted in 2020 at the NuStar Vancouver Annex Facility.

If you have any questions or would like to discuss this further, please contact me at (503) 577-1535 or Stephanie Bosze Salisbury at (503) 807-3835.

Sincerely,

Amanda Spencer
Principal Hydrogeologist

Enclosure
2020 Groundwater Monitoring Report (electronic via email and 2 hard copies)

cc: Renee Robinson, NuStar Energy, L.P. (electronic deliverable)
Aaron Flett, NuStar Energy, L.P. (electronic deliverable)
Zack Chaffin, NuStar Energy, L.P. (electronic deliverable)
Chris Chan, NuStar Energy, L.P. (electronic deliverable)

2020 Groundwater Monitoring Report

NuStar Vancouver Annex Terminal

5420 NW Fruit Valley Road

Vancouver, Washington

Prepared for:

NuStar Terminals Operations Partnership, L.P.
19003 IH-10 West
San Antonio, Texas 78257

Prepared by:

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

Project No. 0060-001-005
February 12, 2021

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Prepared by:

Amanda Spencer

Principal, Cascadia Associates

Stephanie Bosze Salisbury, L.G.

Senior Associate Geologist, Cascadia Associates

CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

This groundwater monitoring report was prepared by Cascadia Associates, LLC (Cascadia) on behalf of NuStar Terminals Operations Partnership L.P. (NuStar) for groundwater monitoring conducted in 2020 at the NuStar Vancouver Annex Terminal located at 5420 NW Fruit Valley Road, Vancouver, Washington (the Facility). A location map for the Facility is provided on Figure 1; a site plan is provided on Figure 2.

On July 12, 2012, NuStar submitted a draft Feasibility Study (FS) to the Washington State Department of Ecology (Ecology) in accordance with Agreed Order (AO) No. 09-TC-S DE5250 between Ecology and NuStar (Ash Creek, 2012). The technical basis of the FS was the Remedial Investigation (RI) and Risk Assessment (RA) documented in the *Remedial Investigation and Risk Assessment Report* (RI/RA Report) submitted to Ecology in December 2010 (Ash Creek, 2010) and approved by Ecology on June 23, 2011. The draft FS proposed monitored natural attenuation to address residual hydrocarbon constituents in groundwater in the eastern portion of the Facility. On October 16, 2013, Ecology provided NuStar with comments on the draft FS. In the months following receipt, NuStar held several meetings with Ecology to discuss Ecology's comments on the FS, as well as additional comments that were presented to NuStar in a February 4, 2014 meeting. The meetings culminated in a Final Project Coordinator's Decision (the "Decision") issued by Ecology on August 26, 2014, which established a series of steps for collecting additional data to support submittal of a revised FS.

Between 2014 and 2020, multiple soil and groundwater investigations were conducted as part of the Supplemental Remedial Investigation process. The additional data requested by Ecology included additional sitewide groundwater monitoring and additional groundwater investigation near historical borings SB-8 and SB-9 located in the western portion of the terminal. Results of the additional investigation indicated the presence of petroleum hydrocarbons in groundwater at concentrations above Washington Model Toxics Control Act (MTCA) Method A Cleanup Levels in two apparently isolated areas in the vicinity of historical borings SB-8 and SB-9 (Apex, 2015). Seven additional monitoring wells (MW-5 through MW-10 and MW-8D) were installed at the locations shown on Figure 2 for continued groundwater monitoring. Additionally, a limited area of affected groundwater was identified in the central portion of the facility near the vapor recovery unit. A pilot study was conducted in the vicinity of well MW-5 in 2017 to evaluate the efficacy of injecting chemical oxidants to address the petroleum hydrocarbons and to support preparation of the Feasibility Study (Cascadia, 2019a).

In total, more than 90 soil borings have been installed at the site, facilitating the collection and analysis of 115 soil samples and 108 grab groundwater samples. Thirteen monitoring wells in total have been installed over the course of the project, which are periodically monitored.

In accordance with the Final Project Coordinator's Decision, a Supplemental RI and Revised FS report was submitted to Ecology on June 1, 2020. The report was revised per Ecology comments

and resubmitted on October 23, 2020 for final approval. Ecology approved the report on October 30, 2020. The report detailed the aforementioned investigations conducted between 2014 and 2020, evaluated potential cleanup alternatives, and provided a recommended cleanup action for the Facility. The approved cleanup actions include source area soil removal followed by installation of a groundwater recirculation system in two limited areas in the western portion of the Facility. The approved cleanup action also includes the injection of plume stabilization compounds to address the limited area of affected groundwater in the central area near the vapor recovery unit. Institutional controls and soil management plans will be implemented in the limited area of affected soil in the eastern portion of the Facility near the truck loading areas. The approved cleanup action also includes continued routine groundwater monitoring at the Facility.

Ecology will prepare a draft Agreed Order for cleanup action for review and negotiation by NuStar; additionally, the Department of Ecology will publish a Draft Corrective Action Plan for public comment; the final Cleanup Action Plan will be an exhibit to the Agreed Order and will describe the scope of work for the Agreed Order.

NuStar initiated quarterly monitoring at the Facility in the fourth quarter of 2017. This report presents the results of the quarterly monitoring program conducted in 2020.

1.1 SITE LOCATION, DESCRIPTION, AND HISTORY

Location. The Facility address is 5420 NW Fruit Valley Road, Vancouver, Washington 98660 (Latitude: N45º 39.70', Longitude: W122º 41.66'), as shown on Figure 1. The Facility is located on Clark County Tax Lot (TL) No. 147360.

Physical Features. Figure 2 is a Site Plan. The Facility is approximately 31 acres and is roughly rectangular, with dimensions of approximately 800 by 1,800 feet. The Facility is located in a mixed industrial-agricultural area and currently includes aboveground storage tanks (ASTs) containing jet fuel and methanol (seven ASTs ranging in size from 30,000 to 3,000,000 gallons); a covered truck refueling rack with two smaller volume ASTs (an approximately 400-gallon AST, which stores anti-static additive [ASA] and a 7,500-gallon AST containing fuel system icing inhibitor [FSII] additive); and several buildings used for equipment storage and offices. A former underground storage tank (UST) associated with a vapor recovery system was also located on the Facility and was removed in 2001. The vapor recovery system remains on site but is no longer used. The surface of the Facility is comprised of graveled areas and grass fields, with asphalt-paved roads providing access to the fueling areas, ASTs, and office buildings.

Property History. Support Terminals Operating Partnership, L.P. (STOP) purchased the Facility from Cenex Harvest States Cooperative (Cenex) in 2003. In March 2008, NuStar acquired STOP.

The property was developed in 1957 as a truck loading terminal. Records are unclear if the Facility was developed by Cenex. Historically, chemicals and other products stored at the Facility included liquid fertilizers and refined petroleum products such as gasoline, diesel and kerosene, denatured alcohol, and petroleum product additives. A transmix tank is present in the western portion of the

Facility (Figure 2), and this is typically where waste (such as from tank-bottom cleanouts or the oil/water separator) would be stored prior to off-site disposal or recycling. The transmix tank is no longer in use.

1.2 GEOLOGY AND HYDROGEOLOGY

This section presents the geology and hydrogeology as discussed in the RI/RA Report (Ash Creek, 2010).

1.2.1 Geology

Regional Geology. The regional geology is summarized below and is based on reports prepared by Pacific Groundwater Group (PGG; 2001) and AMEC (2002). The vicinity of the Facility is dominated by three primary units: Recent Alluvial deposits, the Pleistocene Alluvial deposits, and the Troutdale Formation.

The Recent Alluvial deposits are the upper unit with deposits approximately 55 feet thick and consist of fine-grained silt and sand within the areas investigated near Vancouver Lake. The Pleistocene Alluvial deposits are approximately 95 to 115 feet thick and consist of coarse-grained sand and gravel. The Pleistocene Alluvial deposits originate from alluvial deposits from the Columbia River and deposits from the catastrophic Missoula Floods. The Troutdale Formation underlies the Pleistocene Alluvial deposits and can be greater than 1,000 feet thick. It is made up of cemented sandy gravels and semi-consolidated sands, silts, and clays.

Site Geology. During previous Facility investigations performed by others, soil borings have been installed to depths of up to 50 feet below ground surface (bgs) at the Facility. During a 2007 Facility investigation conducted by Ash Creek Associates (Ash Creek, 2007), one boring was completed to a depth of 72 feet bgs. Recent investigations in the western portion of the Facility included installing borings up to depths of 65 feet bgs.

The Recent Alluvial deposits underlying the western portion of the Facility consist of silt and silty clay with some fine sand to depths of approximately 20 to 25 feet bgs. Below 20 to 25 feet bgs, the Recent Alluvial deposits consist of layers of fine- to medium-grained sand to a depth of at least 65 feet bgs. On the eastern portion of the Facility, fine sand or sandy silt with variable layers of sand or silty sand is encountered to a depth of approximately 10 feet bgs. Below 10 feet bgs, the Recent Alluvial deposits in the eastern portion of the Facility consist of layers of fine- to medium-grained sand to a depth of approximately 50 to 60 feet bgs. The Pleistocene Alluvial deposits are encountered below the Recent Alluvial deposits and consist of sand and/or gravel layers of varying thicknesses.

1.2.2 Hydrogeology

Regional Hydrogeology. The regional aquifers, Recent Alluvial Aquifer (RAA); Pleistocene Alluvial Aquifer (PAA); and the aquifers of the Troutdale Formation, follow the regional geology discussed

above. The regional hydrogeology summarized below is based on reports prepared in support of Clark Public Utilities (CPU) South Lake Wellfield (PGG, 2001; PGG, 2009), and by Ash Creek (2008a and 2008b).

The RAA is unconfined and receives recharge directly from the land surface and/or surface water features. The PAA directly underlies the RAA and is a productive aquifer with high well yields (several thousand gallons per minute [gpm] without significant drawdown). The groundwater flow system is highly influenced by local surface water bodies. The Columbia River, Vancouver Lake, Vancouver Lake Flushing Channel, and Lake River form natural hydrologic boundaries to the groundwater flow system. Tidal influences and seasonal variations in surface water runoff cause dynamic variation in the stage of the Columbia River, and resulting adjustments in the stages of the other three connected surface water bodies. The groundwater flow system is also influenced by tidal and seasonal variations in the surface water bodies. Regionally, it is anticipated that groundwater within the RAA and PAA near the Facility would have a net gradient toward Vancouver Lake and the Columbia River.

Site Hydrogeology. In the west tank farm area, depth to first encountered groundwater is typically 16 to 20 feet bgs, and in the eastern portion of the site, near the former truck loading area, depth to groundwater typically ranges from 13 to 32 feet bgs.

First encountered groundwater at the Facility corresponds to the silt and fine- to medium-grained sand of the RAA. Shallow groundwater flow at the Facility is typically, under static conditions, flat with a slight gradient (0.0002 foot per foot [ft/ft]) to the southeast (AMEC, 2002; SECOR, 2003; Ash Creek, 2009).

2.0 GROUNDWATER MONITORING—2020

A comprehensive quarterly groundwater monitoring program was conducted in 2020 to monitor groundwater conditions at the site. The monitoring included the gauging and sampling of shallow monitoring wells MW-1 through MW-11, and deeper monitoring wells MW-5D and MW-8D using the Standard Operating Procedures (SOPs) included as Appendix A. The quarterly events were conducted from February 24 through 25; June 1 through 2; August 17 through 18; and November 16 through 17, 2020.

2.1 GROUNDWATER ELEVATION MEASUREMENTS

Fluid level measurements were recorded to the nearest 0.01 foot from the surveyed top of monitoring well casing. (Note: well MW-11 was installed in February 2019 and the top of casing has not been surveyed; however, depth to groundwater measurements were recorded during each monitoring event.) Depth to groundwater was measured using an electronic water level indicator probe. Although separate phase hydrocarbons (SPH) have not been observed at the site, the wells are assessed using an electronic water/hydrocarbon interface probe to document their absence.

Depth to groundwater and groundwater elevations for 2020 are provided in Table 1. Historical groundwater elevation data collected from 2007 through 2020 are included in Appendix B. Copies of the well gauging forms are provided in Appendix C.

2.1.1 Separate Phase Hydrocarbons

SPH or sheen have not been observed in Facility wells, to date, and were not observed during 2020.

2.1.2 Groundwater Elevation

Consistent with previous years, the groundwater gradient was generally flat with a magnitude across the site that ranged between 0.0026 to 0.0006 in 2020. The following subsections discuss the depth to groundwater and groundwater gradients observed for each quarterly event.

First Quarter 2020

Depths to groundwater ranged from 16.26 to 29.77 feet bgs in wells MW-1 through MW-4 located in the eastern portion of the Facility, corresponding to a range in groundwater elevations of 10.36 to 10.46 feet above Mean Sea Level (MSL). Depths to groundwater in wells MW- 5 through MW-10, located in the western area, ranged from 11.49 to 21.03 feet bgs, corresponding to elevations of 8.31 to 10.30 feet above MSL.

Figure 3 provides a groundwater elevation contour map for the groundwater measurements collected in February 2020 during the first quarter 2020 monitoring event. As shown on Figure 3, the groundwater gradient was generally to the southwest at a magnitude of approximately 0.0005. A groundwater high appeared to be present in the central eastern portion of the site near wells MW-1 and MW-4 suggesting flow to the southeast in the vicinity of the truck loading rack. The measured groundwater elevation in well MW-9 was approximately two feet lower than other nearby wells. This measurement was considered anomalous based on historical conditions and not used in contouring on Figure 3.

Second Quarter 2020

Depths to groundwater ranged from 12.97 to 26.46 feet bgs in wells MW-1 through MW-4 located in the eastern portion of the Facility, corresponding to a range in groundwater elevations of 13.44 to 13.77 feet above MSL. Depths to groundwater in wells MW-5 through MW-10, located in the western tank area, ranged from 7.01 to 15.53 feet bgs, corresponding to elevations of 14.57 to 13.82 feet above MSL.

Figure 4 provides a groundwater elevation contour map for the groundwater measurements collected in June 2020 during the second quarter 2020 monitoring event. The groundwater gradient was easterly at a magnitude ranging between approximately 0.0026 and 0.0006 across the site.

Third Quarter 2020

Depths to groundwater ranged from 18.19 to 31.78 feet bgs in wells MW-1 through MW-4 located in the eastern portion of the site, corresponding to a range in groundwater elevations of 8.46 to 8.64 feet above MSL. Depths to groundwater in wells MW-5 through MW-10, located in the western tank area, ranged from 13.11 to 20.89 feet bgs, corresponding to elevations ranging between 8.54 to 8.64 feet above MSL.

Figure 5 provides a groundwater elevation contour map for the groundwater measurements collected in August 2020 during the third quarter 2020 monitoring event. As shown on Figure 5, the groundwater gradient is essentially flat, with a magnitude measuring approximately 0.0002 across the site. The measured groundwater elevation was slightly higher in wells MW-5 and MW-8 than other monitoring wells, indicating a slight flow direction to the east and southeast.

Fourth Quarter 2020

Depths to groundwater ranged from 17.59 to 31.09 feet bgs in wells MW-1 through MW-4 located in the eastern portion of the site, corresponding to a range in groundwater elevations of 9.13 to 9.29 feet above MSL. Depths to groundwater in wells MW-5 through MW-10, located in the western tank area, ranged from 12.01 to 20.07 feet bgs, corresponding to elevations ranging between 9.22 to 9.66 feet above MSL.

Figure 6 provides a groundwater elevation contour map for the groundwater measurements collected in November 2020. As shown on Figure 6. the groundwater gradient across the site was approximately 0.0003 to the east during the fourth quarter 2020 monitoring event.

2.2 GROUNDWATER SAMPLING AND ANALYSIS

The following describes the field methods, analytical results and quality assurance/quality control (QA/QC) procedures for groundwater sampling conducted at the Facility in 2020.

2.2.1 Methods and Procedures

Samples were collected from each well in accordance with the low-flow sampling SOPs provided in Appendix A. In brief, Facility monitoring wells were purged prior to sample collection, utilizing a peristaltic pump with the intake of the tubing placed midway within the screened interval of the monitoring well. Monitoring wells were purged until field parameters (pH, conductivity, temperature, oxidation-reduction potential [ORP], and dissolved oxygen [DO]) stabilized. Following stabilization of parameters, groundwater samples were collected directly from the discharge tube of the peristaltic pump into laboratory-supplied containers. Field sampling forms are provided in Appendix C.

Samples were labeled and placed in ice-cooled chests for transport, under chain-of-custody protocol, to Apex Laboratories of Tigard, Oregon, for the following analyses:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tert-butyl ether (MTBE), and naphthalene by U.S. Environmental Protection Agency (EPA) Method 8260C; and
- Total petroleum hydrocarbons gasoline (TPHg) by Method NWTPH-Gx and total petroleum hydrocarbons diesel (TPHd) by Method NWTPH-Dx.

2.2.2 Analytical Results

Analytical results for the 2020 groundwater monitoring events are summarized in Table 2. Historical analytical groundwater data collected from 2007 through 2020 are tabulated in Appendix D. Copies of the laboratory analytical reports are contained in Appendix E.

Groundwater analytical results for 2020 for BTEX/MTBE and TPHg and TPHd concentrations are displayed for each Facility monitoring well on Figures 7 and 8, respectively.

Eastern Area (Wells MW-1 through MW-4, and MW-11)

TPHg, TPHd, BTEX, MTBE, and naphthalene were all either non-detect or below MTCA Method A Levels in wells MW-1 through MW-4. Well MW-11, located adjacent to the vapor recovery unit, had variable BTEX, TPHg, and naphthalene concentrations with some results above MTCA Method A Cleanup Levels. Specifically, ethylbenzene and xylenes were below MTCA Method A Cleanup Levels during the first and second quarters of 2020, but above during quarters three and four. Naphthalene was below MTCA Method A Cleanup Levels during the first three quarters of 2020, but above during the fourth quarter. TPHd, toluene, and MTBE concentrations were either non-detect or below MTCA Method A Cleanup Levels in well M-11. As shown on Figures 7 and 8, well MW-11 is surrounded by wells MW-1 through MW-4, demonstrating that the TPH and BTEX concentrations in groundwater remain limited in extent.

Western Area (Shallow Wells MW-5 through MW-10, and Deeper Wells MW-5D and MW-8D)

Throughout the year, TPH, BTEX, MTBE, and naphthalene were non-detect in wells MW-7 through MW-10, MW-5D, and MW-8D, with the exception of TPH slightly above method reporting limits in well MW-5D during the first, second, and fourth quarter of 2020. TPHg, TPHd, xylenes, and naphthalene were detected in well MW-5 at concentrations above MTCA Method A Cleanup Levels. Benzene, ethylbenzene, toluene, MTBE, and total petroleum hydrocarbons in the motor oil carbon range (TPHo) were either not detected or were below MTCA Method A Cleanup Levels in the groundwater samples from well MW-5.

TPHo and MTBE were not detected above method reporting limits in well MW-6 during 2020. Consistent with previous results, TPHg, TPHd, benzene, ethylbenzene, and naphthalene were detected above MTCA Method A Cleanup Levels. Toluene and xylene concentrations were below MTCA Method A Cleanup Levels in well MW-6.

The groundwater monitoring results during 2020 are consistent with previous results that indicate the dissolved-phase hydrocarbons are limited both vertically and laterally, and appear to be two distinct and separate plumes, each localized around wells MW-5 and MW-6, respectively.

2.2.3 Quality Assurance/Quality Control (QA/QC)

QA/QC samples consisted of field duplicate samples, field trip blanks, laboratory method blanks, matrix spike/matrix spike duplicates (MS/MSD), laboratory control samples (LCS), and surrogate spike samples. The field and laboratory QA/QC results and an evaluation of the results to ascertain the usability of the data are included with the laboratory data sheets in Appendix E.

The QA/QC review of the data indicates:

- Samples were received by the analytical laboratory on ice below 6°C, in good condition and in the appropriate laboratory-supplied sample containers.
- The samples were analyzed within their respective method holding times.
- The recovery for the MS sample was within control limits.
- The recovery for the LCS sample was within control limits.
- Surrogate recoveries were within the acceptable range, with the exception of the recovery of a diesel-range surrogate for samples from wells MW-5 and MW-6 (report A0B0728), which was outside laboratory control limits. The data were flagged "F-18" and "F-20" respectively.
- No compounds were detected in the trip blanks or laboratory method blanks with the exception that diesel range hydrocarbons were detected above the reporting limit in a laboratory control blank (report A0H0521). The associated data would be flagged "B-02" if the detected concentration is less than five times the blank detection, indicating the result may be biased high. However, that was not the case in the reporting for this dataset and no data were flagged "B-02."
- The relative percent difference (RPD) between the field samples and field duplicates was within control range, with the exception (report A0H021) that the RPD for the samples from well MW-11 was greater than 30% for TPH-g, toluene, ethylbenzene, xylenes, and naphthalene. The data were flagged "R."

The overall QA objectives have been met and the data are of acceptable quality for use in this project.

3.0 FUTURE WORK

Quarterly monitoring is ongoing. Following the completion of quarterly monitoring in 2021, an Annual 2021 groundwater monitoring report will be prepared during the first quarter of 2022. A

supplemental remedial investigation and revised feasibility study was submitted to and approved by Ecology in October 2020. As discussed in Section 1.0, a draft cleanup action plan for the site is in preparation and will be implemented under a future Agreed Order with Ecology.

4.0 REFERENCES

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TABLES

Table 1
Groundwater Elevation Data
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Date of Measurement	Top of Casing Elevation (feet above MSL)	Screened Interval (feet bgs)	Depth To SPH (feet)	Depth to Groundwater (feet)	SPH Thickness (feet)	Groundwater Elevation (feet)
MW-1	02/24/20	26.72	14.5-24.5	--	16.26	--	10.46
	06/01/20	26.72		--	12.97	--	13.75
	08/17/20	26.72		--	18.19	--	8.53
	11/16/20	26.72		--	17.59	--	9.13
MW-2	02/24/20	38.27	20-35	--	27.91	--	10.36
	06/01/20	38.27		--	24.51	--	13.76
	08/17/20	38.27		--	29.81	--	8.46
	11/16/20	38.27		--	29.01	--	9.26
MW-3	02/24/20	39.17	24.5-34.5	--	28.76	--	10.41
	06/01/20	39.17		--	25.73	--	13.44
	08/17/20	39.17		--	30.53	--	8.64
	11/16/20	39.17		--	29.88	--	9.29
MW-4	02/24/20	40.23	20-35	--	29.77	--	10.46
	06/01/20	40.23		--	26.46	--	13.77
	08/17/20	40.23		--	31.78	--	8.45
	11/16/20	40.23		--	31.09	--	9.14
MW-5	02/24/20	27.03	10-25	--	17.00	--	10.03
	06/01/20	27.03		--	13.21	--	13.82
	08/17/20	27.03		--	18.39	--	8.64
	11/16/20	27.03		--	17.48	--	9.55
MW-5D	02/24/20	26.71	35-45	--	16.62	--	10.09
	06/01/20	26.71		--	12.63	--	14.08
	08/17/20	26.71		--	18.13	--	8.58
	11/16/20	26.71		--	17.02	--	9.69
MW-6	02/24/20	27.33	10-25	--	17.14	--	10.19
	06/01/20	27.33		--	13.45	--	13.88
	08/17/20	27.33		--	18.77	--	8.56
	11/16/20	27.33		--	17.78	--	9.55
MW-7	02/24/20	21.67	10-25	--	11.49	--	10.18
	06/01/20	21.67		--	7.10	--	14.57
	08/17/20	21.67		--	13.11	--	8.56
	11/16/20	21.67		--	12.01	--	9.66
MW-8	02/24/20	27.68	10-25	--	17.38	--	10.30
	06/01/20	27.68		--	13.82	--	13.86
	08/17/20	27.68		--	19.04	--	8.64
	11/16/20	27.68		--	18.11	--	9.57
MW-8D	02/24/20	27.87	35-45	--	17.79	--	10.08
	06/01/20	27.87		--	13.80	--	14.07
	08/17/20	27.87		--	19.29	--	8.58
	11/16/20	27.87		--	18.22	--	9.65
MW-9	02/24/20	29.39	10-25	--	21.08	--	8.31
	06/01/20	29.39		--	15.53	--	13.86
	08/17/20	29.39		--	20.89	--	8.50
	11/16/20	29.39		--	20.07	--	9.32
MW-10	02/24/20	28.71	10-25	--	18.57	--	10.14
	06/01/20	28.71		--	14.68	--	14.03
	08/17/20	28.71		--	20.17	--	8.54
	11/16/20	28.71		--	19.09	--	9.62

Cascadia Associates, LLC

Table 1
Groundwater Elevation Data
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Date of Measurement	Top of Casing Elevation (feet above MSL)	Screened Interval (feet bgs)	Depth To SPH (feet)	Depth to Groundwater (feet)	SPH Thickness (feet)	Groundwater Elevation (feet)
MW-11	02/24/20	NS	10-25	--	16.28	--	NS
	06/01/20	NS		--	13.95	--	NS
	08/17/20	NS		--	18.58	--	NS
	11/16/20	NS		--	18.70	--	NS

Notes:

1. Survey elevations determined by Bluedot Group surveying, November 2017.
2. Reference elevation (i.e., top of casing) relative to NAVD 88 (North American Vertical Datum of 1988), feet above mean sea level.
3. feet above MSL = feet above mean sea level.
4. NS = Not surveyed
5. -- = SPH (separate phase hydrocarbons) not measured/observed.
6. bgs = below ground surface.

Cascadia Associates, LLC

Table 2
Summary of Analytical Results - Monitoring Wells
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Sample Date	TPHg Gasoline (mg/L)	TPHd Diesel (mg/L)	TPHo Heavy Oil (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-1	2/25/2020	<0.100	0.201 [A]	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/2/2020	<0.100	0.212 [A]	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/19/2020	<0.100	<0.189	<0.377	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/17/2020	<0.100	0.0998 [A]	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-2	2/25/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/2/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	0.00774	<0.002
	8/18/2020	<0.100	<0.189	<0.377	<0.0002	<0.001	<0.0005	<0.0015	0.00521	<0.002
	11/17/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	0.00243	<0.004
MW-3	2/25/2020	<0.100	0.0955 [A]	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/2/2020	<0.100	<0.0762	<0.152	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/18/2020	<0.100	<0.189	<0.377	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/17/2020	<0.100	<0.0748	<0.15	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-4	2/25/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/2/2020	<0.100	0.0914	<0.152	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/18/2020	<0.100	<0.189	<0.377	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/17/2020	<0.100	0.0783 [A]	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-5	2/24/2020	**23.4**	**2.4** [F]	<0.154	<0.004	<0.02	0.176	**0.809**	<0.02	**1.52**
	6/1/2020	**12.7**	**2.04** [B E]	**0.193** [C]	<0.004	<0.02	0.244	**0.844**	<0.02	**1.29**
	8/17/2020	**18.8**	**2.17** [D]	<0.377	<0.002	<0.01	0.154	**0.704**	<0.01	**1.4**
	8/17/2020 DUP	**22.6**	**2.1** [D]	<0.377	<0.002	<0.01	0.21	**0.94**	<0.01	**1.74**
	11/16/2020	**18.5**	**1.92** [D]	<0.151	<0.004	<0.02	0.206	**1.05**	<0.02	**1.42**
MW-5D	2/24/2020	<0.100	0.109 [A]	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/1/2020	<0.100	0.0974 [A]	<0.152	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/17/2020	<0.100	<0.187	<0.374	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/16/2020	0.200	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-6	2/25/2020	**15.6**	**4.02** [F]	<0.769	**0.19**	0.0308	**1.74**	0.420	<0.02	**0.340**
	2/25/2020 DUP	**14.8**	**4.35** [F]	<0.769	**0.186**	0.0288	**1.68**	0.405	<0.02	**0.329**
	6/1/2020	**11.3**	**6.92** [B F]	<0.15	**0.163**	0.0286	**1.74**	0.363	<0.01	**0.433**
	8/17/2020	**14.9**	**2.66** [F]	<0.377	**0.166**	0.0345	**1.79**	0.370	<0.01	**0.316**
	11/17/2020	**12.5**	**4.62** [B F]	<0.154	**0.149**	0.0248	**1.85**	0.207	<0.02	**0.279**
	11/17/2020 DUP	**13.7**	**6.93** [B F]	<0.157	**0.163**	0.032	**2.08**	0.398	<0.02	**0.315**
MW-7	2/24/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/1/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/17/2020	<0.100	<0.187	<0.374	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/16/2020	<0.100	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-8	2/24/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/1/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/17/2020	<0.100	<0.187	<0.374	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/16/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-8D	2/24/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/1/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/17/2020	<0.100	<0.189	<0.374	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/16/2020	<0.100	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-9	2/24/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/2/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/17/2020	<0.100	<0.189	<0.377	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/16/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004

Cascadia Associates, LLC

Table 2
Summary of Analytical Results - Monitoring Wells
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Sample Date	TPHg Gasoline (mg/L)	TPHd Diesel (mg/L)	TPHo Heavy Oil (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-10	2/24/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/1/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/19/2020	<0.100	<0.187	<0.374	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/16/2020	<0.100	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-11	2/25/2020	**2.65**	0.341 A F	<0.154	0.00397	<0.01	0.292	0.257	<0.01	0.0257
	6/2/2020	**1.59**	0.129 A F	<0.15	**0.0232**	<0.0025	0.352	0.0812	<0.0025	0.0225
	6/2/2020 DUP	**1.62**	<0.0755	<0.151	**0.022**	<0.0025	0.353	0.083	<0.0025	0.022
	8/19/2020	**13.9** R	<0.187	<0.374	0.00337	0.175 R	**0.817** R	**2.93** R	<0.001	0.0906 R
	8/19/2020 DUP	**22.9** R	0.23 D	<0.377	**0.00541**	0.268 R	**1.36** R	**4.81** R	<0.001	0.145 R
	11/17/2020	**23.3**	0.298 A F	<0.151	**0.0359**	0.0705	**2.18**	**3.31**	<0.001	**0.207**
Washington DOE MTCA Method A Cleanup Level		0.8	0.5	0.5	0.005	1	0.7	1	0.02	0.16

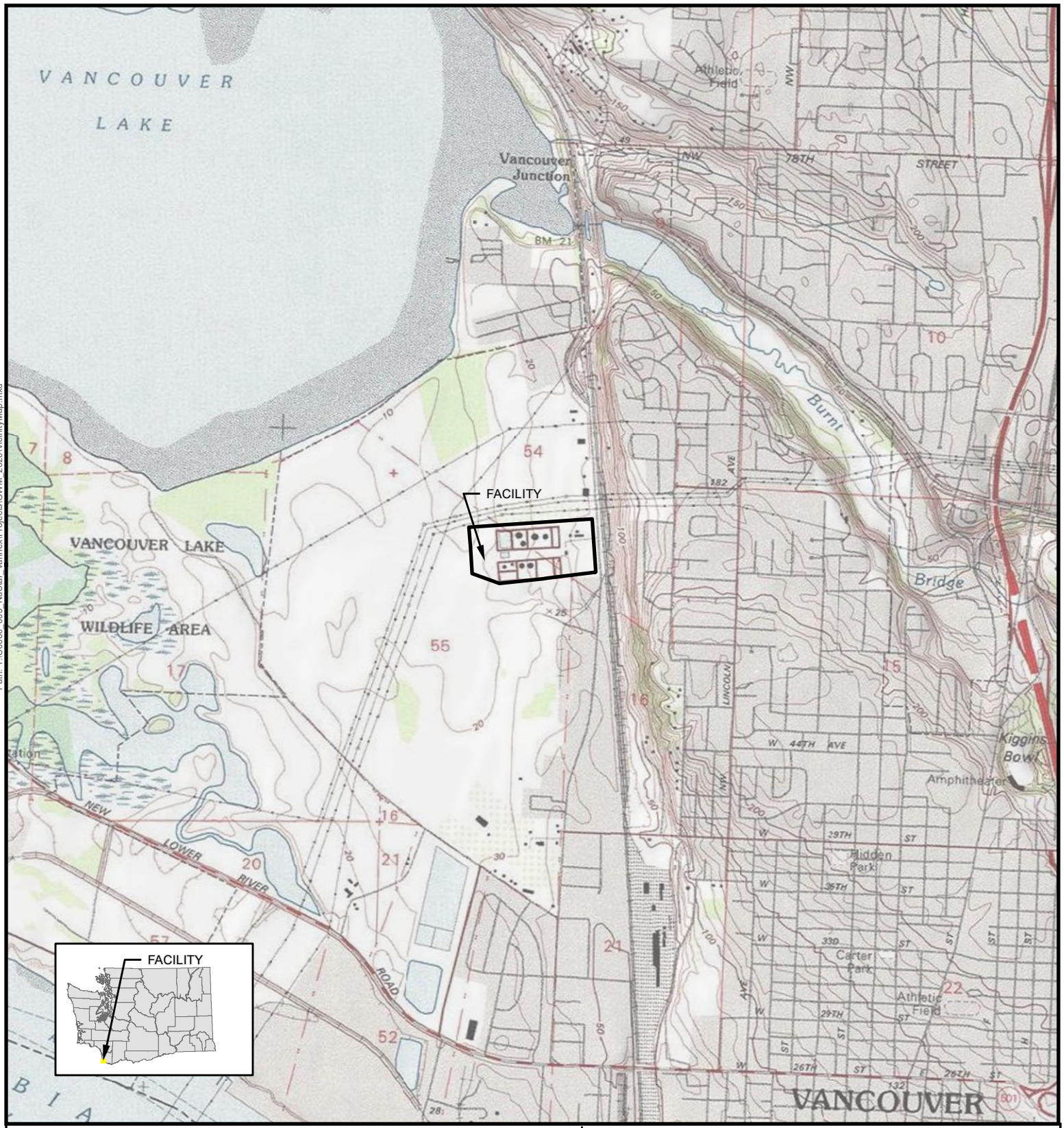
Notes:

1. TPHg = Total petroleum hydrocarbons in gasoline carbon range by NW-TPHgx method.
2. TPHd = Total petroleum hydrocarbons in diesel carbon range by NW-TPHdx method.
3. TPHho = Total petroleum hydrocarbons ion heavy oil carbon range NW-TPHdx method.
4. **Bold** values represent concentration that exceeds MTCA Method A cleanup level.
5. mg/L (ppm) = Milligrams per liter (parts per million).
6. TPHg cleanup level dependent on presence of benzene in groundwater. Cleanup level = 0.800 mg/L if benzene is present and 1.00 mg/L if benzene is not present.
7. Washington DOE MTCA Method A cleanup level = Washington Department of Ecology Model Toxics Control Act Method A cleanup level.
8. < = Not detected at or above the specified laboratory method reporting limit (MRL).
9. bgs = below ground surface
10. -- = Sample not analyzed for constituent.

Notes on Quality Assurance/Quality Control Data Qualifiers

A: Data flagged F-11 = The hydrocarbon pattern indicates possible weathered diesel, mineral oil, or a contribution from a related component.
B: Data flagged F-13 = The chromatographic pattern does not resemble the fuel standard used for quantitation.
C: Data flagged F-16 = Results for oil are estimated due to overlap from the reported diesel result.
D: Data flagged F-18 = Result for Diesel (Diesel Range Organics, C12-C24) is due to overlap from Gasoline or a Gasoline Range product.
E: Data flagged F-19 = Results are estimated due to the presence of multiple fuel products.
F: Data flagged F-20 = Result for Diesel is estimated due to overlap from Gasoline Range Organics or other VOCs.
R: Data flagged R = The relative percent difference between the sample and duplicate sample is above 30%.

FIGURES



Source: USGS Map obtained from Esri ArcGIS Online

Facility Boundary

0 1,000 2,000
Feet

Facility Location Map

2020 Groundwater Monitoring Report
NuStar Terminals Operations Partnership L.P. - Annex Terminal
Vancouver, Washington

Cascadia Associates, LLC

Figure 1

Project:
Produced By: ErikStrandhagen Approved By:
Print Date: 1/26/2021
Path: Y:\C0060_005_NuStar_Vannex\Projects\GWM_2020\VicinityMap.mxd

Document Path: X:\C0060_005_NuStar_Vannex\Projects\GWM_2020\site_plan\v2.mxd

Notes:
NOTE: Base map completed from a number of sources including but not limited to; Figure VAN1-21-002 provided by NuStar (1/8/2007) and a Monitoring Well Survey by Statewide Land Surveying, Inc (10/30/2007).

Locations of roads and containments are approximate.

Source:
Aerial from Mapbox.

- Groundwater Monitoring Well Location (MW-5D and MW-8D are Deep Monitoring Well Locations)
- Grab Groundwater Sample Location
- Deeper Direct-Push Geoprobe Location
- Historical Temporary Well Location (Approximate)
- Historical Hand Auger Location (Approximate)
- Historical Direct-Push Boring Location (Approximate)
- Soil Boring Location (2014)
- Soil Boring Location (2015)
- Soil Boring Location (2019)

0 25 50 100 Feet

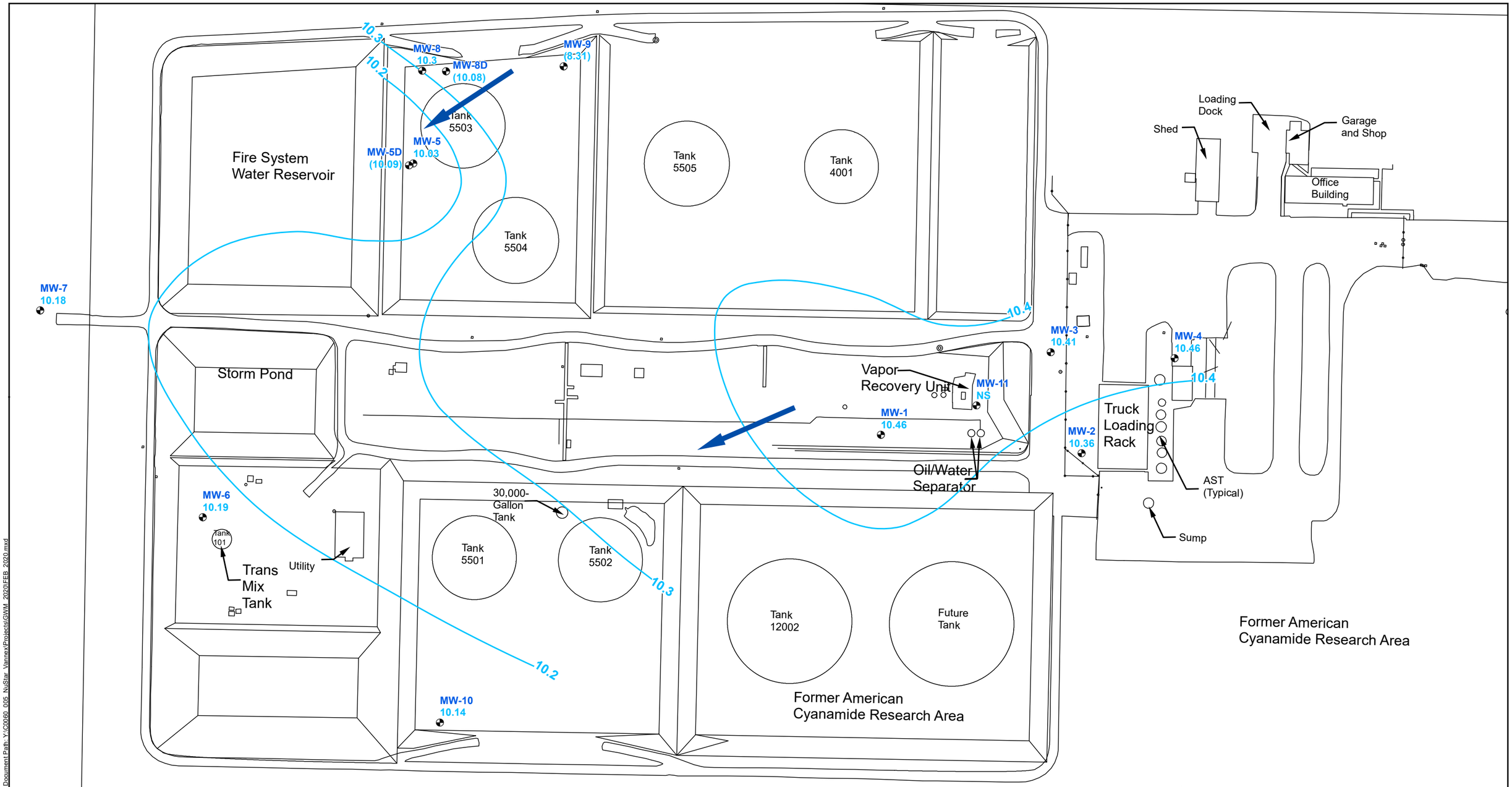
Site Plan

2020 Groundwater Monitoring Report
NuStar Terminals Operations Partnership L.P. - Annex Terminal
Vancouver, Washington

Cascadia Associates, LLC

Figure 2

1/26/2021	Project No.: 0060-001-005	Drawn by: ES	Checked by: JW



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MW-1 — Groundwater Monitoring Well Location

Groundwater Elevation Contour (Dashed Where Inferred)

10.14 — Groundwater Elevation in Feet Above Mean Sea Limit (MSL)

(10.09) — Well Groundwater Elevation in Feet MSL (Not Used for Contouring)

NS — Not Surveyed

Inferred Groundwater Flow Direction

Notes:
1. Base map completed from a number of sources including but not limited to; Figure VAN1-21-002 provided by NuStar (1/8/2007) and a Monitoring Well Survey by Statewide Land Surveying, Inc (10/30/2007).

2. Locations of roads and containments are approximate.

3. Wells MW-1 through MW-11 are shallow wells screened across first encountered groundwater. Wells MW-5D and MW-8D are deeper monitoring well locations.

0 25 50 100 Feet

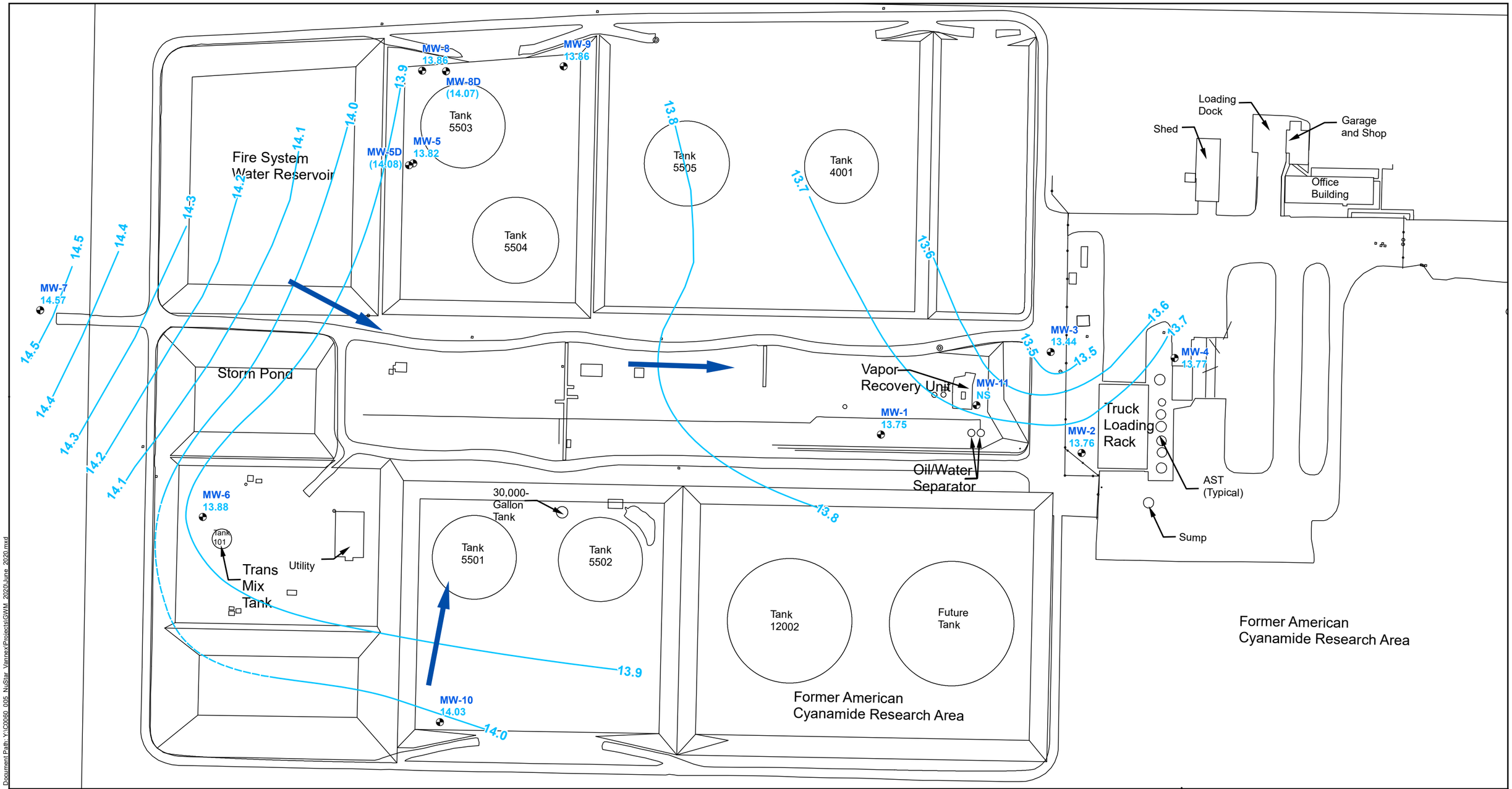
Groundwater Elevation Contour Map February 2020

2020 Groundwater Monitoring Report
NuStar Terminals Operations Partnership L.P. - Annex Terminal
Vancouver, Washington

Cascadia Associates, LLC

Figure 3

1/26/2021	Project No.: 0060-001-006	Drawn by: ES	Checked by: JW



MW-1 — Groundwater Monitoring Well Location

Groundwater Elevation Contour (Dashed Where Inferred)

14.03 — Groundwater Elevation in Feet Above Mean Sea Limit (MSL)

(14.07) — Deep Well Groundwater Elevation in Feet MSL (Not Used for Contouring)

NS — Not Surveyed

Inferred Groundwater Flow Direction

Notes:
1. Base map completed from a number of sources including but not limited to; Figure VAN1-21-002 provided by NuStar (1/8/2007) and a Monitoring Well Survey by Statewide Land Surveying, Inc (10/30/2007).

2. Locations of roads and containments are approximate.

3. Wells MW-1 through MW-11 are shallow wells screened across first encountered groundwater. Wells MW-5D and MW-8D are deeper monitoring well locations.

0 25 50 100 Feet

Groundwater Elevation Contour Map June 2020

2020 Groundwater Monitoring Report
NuStar Terminals Operations Partnership L.P. - Annex Terminal
Vancouver, Washington

Cascadia Associates, LLC

Figure 4

1/26/2021	Project No.: 0060-001-006	Drawn by: ES	Checked by: JW

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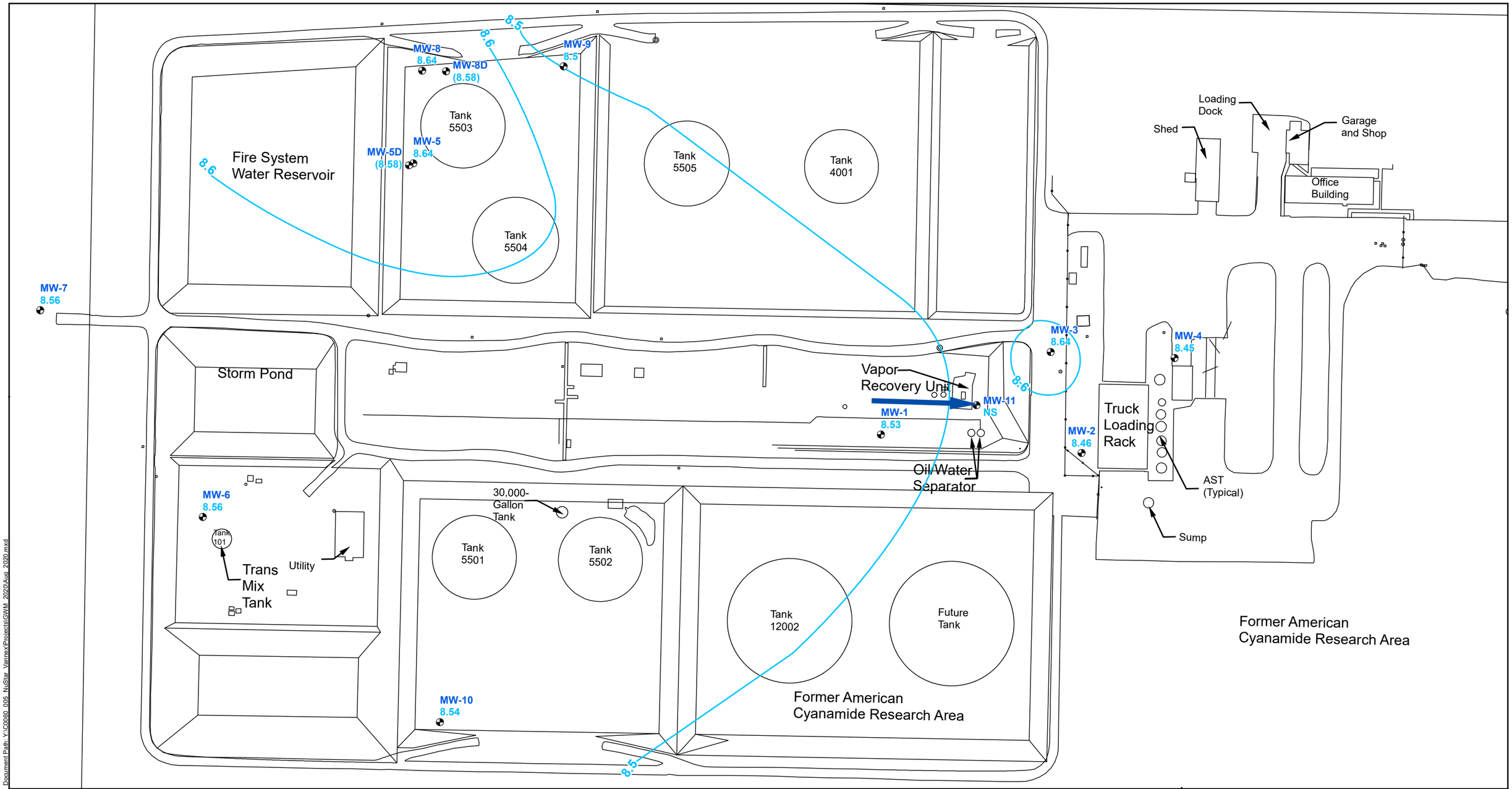


Document Path: Y:\C0060_005_NuStar_Vannex\Projects\GWM_2020\Aug_2020.mxd

MW-1 — Groundwater Monitoring Well Location

Groundwater Elevation Contour (Dashed Where Inferred)

8.54 — Groundwater Elevation in Feet Above Mean Sea Limit (MSL)

(8.58) — Deep Well Groundwater Elevation in Feet MSL (Not Used for Contouring)

NS — Not Surveyed

Inferred Groundwater Flow Direction

Notes:
1. Base map completed from a number of sources including but not limited to; Figure VAN1-21-002 provided by NuStar (1/8/2007) and a Monitoring Well Survey by Statewide Land Surveying, Inc (10/30/2007).

2. Locations of roads and containments are approximate.

3. Wells MW-1 through MW-11 are shallow wells screened across first encountered groundwater. Wells MW-5D and MW-8D are deeper monitoring well locations.

0 25 50 100 Feet

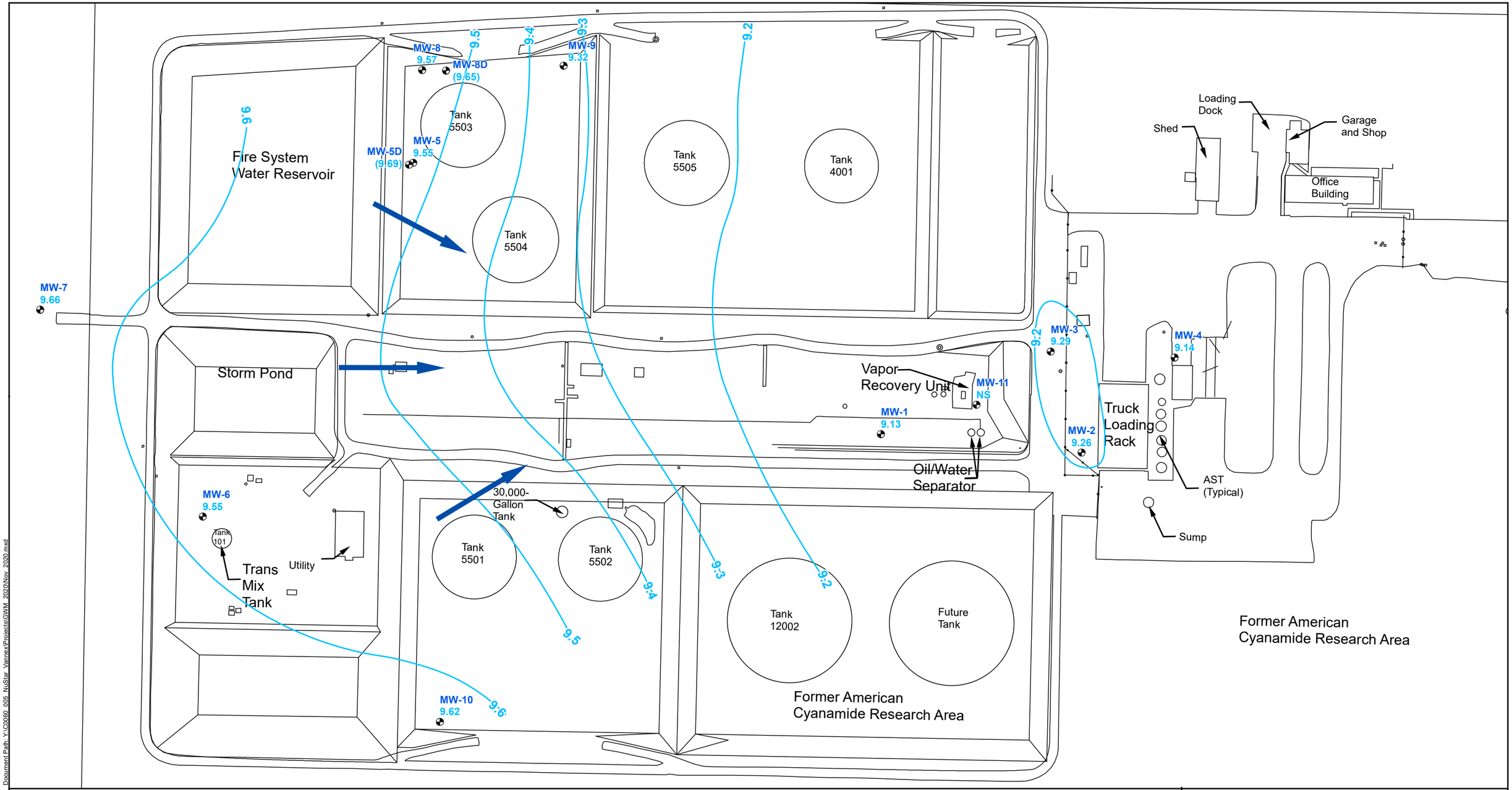
Groundwater Elevation Contour Map August 2020

2020 Groundwater Monitoring Report
NuStar Terminals Operations Partnership L.P. - Annex Terminal
Vancouver, Washington

Cascadia Associates, LLC

Figure 5

1/26/2021	Project No.: 0060-001-006	Drawn by: ES	Checked by: JW



MW-1 — Groundwater Monitoring Well Location

Groundwater Elevation Contour (Dashed Where Inferred)

9.62 — Groundwater Elevation in Feet Above Mean Sea Limit (MSL)

(9.65) — Deep Well Groundwater Elevation in Feet MSL (Not Used for Contouring)

NS — Not Surveyed

Inferred Groundwater Flow Direction

Notes:
1. Base map completed from a number of sources including but not limited to; Figure VAN1-21-002 provided by NuStar (1/8/2007) and a Monitoring Well Survey by Statewide Land Surveying, Inc (10/30/2007).

2. Locations of roads and containments are approximate.

3. Wells MW-1 through MW-11 are shallow wells screened across first encountered groundwater. Wells MW-5D and MW-8D are deeper monitoring well locations.

0 25 50 100 Feet

Groundwater Elevation Contour Map November 2020

2020 Groundwater Monitoring Report
NuStar Terminals Operations Partnership L.P. - Annex Terminal
Vancouver, Washington

Cascadia Associates, LLC

Figure 6

1/26/2021	Project No.: 0060-001-006	Drawn by: ES	Checked by: JW

Document Path: Y:\C0060_005_NuStar_Vannex\Projects\GWM_2020\Nov_2020.mxd

MW-8	Q1	Q2	Q3	Q4
B	<0.0002	<0.0002	<0.0002	<0.0002
T	<0.001	<0.001	<0.001	<0.001
E	<0.0005	<0.0005	<0.0005	<0.0005
X	<0.0015	<0.0015	<0.0015	<0.0015
N	<0.002	<0.002	<0.002	<0.004

MW-8D	Q1	Q2	Q3	Q4
B	<0.0002	<0.0002	<0.0002	<0.0002
T	<0.001	<0.001	<0.001	<0.001
E	<0.0005	<0.0005	<0.0005	<0.0005
X	<0.0015	<0.0015	<0.0015	<0.0015
N	<0.002	<0.002	<0.002	<0.004

MW-7	Q1	Q2	Q3	Q4
B	<0.0002	<0.0002	<0.0002	<0.0002
T	<0.001	<0.001	<0.001	<0.001
E	<0.0005	<0.0005	<0.0005	<0.0005
X	<0.0015	<0.0015	<0.0015	<0.0015
N	<0.002	<0.002	<0.002	<0.004

MW-6	Q1	Q2	Q3	Q4
B	**0.190**	**0.163**	**0.166**	**0.163**
T	0.0308	0.0286	0.0345	0.032
E	**1.74**	**1.74**	**1.79**	**2.08**
X	0.42	0.363	0.37	0.398
N	**0.34**	**0.433**	**0.316**	**0.315**

MW-9	Q1	Q2	Q3	Q4
B	<0.0002	<0.0002	<0.0002	<0.0002
T	<0.001	<0.001	<0.001	<0.001
E	<0.0005	<0.0005	<0.0005	<0.0005
X	<0.0015	<0.0015	<0.0015	<0.0015
N	<0.002	<0.002	<0.002	<0.004

MW-5	Q1	Q2	Q3	Q4
B	<0.004	<0.004	<0.002	<0.004
T	<0.02	<0.02	<0.01	<0.02
E	0.176	0.244	0.154	0.21
X	0.809	0.844	0.704	**1.05**
N	**1.52**	**1.29**	**1.4**	**1.74**

MW-5D	Q1	Q2	Q3	Q4
B	<0.0002	<0.0002	<0.0002	<0.0002
T	<0.001	<0.001	<0.001	<0.001
E	<0.0005	<0.0005	<0.0005	<0.0005
X	<0.0015	<0.0015	<0.0015	<0.0015
N	<0.002	<0.002	<0.002	<0.004

MW-3	Q1	Q2	Q3	Q4
B	<0.0002	<0.0002	<0.0002	<0.0002
T	<0.001	<0.001	<0.001	<0.001
E	<0.0005	<0.0005	<0.0005	<0.0005
X	<0.0015	<0.0015	<0.0015	<0.0015
N	<0.002	<0.002	<0.002	<0.004

MW-4	Q1	Q2	Q3	Q4
B	<0.0002	<0.0002	<0.0002	<0.0002
T	<0.001	<0.001	<0.001	<0.001
E	<0.0005	<0.0005	<0.0005	<0.0005
X	<0.0015	<0.0015	<0.0015	<0.0015
N	<0.002	<0.002	<0.002	<0.004

MW-1	Q1	Q2	Q3	Q4
B	<0.0002	<0.0002	<0.0002	<0.0002
T	<0.001	<0.001	<0.001	<0.001
E	<0.0005	<0.0005	<0.0005	<0.0005
X	<0.0015	<0.0015	<0.0015	<0.0015
N	<0.002	<0.002	<0.002	<0.004

MW-11	Q1	Q2	Q3	Q4
B	0.00397	**0.0232**	**0.00541**	**0.0359**
T	<0.01	<0.0025	0.268	0.0705
E	0.292	0.353	**1.36**	**2.18**
X	0.257	0.083	**4.81**	**3.31**
N	0.0257	0.0225	0.145	**0.207**

MW-2	Q1	Q2	Q3	Q4
B	<0.0002	<0.0002	<0.0002	<0.0002
T	<0.001	<0.001	<0.001	<0.001
E	<0.0005	<0.0005	<0.0005	<0.0005
X	<0.0015	<0.0015	<0.0015	<0.0015
N	<0.002	<0.002	<0.002	<0.004

MW-10	Q1	Q2	Q3	Q4
B	<0.0002	<0.0002	<0.0002	<0.0002
T	<0.001	<0.001	<0.001	<0.001
E	<0.0005	<0.0005	<0.0005	<0.0005
X	<0.0015	<0.0015	<0.0015	<0.0015
N	<0.002	<0.002	<0.002	<0.004

Tank 5503
Tank 4001
Tank 5501
Tank 5502
Tank 12002
Loading Dock
Shed
Garage and Shop
Office Building
Vapor Recovery Unit
Truck Loading Rack
Oil/Water Separator
AST (Typical)
Former American Cyanamide Research Area

Abbreviations		MTCA Method A Cleanup Level (mg/L)
B	Benzene	0.005
T	Toluene	1.00
E	Ethylbenzene	0.70
X	Xylenes	1.00
N	Naphthalene	0.16

Groundwater Monitoring Well Location

Location Sampled
Analyte Sampled

MW-11	Q1	Q2	Q3	Q4
B	0.00397	**0.0232**	**0.00541**	**0.0359**
T	<0.01	<0.0025	0.268	0.0705
E	0.292	0.353	**1.36**	**2.18**
X	0.257	0.083	**4.81**	**3.31**
N	0.0257	0.0225	0.145	**0.207**

Quarterly Period
Highlighted Concentration Exceeds MTCA Method A Cleanup Level Concentration in mg/L
< = Non-Detected

Notes:
1. Base map completed from a number of sources including but not limited to; Figure VAN1-21-002 provided by NuStar (1/8/2007) and a Monitoring Well Survey by Statewide Land Surveying, Inc (10/30/2007).
2. Locations of roads and containments are approximate.
3. Wells MW-1 through MW-11 are shallow wells screened across first encountered groundwater. Wells MW-5D and MW-8D are deeper monitoring well locations.

0 25 50 100 Feet

BTEX and Naphthalene in Groundwater - 2020

2020 Groundwater Monitoring Report
NuStar Terminals Operations Partnership L.P. - Annex Terminal
Vancouver, Washington

Cascadia Associates, LLC

Figure 7

1/26/2021 | Project No.: 0060-001-005 | Drawn by: ES | Checked by: JW

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MW-8	Q1	Q2	Q3	Q4
TPH-g	<0.100	<0.100	<0.100	<0.100
TPH-d	<0.0769	<0.0755	<0.187	<0.0755

MW-8D	Q1	Q2	Q3	Q4
TPH-g	<0.100	<0.100	<0.100	<0.100
TPH-d	<0.0769	<0.0755	<0.189	<0.0748

MW-9	Q1	Q2	Q3	Q4
TPH-g	<0.100	<0.100	<0.100	<0.100
TPH-d	<0.0769	<0.0755	<0.189	<0.0755

MW-5	Q1	Q2	Q3	Q4
TPH-g	**23.4**	**12.7**	**22.6**	**18.5**
TPH-d	**2.40**	**2.04**	**2.17**	**1.92**

MW-5D	Q1	Q2	Q3	Q4
TPH-g	<0.100	<0.100	<0.100	0.200
TPH-d	0.109	0.0974	<0.187	<0.0748

MW-3	Q1	Q2	Q3	Q4
TPH-g	<0.100	<0.100	<0.100	<0.100
TPH-d	0.0955	<0.0762	<0.189	<0.0748

MW-7	Q1	Q2	Q3	Q4
TPH-g	<0.100	<0.100	<0.100	<0.100
TPH-d	<0.0769	<0.0755	<0.187	<0.0748

MW-6	Q1	Q2	Q3	Q4
TPH-g	**15.6**	**11.3**	**14.9**	**13.70**
TPH-d	**4.35**	**6.92**	**2.66**	**6.93**

MW-1	Q1	Q2	Q3	Q4
TPH-g	<0.100	<0.100	<0.100	<0.100
TPH-d	0.201	0.212	<0.189	0.0998

MW-11	Q1	Q2	Q3	Q4
TPH-g	**2.65**	**1.62**	**22.9**	**23.3**
TPH-d	0.341	0.129	0.230	0.298

MW-10	Q1	Q2	Q3	Q4
TPH-g	<0.100	<0.100	<0.100	<0.100
TPH-d	<0.0769	<0.0755	<0.187	<0.0748

MW-4	Q1	Q2	Q3	Q4
TPH-g	<0.100	<0.100	<0.100	<0.100
TPH-d	<0.0769	0.0914	<0.189	0.0783

MW-2	Q1	Q2	Q3	Q4
TPH-g	<0.100	<0.100	<0.100	<0.100
TPH-d	<0.0769	<0.0755	<0.189	<0.0755

Tank 5503
Tank 5505
Tank 4001
Tank 5504
Storm Pond
Vapor Recovery Unit
Oil/Water Separator
30,000-Gallon Tank
Tank 101
Trans Mix Tank
Utility
Tank 5501
Tank 5502
Tank 12002
Future Tank
Former American Cyanamide Research Area
Loading Dock
Shed
Garage and Shop
Office Building
Truck Loading Rack
AST (Typical)
Sump
Former American Cyanamide Research Area

Abbreviations		MTCA Method A Cleanup Level (mg/L)
TPH-g	Total Petroleum Hydrocarbons Gasoline-Range	**0.800**
TPH-d	Total Petroleum Hydrocarbons Diesel-Range	**0.500**

Groundwater Monitoring Well Location

Location Sampled → MW-11	Q1	Q2	Q3	Q4	← Quarterly Period
TPH-g	**2.65**	**1.62**	**22.9**	**23.3**	← Highlighted Concentration Exceeds MTCA Method A Cleanup Level
Analyte Sampled → TPH-d	0.341	0.129	0.230	0.298	← Concentration in mg/L

< = Non-Detected

1. Base map completed from a number of sources including but not limited to; Figure VAN1-21-002 provided by NuStar (1/8/2007) and a Monitoring Well Survey by Statewide Land Surveying, Inc (10/30/2007).

2. Locations of roads and containments are approximate.

3. Wells MW-1 through MW-11 are shallow wells screened across first encountered groundwater. Wells MW-5D and MW-8D are deeper monitoring well locations.

0 25 50 100 Feet

TPHg and TPHd in Groundwater - 2020

2020 Groundwater Monitoring Report
NuStar Terminals Operations Partnership L.P. - Annex Terminal
Vancouver, Washington

Cascadia Associates, LLC

Figure 8

1/26/2021	Project No.: 0060-001-005	Drawn by: ES	Checked by: JW

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APPENDIX A

CASCADIA STANDARD OPERATING PROCEDURES (SOPS)

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) describes the methods for documenting environmental field activities. The purpose of establishing SOPs for field notes and documentation is to establish a consistent method and format for the use and control of documentation generated during daily field activities. Field notes and records are intended to provide sufficient information that can be used to recreate the field activities, as well as, the collection of environmental data. Information placed in these documents and/or records shall be factual, detailed and objective.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Bound field books;
- Black waterproof and/or indelible ink pens; and
- Field forms.

3. METHODOLOGY

This SOP primarily includes the documentation procedures for the field logbooks. However, procedures discussed in this SOP are applicable to all other types of field documentation collected, and should be universal in application. Details of other field records and forms (e.g. boring logs, sample labels, chain of custody records, and waste containment labels are discussed in the specific SOP associated with that field activity (e.g. borehole drilling, sample handling, investigative derived waste), and not covered in detail in this SOP.

Field Logbooks:

Field personnel will keep accurate written records of their daily activities in a bound logbook that will be sufficient to recreate the project field activities without reliance on memory. This information will be recorded in chronological order. All entries will be legible, written in black waterproof or indelible ink, and contain accurate and inclusive documentation of field activities, including field data observations, deviations from project plans, problems encountered, and actions taken to solve the problem. Each page of the field logbook will be consecutively numbered, signed and dated by the field author(s). Pages should not be removed for any reason.

There should be no blank lines on a page. A single blank line or a partial blank line (such as at the end of a paragraph) should be lined to the end of the page. If only part of a page is used, the remainder of the page should have an "X" drawn across it.

In addition to documenting field activities, field logbooks will include the following:

- Date and time of activities,
- Site location,
- Purpose of site visit,
- Site and weather conditions,

- Personnel present, including sampling crew, facility/site personnel and representatives (including site arrival and departure times),
- Subcontractors present,
- Regulatory agencies and their representatives (including phone numbers, site arrival and departure times),
- Level of health and safety protection,
- Sampling methodology and information,
- Sample locations (sketches are helpful),
- Source of sample(s), sample identifications, sample container types and preservatives used, and lot numbers for bottles and preservatives (if applicable and if not recorded on other forms or in a sample control logbook),
- A chronological description of the field observations and events,
- Specific considerations associated with sample acquisition (e.g., field parameter measurements, field screening data, HASP monitoring data, etc.) (if not recorded on another form),
- Wastes generated, containment units (including volumes, matrix, etc), and storage location (if not recorded on another form),
- Field quality assurance/quality control samples collection, preparation, and origin (if not recorded on other forms or in a sample control logbook),
- The manufacturer, model and serial number of field instruments (e.g., PID, water quality, etc.) shall be recorded, if not using a calibration form. Also, source lot # and expiration date of standard shall be recorded if calibrated in the field.
- Well construction materials, water source(s), and other materials used on-site (if not recorded on another form).
- Sample conditions that could potentially affect the sample results,
- If deviating from plan, clearly state the reason(s) for deviation,
- Persons contacted and topics discussed,
- Documentation of exclusion zone set-up and location,
- Documentation of decontamination procedures, and
- Daily Summary.

Field situations vary widely. No general rules can specify the extent of information that must be entered in a logbook. However, records should contain sufficient information so that someone can reconstruct the field activity without relying on the collector's memory. Language used shall be objective, factual, and free of personal opinions. Hypothesis for observed phenomena may be

recorded, however, they must be clearly indicated as such and only relate to the subject observation.

Logbooks will be assigned to a specific sampling team. If it is necessary to transfer the log book to alternative team member during field work, the person relinquishing the log book will sign and date the log book at the time of transfer.

Field logbooks should consist of a bound book, in which the insertion or removal of pages will be visibly noticeable after the logbook has been assembled. Logbooks can be prepared by gluing or laminating pages together either at the left side or top of the page. If inclement weather is expected, logbooks may have plastic laminated front and back covers to protect the interior pages, and should not be broken apart for coping. Loose-leaf binding, such as comb binding is not considered hard binding. To maintain the integrity of the logbook, pages should be consecutively numbered prior to use. Logbook pages can be of any format, and may include blank pages for recording or field forms that are used for specific tasks. As an alternative, commercially bound and consecutive page numbered field logbooks may also be used.

Additional Field Forms/Records:

Additional field records may be required for each specific field event. The use of these records and examples are described in other SOPs specific for the activity (e.g. Borehole Logging SOP, Groundwater Sampling and Purging SOP, etc.). These other records may include:

- Borehole Logs during drilling,
- Well Construction and Development records,
- Groundwater Purge and Sample Collection Records,
- Water Level Monitoring,
- Investigation Derived Waste (IDW) Tracking Records,
- Instrument Calibration Records, and
- Health and Safety Monitoring Records and sign-off sheets.

Prior to field activities, the field sampling personnel will coordinate with the Project Manager, or designee, to determine which additional records will be required for the specific field task. These additional records will be maintained in a field file or a three-ring notebook throughout the duration of the field activities, or included in a specially prepared site-specific notebook. If the field notebook is being created, the forms may be part of the laminated book.

Corrections:

If an error is made in the field, logbook corrections will be made by drawing a single line through the error, entering the correct information, and initialing and dating the change. Materials that obliterate the original information, such as correction fluids and/or mark-out tapes, are prohibited. All corrections will be initialed and dated. Some projects require that a brief reason for the change must also be added where the correction was made. Ask the Project Manager, if this requirement is necessary.

Documentation Reviews:

Periodically, the Project Manager, or designee, will review the field logbooks pertaining to the activities under their supervision. The elements of this review will include technical content, consistency, and compliance with the project plans and SOPs. Discrepancies and errors identified during the review should be resolved between reviewer and author of the field documentation. Corrections and/or additions of information shall be initialed and dated by the field author or reviewer.

1. PURPOSE AND SCOPE

The objective of this standard operating procedure (SOP) is to define the methods and requirements for collection of groundwater samples from monitoring wells applying low flow protocols. Low flow sampling is a technique for collecting samples that does not require the removal of large volumes of water and therefore does not overly agitate the water, suspend particles, or potentially aspirate VOCs. Typical flow rates for low flow sampling should range from 0.1 L/min to 0.5 L/min depending on site characteristics. The groundwater monitoring activities will consist of measuring water levels, purging and sampling groundwater, and measuring groundwater field parameters. This procedure is applicable during all Cascadia Associates, LLC low flow groundwater sampling activities.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Traffic cones, tools, keys, and buckets/drums;
- Water quality meter with calibration solutions (record daily calibration/calibration check in field notes);
- Sampling equipment (water level indicator, pump, tubing);
- Laboratory-supplied sample containers (Consult the project-specific sampling and analysis plan (SAP) for sampling requirements);
- Field documentation materials;
- Decontamination materials; and
- Personal protective equipment (consult the site-specific Health and Safety Plan).

3. METHODOLOGY

Water Levels:

Water levels in the wells will be measured and recorded for the purpose of determining groundwater elevations and gradient. The wells will be opened and the water level allowed to equilibrate before the measurements are taken. Measurements of the depth to water will be made to the nearest 0.01 foot using an electronic water level indicator.

Purging:

Purge using low-flow sampling equipment (e.g., peristaltic or bladder pump) at a rate no greater than the recharge rate of the groundwater to prevent water table drawdown. Unless specified otherwise in the project-specific SAP the sample tubing/pump will be lowered to the middle of the screened interval. Groundwater field parameters (pH, electrical conductivity, and temperature) will be measured using a water quality meter and flow cell connected to the discharge tubing of the sample pump to assess the effectiveness of purging. Purging will be considered complete when the water quality parameters (i.e., pH, temperature, and specific conductance) stabilize within 10 percent for three consecutive 3-minute intervals. Consult the

project-specific SAP for additional parameters and stabilization criteria. Purge water will be placed in Department of Transportation (DOT) approved drums.

Sample Collection:

After the purging of each well is complete, collect groundwater samples for chemical analyses using the same pump used for the well purging.

Low Yield Sampling Procedure:

If a well pumps dry during purging discontinue measurement of water quality parameters. Collect groundwater samples once the water level recovers to 90 percent of the pre-purge water column. Contact project manager in the event of slow recharge conditions. Always collect samples for VOC analysis as soon after recharge as possible.

APPENDIX B

HISTORICAL GROUNDWATER ELEVATION DATA

Appendix B--Table 1
Groundwater Elevation Data
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Date of Measurement	Top of Casing Elevation (feet above MSL)	Screened Interval (feet bgs)	Depth To SPH (feet)	Depth to Groundwater (feet)	SPH Thickness (feet)	Groundwater Elevation (feet)
MW-1	05/14/02	NS	14.5 - 24.5	--	16.00	--	NS
	05/25/07	26.66		--	14.92	--	11.74
	08/24/07	26.66		--	18.67	--	7.99
	11/26/07	26.66		--	17.91	--	8.75
	02/27/08	26.66		--	16.92	--	9.74
	03/30/10	26.66		--	17.09	--	9.57
	09/01/10	26.66		--	19.19	--	7.47
	12/16/14	26.66		--	16.19	--	10.47
	03/25/15	26.66		--	15.25	--	11.41
	06/24/15	26.66		--	18.43	--	8.23
	09/15/15	26.66		--	19.05	--	7.61
	11/30/17	26.72		--	16.16	--	10.56
	02/28/18	26.72		--	15.07	--	11.65
	05/29/18	26.72		--	8.43	--	18.29
	08/30/18	26.72		--	18.37	--	8.35
	02/18/19	26.72		--	16.51	--	10.21
	05/20/19	26.72		--	13.22	--	13.50
	08/28/19	26.72		--	19.04	--	7.68
	11/18/19	26.72		--	18.64	--	8.08
	02/24/20	26.72			16.26		10.46
	06/01/20	26.72			12.97		13.75
	08/17/20	26.72			18.19		8.53
	11/16/20	26.72			17.59		9.13
MW-2	05/14/02	NS	20 - 35	--	27.46	--	NS
	05/25/07	38.21		--	26.46	--	11.75
	08/24/07	38.21		--	30.17	--	8.04
	11/26/07	38.21		--	29.42	--	8.79
	02/27/08	38.21		--	28.50	--	9.71
	03/30/10	38.21		--	28.66	--	9.55
	09/01/10	38.21		--	30.74	--	7.47
	12/16/14	38.21		--	27.77	--	10.44
	03/25/15	38.21		--	26.79	--	11.42
	06/24/15	38.21		--	30.05	--	8.16
	09/15/15	38.21		--	30.65	--	7.56
	11/30/17	38.27		--	27.66	--	10.61
	02/28/18	38.27		--	26.70	--	11.57
	05/29/18	38.27		--	19.96	--	18.31
	08/30/18	38.27		--	29.94	--	8.33
	02/18/19	38.27		--	28.04	--	10.23
	05/20/19	38.27		--	24.73	--	13.54
	08/28/19	38.27		--	30.63	--	7.64
	11/18/19	38.27		--	30.16	--	8.11
	02/24/20	38.27			27.91		10.36
	06/01/20	38.27			24.51		13.76
	08/17/20	38.27			29.81		8.46
	11/16/20	38.27			29.01		9.26

Please refer to notes at end of table.

Cascadia Associates, LLC

Table 1
Groundwater Elevation Data
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Date of Measurement	Top of Casing Elevation (feet above MSL)	Screened Interval (feet bgs)	Depth To SPH (feet)	Depth to Groundwater (feet)	SPH Thickness (feet)	Groundwater Elevation (feet)
MW-3	05/14/02	NS	24.5 - 34.5	--	28.15	--	NS
	05/25/07	39.11		--	27.17	--	11.94
	08/24/07	39.11		--	31.04	--	8.07
	11/06/07	39.11		--	30.36	--	8.75
	02/27/08	39.11		--	28.71	--	10.40
	03/30/10	39.11		--	29.55	--	9.56
	09/01/10	39.11		--	31.65	--	7.46
	12/16/14	39.11		--	28.54	--	10.57
	03/25/15	39.11		--	27.72	--	11.39
	06/24/15	39.11		--	30.85	--	8.26
	09/15/15	39.11		--	31.52	--	7.59
	11/30/17	39.17		--	28.61	--	10.56
	02/28/18	39.17		--	27.18	--	11.99
	05/29/18	39.17		--	20.91	--	18.26
	08/30/18	39.17		--	30.80	--	8.37
	02/18/19	39.17		--	28.94	--	10.23
	05/20/19	39.17		--	26.03	--	13.14
	08/28/19	39.17		--	31.51	--	7.66
	11/18/19	39.17		--	31.06	--	8.11
	02/24/20	39.17			28.76		10.41
	06/01/20	39.17			25.73		13.44
	08/17/20	39.17			30.53		8.64
	11/16/20	39.17			29.88		9.29
MW-4	05/14/02	NS	20 - 35	--	29.40	--	NS
	05/25/07	40.17		--	28.35	--	11.82
	08/24/07	40.17		--	32.12	--	8.05
	11/06/07	40.17		--	31.40	--	8.77
	02/27/08	40.17		--	30.40	--	9.77
	03/30/10	40.17		--	30.77	--	9.40
	09/01/10	40.17		--	32.62	--	7.55
	12/16/14	40.17		--	29.63	--	10.54
	03/25/15	40.17		--	28.76	--	11.41
	06/24/15	40.17		--	31.92	--	8.25
	09/15/15	40.17		--	32.61	--	7.56
	11/30/17	40.23		--	29.59	--	10.64
	02/28/18	40.23		--	28.60	--	11.63
	05/29/18	40.23		--	21.88	--	18.35
	08/30/18	40.23		--	31.86	--	8.37
	02/18/19	40.23		--	30.04	--	10.19
	05/20/19	40.23		--	26.74	--	13.49
	08/28/19	40.23		--	32.59	--	7.64
	11/18/19	40.23		--	32.09	--	8.14
	02/24/20	40.23			29.77		10.46
	06/01/20	40.23			26.46		13.77
	08/17/20	40.23			31.78		8.45
	11/16/20	40.23			31.09		9.14
MW-5	12/16/14	27.03	10 - 25	--	16.60	--	10.43
	03/25/15	27.03		--	15.37	--	11.66
	06/24/15	27.03		--	18.89	--	8.14
	09/15/15	27.03		--	19.35	--	7.68
	10/23/17	27.03		--	17.82	--	9.21
	11/30/17	27.03		--	16.39	--	10.64

Please refer to notes at end of table.

Cascadia Associates, LLC

Appendix B--Table 1
Groundwater Elevation Data
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Date of Measurement	Top of Casing Elevation (feet above MSL)	Screened Interval (feet bgs)	Depth To SPH (feet)	Depth to Groundwater (feet)	SPH Thickness (feet)	Groundwater Elevation (feet)
MW-5	02/28/18	27.03	10-25	--	15.41	--	11.62
	05/29/18	27.03		--	8.68	--	18.35
	08/30/18	27.03		--	18.55	--	8.48
	02/18/19	27.03		--	16.70	--	10.33
	05/20/19	27.03		--	13.19	--	13.84
	08/28/19	27.03		--	19.31	--	7.72
	11/18/19	27.03		--	18.92	--	8.11
	02/24/20	27.03			17.00		10.03
	06/01/20	27.03			13.21		13.82
	08/17/20	27.03			18.39		8.64
	11/16/20	27.03			17.48		9.55
MW-5D	10/24/17	26.71	35 - 45	--	17.50	--	9.21
	11/30/17	26.71		--	16.21	--	10.50
	02/28/18	26.71		--	15.20	--	11.51
	05/29/18	26.71		--	8.37	--	18.34
	08/30/18	26.71		--	18.51	--	8.20
	02/18/19	26.71		--	16.43	--	10.28
	05/20/19	26.71		--	12.72	--	13.99
	08/28/19	26.71		--	19.01	--	7.70
	11/18/19	26.71		--	18.62	--	8.09
	02/24/20	26.71			16.62		10.09
	06/01/20	26.71			12.63		14.08
	08/17/20	26.71			18.13		8.58
	11/16/20	26.71			17.02		9.69
MW-6	12/16/14	27.33	10 - 25	--	16.93	--	10.40
	03/25/15	27.33		--	15.73	--	11.60
	06/24/15	27.33		--	19.34	--	7.99
	09/15/15	27.33		--	19.70	--	7.63
	10/24/17	27.33		--	18.12	--	9.21
	11/30/17	27.33		--	16.71	--	10.62
	02/28/18	27.33		--	15.77	--	11.56
	05/29/18	27.33		--	9.03	--	18.30
	08/30/18	27.33		--	18.99	--	8.34
	02/18/19	27.33		--	16.99	--	10.34
	05/20/19	27.33		--	13.56	--	13.77
	08/28/19	27.33		--	19.66	--	7.67
	11/18/19	27.33		--	19.31	--	8.02
	02/24/20	27.33			17.14		10.19
	06/01/20	27.33			13.45		13.88
	08/17/20	27.33			18.77		8.56
	11/16/20	27.33			17.78		9.55
MW-7	11/30/2017	21.67	10 - 25	--	11.12	--	10.55
	2/28/2018	21.67		--	10.19	--	11.48
	5/29/2018	21.67		--	3.4	--	18.27
	08/30/18	21.67		--	13.26	--	8.41
	02/18/19	21.67		--	11.41	--	10.26
	05/20/19	21.67		--	7.73	--	13.94
	08/28/19	21.67		--	13.99	--	7.68
	11/18/19	21.67		--	13.76	--	7.91
	02/24/20	21.67			11.49		10.18
	06/01/20	21.67			7.10		14.57

Please refer to notes at end of table.

Cascadia Associates, LLC

Table 1
Groundwater Elevation Data
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Date of Measurement	Top of Casing Elevation (feet above MSL)	Screened Interval (feet bgs)	Depth To SPH (feet)	Depth to Groundwater (feet)	SPH Thickness (feet)	Groundwater Elevation (feet)
MW-7	08/17/20	21.67	10-25		13.11		8.56
	11/16/20	21.67			12.01		9.66
MW-8	11/30/2017	27.68	10 - 25	--	16.91	--	10.77
	2/28/2017	27.68		--	16.01	--	11.67
	5/29/2018	27.68		--	9.31	--	18.37
	08/30/18	27.68		--	19.22	--	8.46
	02/18/19	27.68		--	17.28	--	10.40
	05/20/19	27.68		--	13.93	--	13.75
	08/28/19	27.68		--	19.94	--	7.74
	11/18/19	27.68		--	19.57	--	8.11
	02/24/20	27.68			17.38		10.30
	06/01/20	27.68			13.82		13.86
	08/17/20	27.68			19.04		8.64
	11/16/20	27.68			18.11		9.57
MW-8D	11/30/2017	27.87	35 - 45	--	17.36	--	10.51
	2/28/2018	27.87		--	16.35	--	11.52
	5/29/2018	27.87		--	9.53	--	18.34
	08/30/18	27.87		--	19.41	--	8.46
	02/18/19	27.87		--	17.59	--	10.28
	05/20/19	27.87		--	13.9	--	13.97
	08/28/19	27.87		--	20.21	--	7.66
	11/18/19	27.87		--	19.80	--	8.07
	02/24/20	27.87			17.79		10.08
	06/01/20	27.87			13.80		14.07
	08/17/20	27.87			19.29		8.58
	11/16/20	27.87			18.22		9.65
MW-9	11/30/2017	29.39	10 - 25	--	18.78	--	10.61
	2/28/2018	29.39		--	17.79	--	11.60
	5/29/2018	29.39		--	11.09	--	18.30
	08/30/18	29.39		--	21.04	--	8.35
	02/18/19	29.39		--	19.13	--	10.26
	05/20/19	29.39		--	14.63	--	14.76
	08/28/19	29.39		--	21.74	--	7.65
	11/18/19	29.39		--	21.28	--	8.11
	02/24/20	29.39			21.08		8.31
	06/01/20	29.39			15.53		13.86
	08/17/20	29.39			20.89		8.50
	11/16/20	29.39			20.07		9.32
MW-10	11/30/2017	28.71	10 - 25	--	18.16	--	10.55
	2/28/2018	28.71		--	17.19	--	11.52
	5/29/2018	28.71		--	10.38	--	18.33
	08/30/18	28.71		--	20.3	--	8.41
	02/18/19	28.71		--	18.42	--	10.29
	05/20/19	28.71		--	14.76	--	13.95
	08/28/19	28.71		--	21.02	--	7.69
	11/18/19	28.71		--	20.67	--	8.04
	02/24/20	28.71			18.57		10.14
	06/01/20	28.71			14.68		14.03
	08/17/20	28.71			20.17		8.54
	11/16/20	28.71			19.09		9.62

Please refer to notes at end of table.

Cascadia Associates, LLC

Table 1
Groundwater Elevation Data
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Date of Measurement	Top of Casing Elevation (feet above MSL)	Screened Interval (feet bgs)	Depth To SPH (feet)	Depth to Groundwater (feet)	SPH Thickness (feet)	Groundwater Elevation (feet)
MW-11	02/18/19	NS	10 - 25	--	17.27	--	NS
	05/20/19	NS		--	14.32	--	NS
	08/28/19	NS		--	19.55	--	NS
	11/18/19	NS		--	19.36	--	NS
	02/24/20	NS			16.28		NS
	06/01/20	NS			13.95		NS
	08/17/20	NS			18.58		NS
	11/16/20	NS			18.70		NS

Notes:

1. Survey elevations determined by Bluedot Group surveying, November 2017.
2. Reference elevation (i.e., top of casing) relative to NAVD 88, feet above mean sea level.
3. feet above MSL = feet above mean sea level.
4. NS = Not surveyed
5. -- = SPH not measured/observed.
6. bgs = below ground surface.

APPENDIX C

FIELD GAUGING AND SAMPLING FORMS

Project: GWM 3Q20
Client: NuStar Vancouver
Sampler: GW

Date: 8/17
Permit:

Well ID:	Time:	DTP:	DTW:	Product Thickness:	Notes:
MW-4	756		31.78		
MW-2	822		29.81		
MW-3	830		30.53		
MW-10	836		20.17		
MW-7	847		13.11		
MW-6	851		18.77		
MW-1	857		18.19		
MW-11	901		18.58		
MW-9	910		20.89		
MW-8D	915		19.29		
MW-8	920		19.04		
MW-5	924		18.39		
MW-5D	927		18.13		

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-5	Job Number:	T
Client:	Nu Star Vanmar	Date:	8/17
Project:	GWM 3Q20	Sampler:	AG
Weather:	Sun 85°	Time In/Out:	930 - 1015

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:	18.39	Water Column Length:	—
Well Cap Lock Present:	Yes / No	Screened Interval:	—	Purge Volume:	—
Comments:	—				

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

PURGING DATA

Purge Method:	Peri	Pump Intake Depth:	MS
Sampling Method:	peri	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	
942			18.41	.2	6.79	15.91	774	34.06	-68.6	clear
945			19.88	.1	6.69	15.39	763	9.62	-45.6	↓
948			19.81	↓	6.68	15.10	758	4.91	-51.6	
951			20.24		6.71	15.04	750	2.40	-49.7	
954			20.50		6.71	15.07	745	2.17	-46.5	
957			20.92	↓	6.72	15.05	744	2.10	-44.6	

PURGING DATA

Sample ID:	MW-5	Sampling Flow Rate:	.1		Analytical Laboratory:	Apex
Sample Time:	957	Final Depth to Water:	22.51		Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2x 1L	HCl	TPH	—	—	—	—
3x 40	HCl	VOC	—	—	—	—
2x 1L	HCl	TPH	—	—	—	MW-5 Dup
3x 40	HCl	VOC	—	—	—	MW-5 Dup

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-5D	Job Number:	—
Client:	NW Star Vannes	Date:	8/17
Project:	GWM 3020	Sampler:	AW
Weather:	Sun 85	Time In/Out:	1020-1045

WELL DATA

Monument Type:	Flush-mount/Stick-up / Other:	Well Diameter:	2"	Depth to Free Product:	—
		Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	18.13	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	Pump Intake Depth:	MS
Sampling Method:		Tubing Material & Type:	LDPE (NEW / DEDICATED)

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1024			18.13	.2	6.77	17.51	694	2.16	-46.0	clear
1027			18.17	↓	6.86	16.32	670	1.95	-37.7	↓
1030			↓	↓	7.02	15.10	418	1.61	-10.0	↓
1033			↓	↓	7.05	14.89	408	1.41	-7.7	↓
1036			↓	↓	7.06	14.78	405	1.30	-5.1	↓

PURGING DATA

Sample ID:	MW-5D	Sampling Flow Rate:	.2		Analytical Laboratory:		ARI
Sample Time:	1036	Final Depth to Water:	18.19		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-8	Job Number:	
Client:	Nu Star Vanno	Date:	8/17
Project:	GWM 3Q20	Sampler.	AW
Weather:	Sunny	Time In/Out:	1050-1125

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:	19.07	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	Pump Intake Depth:	MS
Sampling Method:	Peri	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	
1059			19.07	.2	7.00	17.10	279	21.2	35.2	clear
1102			19.57	.1	6.67	13.96	122	7.74	31.1	↓
1105			20.35	↓	6.48	13.78	116	4.01	24.0	
1108			20.89	↓	6.39	13.55	109	3.90	32.1	
1111			21.07	↓	6.32	13.54	105	3.82	32.9	
1114			21.40	↓	6.31	13.52	106	3.80	34.3	

PURGING DATA

Sample ID:	MW-8	Sampling Flow Rate:	.1		Analytical Laboratory:		Kp-4
Sample Time:	1114	Final Depth to Water:	23.07		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x 40	HCl	VOC	—				
2x 1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-7	Job Number:	
Client:	Nu Star Vanna	Date:	8/17/16
Project:	GW M 3020	Sampler:	
Weather:	Sun 85	Time In/Out:	1220 - 1304

WELL DATA

Monument Type:	Flush-mount/Stick-up / Other:	Well Diameter:	2"	Depth to Free Produ t	—
		Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	13.25	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	Pump Intake Depth:	MS
Sampling Method:	peri	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	
1226			13.25	.2	6.65	16.61	573	8.80	51.6	clear
1229			13.26	.1	6.62	15.25	650	5.41	45.6	
1232			13.52	↓	6.61	14.55	674	3.79	42.3	↓
1235			13.60		6.65	14.42	681	3.59	36.1	
1238			13.65		6.67	14.39	684	3.51	34.7	

PURGING DATA

Sample ID:	MW-7	Sampling Flow Rate:	.1		Analytical Laboratory:		Apex
Sample Time: → 1228 (on label)	1238	Final Depth to Water:	13.77		Did Well Dewater:		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-9	Job Number:	
Client:	NuStar Vancouver	Date:	8/17/16
Project:	GWM 3Q16	Sampler:	AJ
Weather:	Sun - hot	Time In/Out:	1310 - 1400

WELL DATA

Monument Type:	Flush-mount / Stick-up / Other:	Well Diameter:	2"	Depth to Free Produ t	—
		Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water.	20.89	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	Pump Intake Depth:	
Sampling Method:	LL	Tubing Material & Type:	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	
1316			20.89	.2	6.14	19.41	491	21.72	29.9	clear
1319			↓	↓	6.63	15.46	294	10.32	26.3	↓
1322					6.50	15.39	155	6.64	39.5	
1325					6.40	14.95	140	6.75	47.6	
1328					6.35	14.96	122	5.50	50.1	
1331					6.36	14.97	118	5.22	56.5	
1334					6.33	14.97	116	5.17	57.0	

PURGING DATA

Sample ID:	MW-9	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex
Sample Time:	1334	Final Depth to Water:	20.89		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

Replace lid

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-6	Job Number:	
Client:	NuStar Vancouver	Date:	8/17
Project:	GWM 3Q20	Sampler:	AW
Weather:	Sun-hot	Time In/Out:	1405 - 1500

WELL DATA

Monument Type:	Flush-mount / Stick-up	Well Diameter:	2"	Depth to Free Produ t.	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	18.90	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	Pump Intake Depth:	MS
Sampling Method:	pf	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	
1412			18.90	.2	6.25	17.20	820	13.37	52.5	clear
1415			19.71	.1	6.35	15.60	936	6.72	20.0	↓
1418			20.62	↓	6.41	15.61	960	4.47	-20.4	
1421			21.50		6.46	15.52	970	3.95	-37.3	
1424			22.07		6.49	15.45	975	3.80	-45.7	
1427			22.31	↓	6.50	15.48	981	3.72	-48.1	↓

PURGING DATA

Sample ID:	MW-6	Sampling Flow Rate:	.1			Analytical Laboratory:	Apex
Sample Time:	1427	Final Depth to Water:	23.14			Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x1L	HCl	TPH	—				
3x40	HCl	VOC	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-3	Job Number.	
Client:	Nustar Varney	Date:	8/18
Project:	GWM 3Q20	Sampler:	AW
Weather:	sun 75	Time In/Out:	720

WELL DATA

Monument Type:	Flush-mount / Stick-up / Other:	Well Diameter:	2"	Depth to Free Product:	—
		Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	30.52	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:	BP	Pump Intake Depth:	MS
Sampling Method:	BP	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	
745			30.52	.25	6.18	17.24	262	17.32	14.0	clear
748			30.52	↓	6.34	15.61	266	10.11	7.2	↓
751			↓	↓	6.50	15.20	228	5.03	20.2	Cloudy
754			↓	↓	6.54	15.17	227	3.58	29.4	↓
757			↓	↓	6.52	15.14	218	3.25	32.3	↓
800			↓	↓	6.52	15.12	216	3.11	36.1	↓
										Sds

PURGING DATA

Sample ID:	MW-3	Sampling Flow Rate:	.25			Analytical Laboratory:	Apex
Sample Time:	800	Final Depth to Water:	30.53			Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	~				~
2x1L	HCl	TPH	~				~

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-4	Job Number:	
Client:	Nu Star Vanner	Date:	8/18
Project:	GWM 3Q20	Sampler:	MW
Weather:	Pt Sunny	Time In/Out:	840

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	31.60	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:	
Sampling Method:	BP	Tubing Material & Type:	SS 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	
848			31.60	.25	6.26	21.18	218	20.63	43.0	clear
851			↓	↓	6.29	19.11	223	11.46	44.0	↓
854					6.27	18.62	235	10.01	51.0	
857					6.23	17.50	266	6.18	52.1	
900					6.17	15.96	255	5.23	54.9	
903					6.14	15.25	260	4.19	55.2	
906					6.14	15.26	263	4.02	55.9	
909					6.14	15.19	262	3.91	57.0	

PURGING DATA

Sample ID:	MW-4	Sampling Flow Rate:	.25		Analytical Laboratory:		Apex
Sample Time:	909	Final Depth to Water:	31.60		Did Well Dewater:		ND
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x1L	HCl	TPH	—				
3x40	HCl	VOC	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-2	Job Number:	
Client:	Nustar Vancouver	Date:	8/18
Project:	GWM 3Q20	Sampler:	JW
Weather:	Ft Sun	Time In/Out:	1024

WELL DATA

Monument Type:	Flush mount/Stick-up / Other:	Well Diameter:	2"	Depth to Free Produ t.	—
		Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	29.64	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	Pump Intake Depth:	ft bgs
Sampling Method:	Peri	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	
1036			29.69	.2	6.18	20.97	260	15.62	65.7	clear
1039			29.70		6.16	16.27	219	9.26	45.4	
1042			29.70		6.11	15.76	215	5.19	48.4	
1045					6.10	15.60	211	3.14	71.0	
1048					6.08	15.55	208	3.01	72.0	
1051					6.08	15.54	207	2.91	73.6	

PURGING DATA

Sample ID:	MW-2	Sampling Flow Rate:	.2			Analytical Laboratory:	Apex
Sample Time:	1051	Final Depth to Water:	29.70			Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x1L	HCl	TPH	—			—	
3x40	HCl	VOC	—			—	

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-1	Job Number:	—
Client:	NuStar Vancouver	Date:	8/19
Project:	GWM 3Q20	Sampler:	JW
Weather:	Sun 80°	Time In/Out:	800-835

WELL DATA

Monument Type:	Flush-mount/Stick-up / Other:	Well Diameter:	2"	Depth to Free Product:	—
		Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	17.97	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	Pump Intake Depth:	MS
Sampling Method:	LF	Tubing Material & Type:	LDPE

NEW / DEDICATED

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
811			17.97	.2	5.76	20.64	359	21.14	87.9	cloudy
814			17.97		5.86	15.67	704	6.77	68.6	clear
817			↓		5.87	15.65	699	4.64	64.0	
820					6.04	15.48	595	2.79	51.7	
823					6.07	15.49	581	2.54	51.1	
827					6.12	15.46	572	2.47	50.0	

PURGING DATA

Sample ID:	MW-1	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex
Sample Time:	827	Final Depth to Water:	17.97		Did Well Dewater:		NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-11	Job Number:	—
Client:	NW Steel Venture	Date:	8/19
Project:	GWM 2020	Sampler:	AW
Weather:	Sunny 80	Time In/Out:	840 - 930

WELL DATA

Monument Type:	Flush mount/Stick-up / Other:	Well Diameter:	2"	Depth to Free Product:	—
		Well Depth:	—	Free Product Thickness.	—
Monument Condition:	good	Depth to Water:	19.26	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 pump	Pump Intake Depth:	MS
Sampling Method:	peri pump	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	
847			19.26	.2	6.18	17.02	446	20.19	55.3	clear
850			19.49	.1	6.23	15.41	290	14.11	47.5	
853			19.65	↓	6.21	15.17	270	4.80	43.3	↓
856			19.81	↓	6.17	15.07	239	2.79	44.1	↓
859			19.90	↓	6.21	14.99	221	2.65	45.0	↓
902			20.00	↓	6.20	14.96	214	2.54	45.9	↓

PURGING DATA

Sample ID:	MW-11	Sampling Flow Rate:	.1		Analytical Laboratory:		Apex MS
Sample Time:	902	Final Depth to Water:	20.07		Did Well Dewater:		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	↓	TPH	—				
3x40	↓	VOC	—				MW-11 Dup
2x1L	↓	TPH	—				MW-11 Dup

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-10	Job Number:	
Client:	Mustang Vannoy	Date:	8/19
Project:	Gurm 3920	Sampler:	AW
Weather:	Sun 80	Time In/Out:	1120 - 1210

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:	19.89	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 pump	Pump Intake Depth:	
Sampling Method:	Peri pump	Tubing Material & Type:	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	
1128			19.89	.2	6.31	21.07	214	15.62	38.7	clear
1131			↓	↓	6.34	15.84	122	7.90	44.8	↓
1134					6.36	14.73	105	3.10	53.5	
1137					6.31	14.49	103	3.01	60.5	
1140					6.29	14.38	103	2.95	62.0	

PURGING DATA

Sample ID:	MW-10	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex
Sample Time:	1140	Final Depth to Water:	19.97		Did Well Dewater:		NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC					
2x1L	HCl	TPH					

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-8D	Job Number:	
Client:	Nustar Vanne	Date:	8/17
Project:	GWM 3020	Sampler:	AC
Weather:	Sunny	Time In/Out:	1130 - 1210

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:	19.36	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	Pump Intake Depth:	MS
Sampling Method:	Peri	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	
1135			19.36	.2	6.34	14.99	97	20.19	49.0	clear
1138			19.42	↓	6.68	13.93	117	7.93	54.5	
1142			19.39		6.84	13.61	120	5.85	55.1	↓
1145			19.39		7.01	13.52	130	3.42	54.9	
1148			↓		7.02	13.52	129	3.25	54.7	
1151					7.04	13.51	132	3.10	54.0	

PURGING DATA

Sample ID:	MW-8D	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex
Sample Time:	1151	Final Depth to Water:	19.39		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x 40	HCl	VOC	—				
2x 1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

Project: GwM 4920
Client: NuStar Vanmet
Sampler: AW

Date: 8/16
Permit:

Well ID:	Time:	DTP:	DTW:	Product Thickness:	Notes:
MW-1	817		17.59		
MW-11	823		18.70		
MW-2	830		29.01		
MW-4	834		31.09		
MW-3	840		29.88		
MW-10	854		19.09		
MW-7	901		12.01		
MW-6	908		17.78		
MW-9	913		20.07		
MW-8D	916		18.22		
MW-8	919		18.11		
MW-5D	924		17.02		
MW-5	926		17.48		

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-5	Job Number:	
Client:	Nustar Vancouver	Date:	11/16
Project:	GWM 4Q20	Sampler:	AB
Weather:	Rain 50°	Time In/Out:	930 - 1015

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:	17.48	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—
Comments:					

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

PURGING DATA

Purge Method:	peri low flow	Pump Intake Depth:	MS
Sampling Method:		Tubing Material & Type:	LDPE NEW / DEDICATED

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
940			17.48	.2	6.95	13.69	741	30.14	109.1	clear
943			18.04		7.03	13.66	742	14.56	60.1	
946			18.65		7.07	13.64	743	7.15	39.0	
949			19.01		7.13	13.71	746	4.31	-13.5	
952			19.40		7.15	13.74	742	2.91	-30.9	
955			19.86		7.16	13.68	740	2.70	-37.1	
958			20.13	↓	7.16	13.67	738	2.64	-43.2	↓

PURGING DATA

Sample ID:	MW-5	Sampling Flow Rate:	.2		Analytical Laboratory:		4Peaks
Sample Time:	958	Final Depth to Water:	20.46		Did Well Dewater:		NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-5D	Job Number:	
Client:	Nustar Vanno	Date:	11/19
Project:	GWM 4Q20	Sampler:	AW
Weather:	Rain	Time In/Out:	1015 - 1045

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:	17.00	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 low flow	Pump Intake Depth:	MS
Sampling Method:		Tubing Material & Type:	LDPE

(NEW) / DEDICATED

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1014			17.00	.25	7.25	13.07	701	8.47	-77.4	clear
1017			↓	↓	7.30	13.21	659	5.36	-68.2	
1020					7.34	13.20	613	3.21	-57.3	
1023					7.36	13.35	571	2.17	-49.1	
1026					7.37	13.41	556	2.02	-45.0	
1029					7.36	13.46	549	1.96	-43.7	↓

PURGING DATA

Sample ID:	MW-5D	Sampling Flow Rate:	.25	Analytical Laboratory:	Apex	
Sample Time:	1029	Final Depth to Water:	17.04	Did Well Dewater:	No	

No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-8	Job Number:	—
Client:	Nu Star	Date:	11/16
Project:	Groom 40220	Sampler:	JD
Weather:	Rain	Time In/Out:	1045 - 1120

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:	18.81	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:	peri	Pump Intake Depth:	MS
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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1050			18.81	.25	7.44	12.51	503	7.04	-22.0	clear
1053			19.15	.2	7.29	12.59	300	3.91	-22.4	
1056			19.89	↓	7.03	12.61	207	2.86	-12.6	↓
1059			20.50		6.97	12.70	196	2.34	4.1	
1102			20.81		6.96	12.71	190	2.59	10.2	

PURGING DATA

Sample ID:	MW-8	Sampling Flow Rate:	.2	Analytical Laboratory:		Apex
Sample Time:	1102	Final Depth to Water:	21.20	Did Well Dewater:		No

No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
3x40	HCl	VOC	—			
2x1L	HCl	TPH	—			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-8D	Job Number:	
Client:	NuStar Vannex	Date:	11/16
Project:	GWM 4Q20	Sampler:	MS
Weather:	Rain	Time In/Out:	1120-1200

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:	18.29	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 low flow	Pump Intake Depth:	MS
Sampling Method:		Tubing Material & Type:	CDPE — 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	
1124			18.29	.25	6.54	12.11	97	20.45	114.3	clear
1127			↓	↓	6.68	12.25	114	7.96	115.2	↓
1130					7.20	12.41	129	4.74	115.3	
1133					7.42	12.47	135	2.75	109.4	
1136					7.47	12.49	138	2.44	104.1	
1139					7.50	12.48	139	2.36	102.7	

PURGING DATA

Sample ID:	MW-8D	Sampling Flow Rate:	.25		Analytical Laboratory:		Apex
Sample Time:	1139	Final Depth to Water:	18.29		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-9	Job Number:	
Client:	Nustar Vancouver	Date:	11/16
Project:	GWM 4Q20	Sampler:	AW
Weather:	Rain 50°	Time In/Out:	1205 - 1240

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:	20.09	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 / Low flow	Pump Intake Depth:	MS
Sampling Method:		Tubing Material & Type:	LDPE (NEW / DEDICATED)

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1212			20.09	.25	7.57	12.14	143	11.51	70.3	clear
1215			↓	↓	7.16	12.56	131	6.05	74.6	↓
1218					6.71	13.06	123	4.45	91.0	
1221					6.72	13.15	121	4.34	99.0	
1224					6.70	13.20	120	4.29	103.1	

PURGING DATA

Sample ID:	MW-9	Sampling Flow Rate:	.25		Analytical Laboratory:	Apex
Sample Time:	1224	Final Depth to Water:	20.09		Did Well Dewater:	No

No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x 40	HCl	VOC	—	—	—	—	—
2x 1L	HCl	Dx	—	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-7	Job Number:	
Client:	NuStar Vancouver	Date:	11/16
Project:	GWM 4Q 20	Sampler:	AW
Weather:	Rain 52°	Time In/Out:	1250-1330

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:	12.40	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:	Peri Low Flow	Pump Intake Depth:	IMS
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	
1257			12.40	.25	6.78	13.27	348	20.14	143.2	clear
1300			12.42		6.89	13.67	571	12.10	139.7	
1303			12.45		7.01	13.69	645	5.01	120.2	
1306			12.45		7.13	13.66	684	2.25	97.5	
1309			↓		7.16	13.65	695	2.14	87.9	
1312			↓		7.17	13.64	701	2.10	85.1	↓

PURGING DATA

Sample ID:	MW-7	Sampling Flow Rate:	.25		Analytical Laboratory:		Apex
Sample Time:	1312	Final Depth to Water:	12.45		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x 40	HCl	VOC	—	—	—	—	—
2x 1L	HCl	TPH	—	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-10	Job Number:	
Client:	Nu Star	Date:	11/16
Project:	GWM 4Q20	Sampler:	AS
Weather:	Pt Cloudy	Time In/Out:	1400-1440

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:	19.24	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	Pump Intake Depth:	MS
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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1408			19.24	.25	6.75	12.65	620	10.15	40.7	clear
1411			↓	↓	7.04	12.75	396	7.65	57.9	↓
1414					7.08	13.01	235	4.07	70.9	
1417					7.06	13.10	223	3.78	84.8	
1420				X	7.06	13.12	219	3.71	87.9	

PURGING DATA

Sample ID:	MW-10	Sampling Flow Rate:	.25		Analytical Laboratory:		Apex
Sample Time:	1420	Final Depth to Water:	19.24		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-2	Job Number:	
Client:	Western Summit	Date:	11/17/20
Project:	Gym 4620	Sampler:	MW
Weather:	Rain.	Time In/Out:	730 - 930

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:		Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	28.30	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:	Peristaltic	Pump Intake Depth:	
Sampling Method:	Low flow	Tubing Material & Type:	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	
751			28.30	.25	6.64	13.29	217	18.63	247.5	clear
754			↓	↓	6.80	13.32	219	8.42	334.1	↓
757					6.99	13.37	225	4.92	361.4	
800					7.10	13.47	213	2.87	250.7	
803					7.11	13.49	209	2.65	267.9	
806					7.11	13.50	206	2.60	271.6	

PURGING DATA

Sample ID:	MW-2	Sampling Flow Rate:	.25		Analytical Laboratory:	Apex
Sample Time:	806	Final Depth to Water:	28.82		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 1L	HCl	TPH	—		—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-1	Job Number:	
Client:	Nu Star Ventures	Date:	11/17
Project:	GWM 4Q20	Sampler:	JG
Weather:	Rain	Time In/Out:	840-930

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:	17.35	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:	Peri.	Pump Intake Depth:	MS
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 (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
855			17.35	.2	6.64	12.47	205	13.92	847.1	clear
858					6.99	13.29	251	3.65	306.1	
901					7.01	13.74	306	2.02	175.6	
904					6.92	13.81	341	1.52	90.2	
907					6.92	13.85	355	1.29	82.2	
910					6.93	13.87	362	1.20	75.4	

PURGING DATA — MW-1

Sample ID:	910	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex
Sample Time:	910	Final Depth to Water:	17.35		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-11	Job Number:	
Client:	Austin Valves	Date:	11/15/17
Project:	GWM 4Q20	Sampler:	AW
Weather:	Rain	Time In/Out:	930-1015

WELL DATA

Monument Type:	Flush-mount/Stick-up / Other:	Well Diameter:	2"	Depth to Free Product:	—
		Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	19.31	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 (low flow)	Pump Intake Depth:	
Sampling Method:		Tubing Material & Type:	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	
939			19.31	.25	7.04	13.44	449	3.94	63.6	clear
942			↓	↓	7.43	14.07	493	2.57	40.1	↓
945					7.53	14.30	516	1.46	-111.0	
948					7.58	14.40	521	1.07	-151.7	
951					7.59	14.43	524	1.02	-151.6	
954					7.59	14.42	525	.99	-162.1	

PURGING DATA

Sample ID:	MW-11	Sampling Flow Rate:	.25		Analytical Laboratory:		Apex
Sample Time:	954	Final Depth to Water:	19.30		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-4	Job Number:	
Client:	Nustar Vancouver	Date:	11/17
Project:	GWM 4Q20	Sampler:	GW
Weather:	Rain	Time In/Out:	1020-1050

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:		Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	30.84	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~~ Bladder low flow	Pump Intake Depth:	MS
Sampling Method:		Tubing Material & Type:	SB — NEW / DEDICATED

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1024			30.84	.3	7.64	13.20	379	6.16	-104.1	clear
1027					7.04	13.55	325	4.53	-51.6	
1030					6.90	13.50	310	3.17	-30.5	
1033					6.89	13.49	306	2.65	-24.0	
1036					6.86	13.52	304	2.19	-22.7	
1039					6.86	13.52	302	1.95	-22.0	
1042					6.87	13.52	302	1.74	-21.7	

PURGING DATA

Sample ID:	MW-4	Sampling Flow Rate:	.3		Analytical Laboratory:		Apex
Sample Time:	1042	Final Depth to Water:	30.84		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-3	Job Number:	
Client:	Nu Stem Nanaimo	Date:	11/13
Project:	GWM 4Q20	Sampler:	JW
Weather:	Rain	Time In/Out:	1100 - 1145

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	30.03	Water Column Length:	—
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	—
Comments:					

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

PURGING DATA

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

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1109			30.03	.3	6.86	13.06	290	8.69	27.6	clear
1112			30.19		6.91	13.32	281	5.62	28.4	
1115			30.24		6.90	13.69	274	3.52	21.7	
1118			30.35		6.90	13.62	272	1.99	20.9	
1121			30.44		6.90	13.59	276	1.78	20.0	
1124			30.56		6.91	13.58	280	1.70	19.4	

PURGING DATA

Sample ID:	MW-3	Sampling Flow Rate:	.3		Analytical Laboratory:		Apex
Sample Time:	1124	Final Depth to Water:	31.01		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x1L	TPH	HCl	—				
3x40	VOC	HCl	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-6	Job Number:	
Client:	Northstar Marine	Date:	11/17/20
Project:	GWM 4Q20	Sampler:	TC
Weather:	Rain	Time In/Out:	1155

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:	19.02	Water Column Length:	—
Well Cap Lock Present:	Yes / No	Screened Interval:	—	Purge Volume:	—
Comments:					

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

PURGING DATA

Purge Method:	Peri Pump	Pump Intake Depth:	MS
Sampling Method:	Peristaltic	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	
1202			14.02	.2	6.96	13.38	690	7.27	26.0	clear
1205			19.55	.2	7.01	13.46	812	4.32	-9.9	
1208			20.10	.15	7.14	13.85	981	1.01	-97.4	
1211			20.36	"	7.14	13.90	991	.92	-103.3	
1214			20.65	"	7.14	13.92	992	.90	-104.7	

PURGING DATA

Sample ID:	MW-6	Sampling Flow Rate:	.15		Analytical Laboratory:		Apex
Sample Time:	1214	Final Depth to Water:	21.04		Did Well Dewater:		N
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				
3x40	HCl	VOC	—			MW-6	Dup
2x1L	HCl	TPH	—			MW-6	Dup

NOTES/ADDITIONAL COMMENTS

Project: GWM 1Q20
Client: NuStar Vancouver
Sampler: AW

Date: 2/24
Permit: 9986

Well ID:	Time:	DTP:	DTW:	Product Thickness:	Notes:
MW-9	705		21.08		
MW-8D	709		17.79		
MW-8	715		17.38		
MW-5D	719		16.62		
MW-5	722		17.00		
MW-10	731		18.57		
MW-1	743		16.26		
MW-11	751		16.28		
MW-3	756		28.76		
MW-4	801		29.77		
MW-2	804		27.91		
MW-6	812		17.14		
MW-7	836		11.49		

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-7	Job Number:	
Client:	NuStar Vancouver	Date:	2/24
Project:	GWM 1Q20	Sampler:	MW
Weather:	Cloudy ~45°	Time In/Out:	835 - 920

WELL DATA

Monument Type:	Flush-mount/Stick-up / Other:	Well Diameter:	2"	Depth to Free Product:	—
		Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	11.49	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:	PP	Pump Intake Depth:	MS
Sampling Method:	PP	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	
842			11.49	0.2	6.65	12.53	569	14.23	31.4	clear
845			11.49		6.61	12.69	566	11.07	28.0	
848					6.57	12.75	550	7.27	23.0	
851					6.54	12.81	547	4.01	22.6	
854					6.49	12.89	541	3.72	25.6	
857					6.46	12.98	539	3.67	24.2	

PURGING DATA

Sample ID:	MW-7	Sampling Flow Rate:	.2		Analytical Laboratory:	Apex
Sample Time:	857	Final Depth to Water:	11.52		Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2 x 1L	HCl	TPH	—			
3 x 40	HCl	VOC	—			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-10	Job Number:	
Client:	NuStar Vonnea	Date:	2/4
Project:	GWM 1Q20	Sample	
Weather:	Cloudy	Time In/Out:	930 1015

WELL DATA

Monument Type:	Flush mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Pr	—
Monument Condition:	gpd	Depth to Water:	18.57	Water	
Well Cap Lock Present:	Yes No	Screened Interval:	—	Purge Volume:	

Comments:

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

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

PURGING DATA

Purge Method: ~~pp~~ | Pump Intake Depth: MS

Sampling Method: ~~pp~~ | Tubing Material & Type: LDPE

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)
					+/-0.1	+/-0.5 °C	+/-5			
939			18.57	.2	7.12	12.95	76	27 6	32 6	
942			18.61		6.96	12.81	134	17.30	75	
945			18.61		6.14	12.91	115	10 91	91.	
948			18.62		5.99	12.87	100	9.31	94.9	
951			18.62		6.01	12.87	99	9.22	95 9	
954					5.99	12.89	99	9.19	96	

PURGING DATA

Sample ID:	MW-10	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex
Sample Time:	954	Final Depth to Water:	18.65		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x1L	HCl						
3x40	HCl						

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-5	Job Number:	
Client:	NuStar Vannes	Date:	2/24
Project:	GWM 1Q20	Sampler:	TW
Weather:	Cloudy	Time In/Out:	1025 - 1105

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:	17.00	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:	BB	Pump Intake Depth:	
Sampling Method:	BB	Tubing Material & Type:	LDPE 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	
1034			17.00	.2	5.89	12.38	81	17.04	139.3	clear
1037			17.15	↑	5.91	12.40	123	13.29	135.4	↑
1040			17.25	↑	6.35	13.49	490	3.04	-20.2	↑
1043			17.33	↑	6.40	13.52	499	2.74	-26.6	↑
1046			17.38	↓	6.43	13.53	~~2.61~~ 506	2.61	-34.1	↓

PURGING DATA

Sample ID:	MW-5 1046	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex
Sample Time:		Final Depth to Water:	17.81		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x 1L	HCl	TPH					
3x 40	HCl	VOC					

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-5D	Job Number:	
Client:	NuStar Vancouver	Date:	2/24
Project:	GWM 1920	Sampler:	JW
Weather:	Cloudy	Time In/Out:	1110 - 1150

WELL DATA

Monument Type:	Flush-mount / Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other: good	Well Depth:	—	Free Product Thickness:	—
Monument Condition:		Depth to Water:	16.62	Water Column Length:	—
Well Cap Lock Present:	Yes / No	Screened Interval:	—	Purge Volume:	—

Comments:

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

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

PURGING DATA

Purge Method:	pp	Pump Intake Depth:	MS
Sampling Method:	pp	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	
1114			16.62	.2	6.52	12.95	511	24.47	-58.5	cloudy
1117			16.62	↓	6.62	13.01	412	9.78	-48.9	clear
1120			↓	↓	6.77	13.20	309	3.32	-34.3	↓
1123			↓	↓	6.81	13.27	287	2.21	-22.5	↓
1126			↓	↓	6.81	13.28	285	2.19	-20.9	↓
1129			↓	↓	6.82	13.29	284	2.14	-20.1	↓

PURGING DATA

Sample ID:	MW-5D	Sampling Flow Rate:	.2		Analytical Laboratory:	Apex
Sample Time:	1129	Final Depth to Water:	16.65		Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2 x 1L	HCl	TPH	—			
3 x 40	HCl	VOC	—			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-8	Job Number:	—
Client:	Nu Star Vancouver	Date:	2/24
Project:	GWM 1Q20	Sampler:	JW
Weather:	Cloudy	Time In/Out:	1155 - 1235

WELL DATA

Monument Type:	Flush-mount/Stick-up (Flush-mount circled) Other:	Well Diameter:	2"	Depth to Free Product:	—
		Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	17.38	Water Column Length:	—
Well Cap Lock Present:	Yes (circled) 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:	PP	Pump Intake Depth:	MS
Sampling Method:	PP	Tubing Material & Type:	LDPE — NEW (circled) / 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	
1201			17.38	.2	6.82	11.83	263	20.16	54.1	cloudy
1204			17.51	.1	6.22	11.94	142	9.78	48.4	
1207			17.62	↓	6.03	12.08	92	7.40	66.4	clear
1210			17.71	↓	5.99	12.10	87	7.29	68.6	↓
1213			17.79	↓	5.96	12.11	84	7.23	70.2	↓

PURGING DATA

Sample ID:	MW-8	Sampling Flow Rate:	.1	Analytical Laboratory:	Apex
Sample Time:	1213	Final Depth to Water:	18.05	Did Well Dewater:	No

No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2 x 1L	HCl	TPH	—	—	—	—
3 x 40	HCl	VOC	—	—	—	—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-8D	Job Number:	—
Client:	NuStar Vancouver	Date:	2/24
Project:	GWM 1Q20	Sampler:	JG
Weather:	Cloudy	Time In/Out:	1240-1330

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:	17.79	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:	~~Bailer~~	Pump Intake Depth:	MS
Sampling Method:	~~Bailer~~	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	
1248			17.79	.2	5.61	11.43	71	18.02	132.9	clear
1251			17.79		6.24	11.90	89	11.57	132.3	
1254					6.59	12.08	96	6.55	125.7	
1257					6.71	12.20	98	4.64	117.2	
1300					6.75	12.24	98	2.61	114.0	
1303					6.76	12.23	98	2.49	112.9	
1306					6.76	12.25	98	2.43	112.3	

PURGING DATA

Sample ID:	MW-8D	Sampling Flow Rate:	.2			Analytical Laboratory:	Apex
Sample Time:	1306	Final Depth to Water:	17.79			Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2 x 1L	HCl	TPH	—				—
3 x 40	HCl	VOC	—				—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-9	Job Number:	
Client:	Nustar Vaynex	Date:	2/24
Project:	GWM 1Q 20	Sampler:	MW
Weather:	Rain	Time In/Out:	1340 - 1430

WELL DATA

Monument Type:	Flush-mount/Stick-up / Other:	Well Diameter:	2"	Depth to Free Product:	—
		Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	21.08	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:	ff	Pump Intake Depth:	MW
Sampling Method:	ff	Tubing Material & Type:	HDPE

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	
1348			21.08	.2	6.95	12.52	99	13.61	90.9	clear
1351			21.11		6.24	12.70	95	7.62	95.9	
1354			21.15		6.03	13.02	91	8.00	104.7	
1357			21.17		5.99	13.07	91	8.09	105.8	
1400			21.16		5.99	13.08	91	8.04	106.1	
1403			21.19		5.96	13.12	90	8.14	109.8	

PURGING DATA

Sample ID:	MW-9	Sampling Flow Rate:	.2			Analytical Laboratory:	Apex
Sample Time:	1403	Final Depth to Water:	21.24			Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-6	Job Number:	
Client:	NuStar Vanner	Date:	2/25
Project:	GWM 1Q20	Sampler:	GW
Weather:	Cloudy 40°	Time In/Out:	730 - 825

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:	17.14	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:	MS
Sampling Method:		Tubing Material & Type:	LDPE NEW / DEDICATED

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
736			17.14	.2	6.87	11.19	366	27.01	89.5	clear
739			17.14		7.05	10.74	706	9.13	60.3	
742			↓	↓	6.85	12.03	717	4.04	6.1	↓
745					6.77	12.50	738	3.10	-19.7	
748					6.76	12.58	742	2.95	-20.3	
751					6.76	12.61	744	2.87	-23.9	

PURGING DATA

Sample ID:	MW-6	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex NS
Sample Time:	751	Final Depth to Water:	17.22		Did Well Dewater:		
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x40	HCl	VOC	—				
2x1L	HCl	TPH	—				
3x40	HCl	VOC	—			MW-6	Dup
2x1L	HCl	TPH	—			MW-6	Dup

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-1	Job Number:	T
Client:	NuStar Vancouver	Date:	2/25
Project:	GWM 1Q20	Sampler:	JW
Weather:	Cloudy	Time In/Out:	850

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:	16.26	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:	ff	Pump Intake Depth:	MS
Sampling Method:	ff	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	
857			16.24	.2	6.59	10.32	664	44.10	-39.1	clear
900			16.25	↓	6.71	11.53	456	10.05	-35.8	↓
903			16.26	↓	6.65	12.17	402	4.62	-32.9	↓
906			↓	↓	6.60	12.92	367	2.55	-23.2	↓
909			↓	↓	6.59	13.01	352	2.40	-22.8	↓
912			↓	↓	6.57	13.04	349	2.31	-19.7	↓

PURGING DATA

Sample ID:	MW-1	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex
Sample Time:	912	Final Depth to Water:	16.26		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x 1L	HCl	TPH					
3x 40	HCl	VOC					

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-11	Job Number:	—
Client:	NuStar Vancouver	Date:	2/25
Project:	GWM 1Q20	Sampler:	AW
Weather:	Cloudy	Time In/Out:	940 - 1039

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:	16.20	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:	PP	Pump Intake Depth:	15
Sampling Method:	PP	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	
950			16.20	.2	6.35	11.80	285	25.86	36.9	clear
953			16.19	↓	6.42	12.57	270	12.51	30.8	↓
956			↓	↓	6.39	12.81	261	4.49	30.0	
959			↓	↓	6.52	13.83	267	2.73	27.9	
1002			↓	↓	6.55	13.49	265	2.46	26.9	
1005			↓		6.56	13.52	264	2.64	25.6	↓

PURGING DATA

Sample ID:	MW-11	Sampling Flow Rate:	.2			Analytical Laboratory:	Apex
Sample Time:	1005	Final Depth to Water:	16.16			Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x1L	HCl	TPH	—				
3x40	HCl	VOC	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-3	Job Number:	—
Client:	NuStar Vargas	Date:	2/25
Project:	GWM 1Q20	Sampler:	JW
Weather:	Pt. Sun	Time In/Out:	1100 - 1145

WELL DATA

Monument Type:	Flush-mount/Stick-up	Well Diameter:	2"	Depth to Free Product:	—
	Other:	Well Depth:	—	Free Product Thickness:	—
Monument Condition:	good	Depth to Water:	28.68	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:	BP	Pump Intake Depth:	MS
Sampling Method:	BP	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	
1106			28.68	.2	6.63	13.08	259	36.44	35.2	clear
1109			↓	↓	6.91	13.54	246	12.76	36.2	↓
1112					6.90	14.21	220	3.07	38.7	
1115					6.87	14.29	215	2.96	39.0	
1118					6.87	14.32	213	2.90	40.3	

PURGING DATA

Sample ID:	MW-3	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex
Sample Time:	1118	Final Depth to Water:	28.77		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x1L	HCl	TPH	—				
3x40	HCl	VOC	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-2	Job Number:	
Client:	NuStar Vancouver	Date:	2/25
Project:	GWM 1Q 20	Sampler:	AL
Weather:	Sun	Time In/Out:	1205 - 1255

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:	27.80	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:	88	Pump Intake Depth:	MS
Sampling Method:	86	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	
1212			27.80	.2	6.22	16.79	211	29.10	90.8	clear
1215			↓	↓	6.39	14.58	147	8.08	91.1	↓
1218					6.83	14.58	137	5.04	91.5	
1221					6.90	14.63	134	4.35	88.9	
1224					6.93	14.63	133	4.25	87.9	
1227					6.94	14.64	134	4.21	86.1	

PURGING DATA

Sample ID:	MW-2	Sampling Flow Rate:	.2			Analytical Laboratory:	Apex
Sample Time:	1227	Final Depth to Water:	27.80			Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x 1L	HCl	TPH	—				—
3x 40	HCl	VOC	—				—

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-4	Job Number:	
Client:	NuStar Vannex	Date:	2/25
Project:	GWM 1Q20	Sampler:	JW
Weather:	Pt. Sun	Time In/Out:	1310 - 1405

WELL DATA

Monument Type:	Flush-mount/Stick-up (Flush-mount circled) Other:	Well Diameter:	2"	Depth to Free Product:	—
		Well Depth:	—	Free Product Thickness:	—
Monument Condition:	cracks	Depth to Water:	29.65	Water Column Length:	—
Well Cap Lock Present:	Yes (circled) 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:	PP	Pump Intake Depth:	MS
Sampling Method:	ef	Tubing Material & Type:	LDPE — NEW (circled) / 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	
1321			29.65	.2	6.04	14.82	156	11.24	106.3	clear
1324			29.69	↓	6.16	14.13	177	8.25	107.5	↓
1327			↓	↓	6.24	13.96	183	6.04	108.9	↓
1330			↓	↓	6.35	13.80	186	4.21	104.2	↓
1333			↓	↓	6.46	13.76	186	2.99	103.9	↓
1336			↓	↓	6.50	13.72	188	2.84	103.0	↓
1339			↓	↓	6.51	13.71	188	2.79	102.7	↓

PURGING DATA

Sample ID:	MW-4	Sampling Flow Rate:	.2	Analytical Laboratory:	Apex
Sample Time:	1339	Final Depth to Water:	29.69	Did Well Dewater:	No

No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2x1L	HCl	TPH	—	—	—	—
3x40	HCl	VOC	—	—	—	—

NOTES/ADDITIONAL COMMENTS

Project: Vannex GWM
Client: NuStar
Sampler: GW

Date: 6/1
Permit:

Well ID:	Time:	DTP:	DTW:	Product Thickness:	Notes:
MW-4	736		26.46		
MW-2	744		24.51		
MW-3	749		25.73		
MW-10	802		14.68		
MW-6	808		13.45		
MW-1	817		12.97		
MW-11	827		13.95		
MW-9	839		15.53		
MW-5D	843		12.63		
MW-5	846		13.21		
MW-8	853		13.82		
MW-8D	859		13.80		
MW-7	914		~~8~~.00		

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-7	Job Number:	
Client:	NuStar Vanmex	Date:	6/1
Project:	GWM 2020	Sampler:	AW
Weather:	Sun 60°	Time In/Out:	905

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:	8.40	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:	Perj	Pump Intake Depth:	MS
Sampling Method:	Perj	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	
931			7.10	.2	8.00	15.57	734	1.64	62	clear
934			7.19		7.90	14.71	726	1.20	59	
937			7.26		7.63	14.11	718	1.05	53	
940			7.31		7.41	13.86	714	.29	49	
943			7.39		7.37	13.82	712	.20	44	
946			7.43		7.36	13.80	712	.17	43	

PURGING DATA

Sample ID:	MW-7	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex
Sample Time:	946	Final Depth to Water:	7.68		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2 x 1L	HCl	TPH	—				
3 x 40	HCl	VOC	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-10	Job Number:	
Client:	NuStar Vancouver	Date:	6/1
Project:	GWM 2020	Sampler:	GW
Weather:	Sun	Time In/Out:	1005 – 1050

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:	14.66	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

Sampling Method: LF

Pump Intake Depth:

Tubing Material & Type: 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	
1012			14.66	.2	7.29	17.44	265	10.06	20	clear
1015			14.70	↓	7.33	14.49	216	9.30	54	↓
1018			14.70		7.02	13.99	121	6.41	103	
1021			↓		6.79	13.81	113	2.64	126	
1024					6.75	13.72	113	2.60	131	
1027				↓	6.75	13.70	110	2.52	135	↓

PURGING DATA

Sample ID:	MW-10	Sampling Flow Rate:	.2			Analytical Laboratory:	Apex
Sample Time:	1027	Final Depth to Water:	14.72			Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x1L	HCl	TPH	←				
3x40	HCl	VOC	←				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-5	Job Number:	T
Client:	Nustar Vancouver	Date:	6/1
Project:	GWM 2Q20	Sampler:	JW
Weather:	Sun	Time In/Out:	1100

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:	13.24	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

Sampling Method:

Pump Intake Depth: MS

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			13.24	.1	6.80	16.07	682	2.17	-59	clear
1107			13.30		6.81	15.72	685	1.40	-60	
1110			13.39		6.85	14.29	678	.29	-97	
1113			13.51		6.87	14.20	675	.19	-105	
1116			13.72	↓	6.84	14.16	672	.16	-103	↓

PURGING DATA

Sample ID:	MW-5	Sampling Flow Rate:	.1			Analytical Laboratory:	Apex
Sample Time:	1116	Final Depth to Water:	14.45			Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2 x 1L	HCl	TPH	—				
3 x 40	HCl	VOC	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-5D	Job Number:	—
Client:	NW Star	Date:	6/6
Project:	GWM 2020	Sampler:	JW
Weather:	Sunny	Time In/Out:	1130-1215

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:	12.67	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 pump	Pump Intake Depth:	MS
Sampling Method:	peri pump	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	
1137			12.67	.2	7.07	16.26	216	1.69	159	clear
1140			12.67	↓	6.68	15.04	305	.92	63	↓
1143			↓	↓	6.55	14.22	336	.59	57	
1146					6.52	14.20	341	.48	42	
1149					6.57	14.17	340	.44	36	

PURGING DATA

Sample ID:	MW-5D	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex
Sample Time:	1149	Final Depth to Water:	12.47		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x 1L	HCl	TPH	—				
3x 40	HCl	VOC	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-8	Job Number:	
Client:	NW Star Vanner	Date:	6/1
Project:	GWM 2020	Sampler:	LW
Weather:	Sunny	Time In/Out:	1220 - 1305

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:	13.87	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: per lf

Sampling Method: per lf

Pump Intake Depth:

Tubing Material & Type: 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	
1227			13.87	.2	6.36	15.45	123	10.13	-33	clear
1230			14.10	.1	7.04	15.24	180	5.79	-45	
1233			14.23		7.39	14.95	142	4.30	11	
1236			14.35		7.30	14.64	120	4.23	26	
1239			14.43		7.22	14.36	107	4.46	41	
1242			14.52		7.20	14.30	109	4.47	37	

PURGING DATA

Sample ID:	MW-8	Sampling Flow Rate:	.1	Analytical Laboratory:	Apex
Sample Time:	1242	Final Depth to Water:	14.90	Did Well Dewater:	

No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2x 1L	HCl	TPH	—			
3x 40	HCl	VOC	—			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-8D	Job Number:	
Client:	Nu Star Ammo	Date:	6/7
Project:	GWM2Q20	Sampler:	AW
Weather:	Sunny	Time In/Out:	1305 – 1350

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:	13.86	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 pump	Pump Intake Depth:	MS
Sampling Method:	peri pump	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	
1315			13.86	.2	6.31	15.68	113	11.69	140	clear
1318			13.86	↓	6.38	14.33	135	10.94	134	↓
1321			↓	↓	6.77	13.80	129	9.95	123	↓
1324			↓	↓	6.95	13.60	126	9.24	123	↓
1327			↓	↓	7.00	13.57	126	9.25	123	↓
1330			↓	↓	6.97	13.57	126	9.26	124	↓

PURGING DATA

Sample ID:	MW-8D	Sampling Flow Rate:	.2		Analytical Laboratory:	Apex
Sample Time:	1330	Final Depth to Water:	13.86		Did Well Dewater:	NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2 x 1L	HCl	TPH	—			
3 x 40	HCl	VOC	—			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-6	Job Number:	
Client:	NuStar Vancouver	Date:	6/1
Project:	GWM 2020	Sampler:	
Weather:	Sun	Time In/Out:	1400

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:	13.50	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	Pump Intake Depth:	
Sampling Method:	LL	Tubing Material & Type:	HDPE / 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	
1410			13.50	.2	6.81	17.47	730	6.79	-35	clear
1413			13.75		6.73	16.82	854	2.81	-57	
1416			13.91		6.67	16.15	890	1.35	-67	
1419			14.05		6.66	16.11	902	1.30	-77	
1422			14.16		6.64	16.07	910	1.24	-85	

PURGING DATA

Sample ID:	MW-6	Sampling Flow Rate:	.2		Analytical Laboratory:	Apex
Sample Time:	1422	Final Depth to Water:	14.20		Did Well Dewater:	No

No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2x 1L	HCl	TPH	—			
3x 40	HCl	VOC	—			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-1	Job Number:	—
Client:	Nu Star Vanmex	Date:	6/2
Project:	GWM 2020	Sampler:	AM
Weather:	Pt Sun 50°	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:	good	Depth to Water:	12.79	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:	peri	Pump Intake Depth:	MS
Sampling Method:	LL	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	
752			12.79	.2	7.14	15.53	317	13.06	140	clear
755			12.79		7.06	15.36	319	11.31	146	
758			12.79		6.76	15.21	326	9.92	157	
801					6.67	15.18	326	9.02	160	
804					6.58	15.14	325	7.69	163	
807					6.57	15.13	324	7.61	164	
810					6.56	15.13	324	7.39	164	

PURGING DATA

Sample ID:	MW-1	Sampling Flow Rate:	.2		Analytical Laboratory:	Apex
Sample Time:	810	Final Depth to Water:			Did Well Dewater:	
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2x 1L	HCl	TPH	—			
3x 40	HCl	VOC	—			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-11	Job Number:	
Client:	NuStar Vanneo	Date:	6/2/16
Project:	GWM 202	Sampler:	
Weather:	Sun	Time In/Out:	830 - 920

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:	13.82	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 pump	Pump Intake Depth:	MS
Sampling Method:	peri pump	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	
836			13.81	.2	6.54	16.50	363	12.45	135	clear
839			13.82	↓	6.72	15.93	383	10.56	3	↓
842			13.84		6.84	15.64	393	8.37	-43	
845			13.85		6.98	15.54	394	7.34	-104	
848			13.85		7.00	15.56	394	6.36	-108	
851			13.87		7.00	15.58	394	6.10	-111	
854			13.89		7.01	15.59	394	6.04	-112	

PURGING DATA

Sample ID:	MW-11	Sampling Flow Rate:	.2		Analytical Laboratory:	Apex
Sample Time:	854	Final Depth to Water:	14.08		Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2 x 1L	HCl	TPH				
3 x 40	HCl	VOC				
2 x 1L	HCl	TPH				MW-11 Dup
3 x 40	HCl	VOC				MW-11 Dup

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-3	Job Number:	
Client:	NuStar Vanmex	Date:	4/2
Project:	GWM 2020	Sampler:	GW
Weather:	Sun	Time In/Out:	930 - 1015

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:	25.55	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 pump	Pump Intake Depth:	MS
Sampling Method:	peri pump	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	
936			25.55	.2	7.03	17.41	320	10.72	-113	clear
939			25.55		7.00	16.73	270	9.49	-102	
942					6.85	16.35	243	8.37	-70	
945					6.82	16.20	246	7.16	-59	
948					6.82	16.15	244	7.01	-49	
951					6.82	16.12	244	6.96	-43	

PURGING DATA

Sample ID:	MW-3	Sampling Flow Rate:	.2		Analytical Laboratory:	Apex
Sample Time:	951	Final Depth to Water:	25.59		Did Well Dewater:	No

No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2 x 1L	HCl	TPH				
3 x 40	HCl	VOC				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-4	Job Number:	—
Client:	Nu Star Vanner	Date:	6/24
Project:	GWM 2020	Sampler:	JW
Weather:	Sun 65°	Time In/Out:	1026 - 1105

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:	26.19	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	Pump Intake Depth:	MS
Sampling Method:	peri	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	
1026			26.19	.2	6.65	18.33	269	11.70	4	clear
1029			↓	↓	6.46	16.37	291	9.74	27	↓
1032					6.40	16.13	295	7.97	34	
1035					6.37	16.10	291	7.29	42	
1038					6.37	16.09	291	7.11	45	
1041			↓	↓	6.36	16.04	292	6.90	46	↓

PURGING DATA

Sample ID:	MW-4	Sampling Flow Rate:	.2		Analytical Laboratory:	Apex
Sample Time:	1041	Final Depth to Water:	26.20		Did Well Dewater:	No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
2x1L	HCl	TPH	—			
3x40	HCl	VOC	—			

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-2	Job Number:	
Client:	NuStar Vonnex	Date:	6/2
Project:	GWM 2020	Sampler:	JA
Weather:	Sun 70°	Time In/Out:	1320 / 1410

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:	24.46	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

Sampling Method: bl

Pump Intake Depth:

Tubing Material & Type: 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	
1320			24.46	.2	6.38	18.26	132	9.79	132	clear
1331			24.50		6.47	17.50	304	8.70	130	
1334			24.51		6.54	16.34	302	7.64	124	
1337			24.53		6.56	16.02	299	6.90	121	
1340			24.54		6.56	15.94	294	6.69	123	
1343			24.57		6.56	15.91	293	6.51	121	

PURGING DATA

Sample ID:	MW-2	Sampling Flow Rate:	.2			Analytical Laboratory:	Apex
Sample Time:	1343	Final Depth to Water:	24.70			Did Well Dewater:	NO
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x 1L	HCl	TPH	—				
3x40	HCl	VOC	—				

NOTES/ADDITIONAL COMMENTS

WELL MONITORING DATA SHEET

Cascadia Associates, LLC

Well ID:	MW-9	Job Number:	
Client:	Mt Star Vanguard	Date:	6/2/20
Project:	GWM 2020	Sampler:	KW
Weather:	Sun	Time In/Out:	1415

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:	15.42	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	Pump Intake Depth:	MS
Sampling Method:	peri	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	
1423			15.44	.2	6.62	19.39	192	8.74	117	clear
1426			15.50	↓	6.61	15.81	135	7.37	126	↓
1429			15.54		6.50	14.92	122	6.51	138	
1432			15.59		6.45	14.80	124	6.49	147	
1435			15.62		6.42	14.75	121	6.44	152	
1438										

PURGING DATA

Sample ID:	MW-9	Sampling Flow Rate:	.2		Analytical Laboratory:		Apex
Sample Time:	1435	Final Depth to Water:	15.88		Did Well Dewater:		No
No. of Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2x1L	HCl	TPH					
3x40	HCl	VOC					

NOTES/ADDITIONAL COMMENTS

APPENDIX D

HISTORICAL GROUNDWATER ANALYTICAL DATA

Appendix D
Summary of Analytical Results - Monitoring Wells
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Sample Date	TPHg Gasoline (mg/L)	TPHd Diesel (mg/L)	TPHo Heavy Oil (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-1	05/14/02	<0.080	0.455 [5.]	<0.500	<0.0005	<0.0005	<0.0005	<0.001	--	--
	05/19/03	--	--	--	<0.001	<0.001	<0.001	<0.002	--	--
	05/25/07	<0.080	<0.238	<0.476	<0.0002	<0.0005	<0.0005	<0.001	--	--
	08/24/07	<0.1	<0.238	<0.476	<0.001	<0.002	<0.002	<0.006	--	--
	11/26/07	<0.080	<0.236	<0.472	<0.001	<0.002	<0.002	<0.006	--	--
	02/27/08	<0.080	<0.294	<0.588	<0.0005	<0.0005	<0.0005	<0.001	--	--
	03/31/10	<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	--	--
	09/01/10	<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	--	--
	12/16/14	<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0005	--	--
	03/25/15	<0.250	<0.046	<0.093	<0.0005	<0.0005	<0.0005	<0.001	--	--
	06/24/15	<0.250	<0.100	<0.250	<0.0005	<0.0005	<0.0005	<0.001	--	--
	09/15/15	<0.250	<0.130	<0.340	<0.0005	<0.0005	0.0015	0.0022	--	--
	02/19/19	<0.100	<0.0762	<0.152	<0.0002	<0.001	<0.0005	<0.00015	<0.001	--
	05/20/19	<0.05	<0.0374	<0.0748	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	--
	08/29/19	<0.05	<0.0374	<0.0748	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	<0.002
	11/19/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	2/25/2020	<0.100	0.201 [A]	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/2/2020	<0.100	0.212 [A]	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/19/2020	<0.100	<0.189	<0.377	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/17/2020	<0.100	0.0998 [A]	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-2	05/14/02	**41.4**	<0.250	<0.500	**4.35**	**2.68**	**1.84**	**8.72**	--	--
	05/19/03	--	--	--	**0.534**	0.00975	0.194	0.876	--	--
	05/25/07	0.439	<0.238	<0.476	**0.071**	0.00114	0.0361	0.0453	--	--
	08/24/07	0.102	<0.238	<0.476	<0.001	<0.002	<0.002	<0.006	--	--
	11/26/07	<0.080	<0.236	<0.472	<0.001	<0.002	<0.002	<0.006	--	--
	02/27/08	0.0817	<0.294	<0.588	0.005	<0.0005	<0.0005	<0.001	--	--
	03/31/10	<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	--	--
	09/01/10	<0.250	<0.250	<0.500	0.0016	<0.0005	<0.0005	<0.0015	--	--
	12/16/14	<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0005	--	--
	03/25/15	<0.250	<0.046	<0.091	<0.0005	<0.0005	<0.0005	<0.001	--	--
	06/24/15	<0.250	<0.100	<0.250	<0.0005	<0.0005	<0.0005	<0.001	--	--
	09/15/15	<0.250	0.17 [D]	0.37	<0.0005	<0.0005	<0.0005	<0.001	--	--
	02/19/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.00015	0.00121	--
	05/20/19	<0.05	<0.0377	<0.0755	<0.0001	<0.0005	<0.00025	<0.00075	0.0031	--
	08/29/19	<0.05	<0.0377	<0.0755	<0.0001	<0.0005	0.00069	<0.00075	0.00125	<0.002
	11/19/19	<0.100	<0.0762	<0.152	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	2/25/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/2/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	0.00774	<0.002
	8/18/2020	<0.100	<0.189	<0.377	<0.0002	<0.001	<0.0005	<0.0015	0.00521	<0.002
	11/17/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	0.00243	<0.004
MW-3	05/14/02	**4.5**	<0.250	<0.500	**0.0419**	0.0096	0.293	0.521	--	--
	05/19/03	--	--	--	**0.0908**	0.0097	0.338	0.5382	--	--
	05/25/07	0.361	<0.238	<0.476	<0.0005	<0.0005	0.0132	0.0145	--	--
	08/24/07	<0.1	<0.238	<0.476	<0.001	<0.002	<0.002	<0.006	--	--
	11/26/07	<0.080	<0.236	<0.472	0.0011	<0.002	0.0066	<0.006	--	--
	02/27/08	**2.14**	0.387 [6.]	<0.500	<0.0005	<0.0005	0.17	0.17	--	--
	2/27/2008 DUP	**1.85**	0.342	<0.485	0.0011	<0.0005	0.19	0.2	--	--
	03/31/10	**2.10**	<0.250	<0.500	<0.0005	<0.0005	0.018	0.021	--	--
	3/31/2010 DUP	**1.90**	<0.250	<0.500	<0.0015	<0.0015	0.018	0.020	--	--
	09/01/10	<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	--	--

Please refer to notes at end of table.

Cascadia Associates, LLC

Appendix D
Summary of Analytical Results - Monitoring Wells
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Sample Date	TPHg Gasoline (mg/L)	TPHd Diesel (mg/L)	TPHo Heavy Oil (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-3	9/1/2010 DUP	<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	--	--
	12/16/14	<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0005	--	--
	03/25/15	<0.418	<0.046	<0.092	<0.0005	<0.0005	<0.0005	<0.001	--	--
	06/24/15	<0.250	0.120	<0.026	<0.0005	<0.0005	<0.0005	<0.001	--	--
	09/15/15	<0.250	0.140	<0.250	<0.0008	<0.0008	<0.0008	<0.001	--	--
	02/18/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.00015	<0.001	--
	05/20/19	<0.05	<0.0377	<0.0755	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	--
	08/29/19	--	--	--	--	--	--	--	--	--
	11/19/19	0.114	<0.0769	<0.154	<0.0002	<0.001	0.00661	0.0113	<0.001	<0.002
	2/25/2020	<0.100	0.0955 [A]	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/2/2020	<0.100	<0.0762	<0.152	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/18/2020	<0.100	<0.189	<0.377	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/17/2020	<0.100	<0.0748	<0.15	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-4	05/14/02	<0.080	0.358	<0.500	<0.0005	<0.0005	<0.0005	<0.001	--	--
	05/19/03	--	--	--	<0.001	<0.001	<0.001	<0.002	--	--
	05/25/07	<0.080	<0.238	<0.476	<0.0002	<0.0005	<0.0005	<0.001	--	--
	08/24/07	<0.1	<0.238	<0.476	<0.001	<0.002	<0.002	<0.006	--	--
	11/26/07	<0.080	<0.236	<0.472	<0.001	<0.002	<0.002	<0.006	--	--
	02/27/08	<0.080	<0.248	<0.495	<0.0005	<0.0005	<0.0005	<0.001	--	--
	03/31/10	<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	--	--
	09/01/10	<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	--	--
	12/16/14	<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0005	--	--
	03/25/15	<0.250	0.074	<0.091	<0.0005	<0.0005	<0.0005	<0.001	--	--
	06/24/15	<0.250	<0.099	<0.250	<0.0005	<0.0005	<0.0005	<0.001	--	--
	09/15/15	<0.250	<0.130	<0.340	<0.0005	<0.0005	<0.0005	<0.001	--	--
	02/18/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.00150	<0.001	--
	05/20/19	<0.05	<0.0377	<0.0755	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	--
	08/29/19	--	--	--	--	--	--	--	--	--
	11/19/19	<0.100	<0.0784	<0.157	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	2/25/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/2/2020	<0.100	0.0914	<0.152	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/18/2020	<0.100	<0.189	<0.377	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/17/2020	<0.100	0.0783 [A]	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-5	12/16/14	**15**	0.350	<0.500	0.00070	0.00066	0.12	**1.2**	--	--
	12/16/2014 DUP	**15**	<0.250	<0.500	0.00088	0.00081	0.18	**1.3**	--	--
	03/25/15	**18.1**	<0.045	<0.091	<0.00050	0.00061	0.218	**1.45**	--	--
	3/25/2015 DUP	**17.2**	<0.046	<0.092	0.0005	0.00065	0.236	**1.22**	--	--
	06/24/15	**15**	0.33 [D]	<0.250	<0.0012	<0.0012	0.228	**1.51**	--	--
	6/24/2015 DUP	**16.8**	**0.560** [D]	<0.250	<0.0012	<0.0012	0.232	**1.49**	--	--
	09/15/15	**17.3**	**0.82** [D]	<0.34	<0.00050	0.00060	0.289	**1.92**	--	--
	07/11/16	**19.4**	**0.310**	<0.29	<0.00084	0.00100	0.215	**1.17**	--	--
	10/23/17	**7.93** [J-]	**1.26**	<0.25	<0.0010	0.00117	0.174	0.99	--	--
	11/30/17	**11.3**	**1.63**	<0.25	<0.0250	<0.0250	0.187	**1.21**	--	--
	11/30/17 DUP	**10.9**	**1.75**	<0.25	<0.0010	0.00112	0.187	**1.48**	--	--
	02/28/18	**9.86**	**1.77**	<0.25	<0.0010	0.00115	0.145	0.877	--	--
	05/29/18	**13.2**	**2.20**	<0.25	<0.0010	0.00130	0.271	**1.15**	--	--
	08/30/18	**18.6**	**0.819** [E]	<0.151	<0.00200	<0.0100	0.190	0.936	--	--
	8/30/2018 DUP	**20.8**	**0.631** [E]	<0.151	<0.00200	<0.0100	0.212	**1.06**	--	--
	02/18/19	**29.2**	**1.06** [E]	<0.151	<0.00200	<0.0100	0.187	**1.06**	<0.010	--

Please refer to notes at end of table.

Cascadia Associates, LLC

Appendix D
Summary of Analytical Results - Monitoring Wells
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Sample Date	TPHg Gasoline (mg/L)	TPHd Diesel (mg/L)	TPHo Heavy Oil (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-5	05/21/19	**22**	**0.722**	<0.0784	<0.002	<0.01	0.252	**1.04**	<0.010	--
	08/28/19	**24.8**	**0.963**	<0.0769	<0.002	<0.01	0.239	**1.1**	<0.01	**2.07**
	8/28/2019 DUP	**21.7**	**0.879**	<0.0769	<0.002	<0.01	0.179	0.836	<0.01	**1.44**
	11/18/19	**23.5**	**0.771**	<0.152	<0.004	<0.02	0.257	**1.19**	<0.02	**1.62**
	11/18/2019 DUP	**20.0**	**0.696**	<0.152	<0.01	<0.05	0.284	**1.46**	<0.05	**1.51**
	2/24/2020	**23.4**	**2.4** [G]	<0.154	<0.004	<0.02	0.176	**0.809**	<0.02	**1.52**
	6/1/2020	**12.7**	**2.04** [BF]	**0.193** [C]	<0.004	<0.02	0.244	**0.844**	<0.02	**1.29**
	8/17/2020	**18.8**	**2.17** [E]	<0.377	<0.002	<0.01	0.154	**0.704**	<0.01	**1.4**
	8/17/2020 DUP	**22.6**	**2.1** [E]	<0.377	<0.002	<0.01	0.21	**0.94**	<0.01	**1.74**
	11/16/2020	**18.5**	**1.92** [E]	<0.151	<0.004	<0.02	0.206	**1.05**	<0.02	**1.42**
MW-5D	10/24/17	0.42	0.147 [J]	<0.25	<0.0010	<0.0010	0.00138	0.00296 [J]	--	--
	11/30/17	0.41	0.49	<0.25	<0.0010	<0.0010	<0.0010	<0.0030	--	--
	02/28/18	0.589	0.249	<0.25	<0.0010	<0.0010	0.00508	0.00204	--	--
	05/29/18	0.68	<0.38	<0.38	<0.0010	<0.0010	0.00220	<0.0030	--	--
	08/30/18	0.673	<0.0755	<0.151	<0.000200	<0.00100	<0.00050	<0.00150	--	--
	02/18/19	0.165	<0.0748	<0.150	<0.000200	<0.00100	<0.00050	<0.00150	<0.001	--
	05/21/19	<0.05	<0.0377	<0.0755	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	--
	08/28/19	**0.309**	<0.0374	<0.0748	<0.0001	<0.0005	0.00078	<0.00075	<0.0005	<0.002
	11/18/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	2/24/2020	<0.100	0.109 [A]	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/1/2020	<0.100	0.0974 [A]	<0.152	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/17/2020	<0.100	<0.187	<0.374	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/16/2020	0.200	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-6	12/16/14	**15**	<0.250	<0.500	**0.47**	0.065	**1.3**	**2.6**	--	--
	03/25/15	**13.7**	0.047	<0.092	**0.516**	0.0756	**1.40**	**2.26**	--	--
	06/24/15	**17.7**	**1.2 D**	<0.250	**0.423**	0.0582	**1.58**	**1.92**	--	--
	09/15/15	**15.1**	**0.54 D**	<0.34	**0.306**	0.0672	**1.23**	**1.92**	--	--
	9/15/2015 DUP	**14**	0.44 D	<0.35	**0.328**	0.0684	**1.32**	**2.07**	--	--
	07/11/16	**15.5**	0.23	<0.28	**0.358**	0.0616	**1.63**	**1.82**	--	--
	10/24/17	**7.73**	**5.07**	0.111 [J]	**0.194**	0.051	**1.51**	**1.29**	--	--
	10/24/17 DUP	**4.19** [J]	**8.96** [QJ]	**1.19** [QJ]	**0.153**	0.046	**1.18**	**1.04**	--	--
	11/30/17	**9.42**	**7.44**	**0.69**	**2.223**	0.053	**1.71**	**1.12**	--	--
	02/28/18	**7.72**	**3.57**	0.152	**0.256**	0.0423	**1.44**	0.735	--	--
	05/29/18	**1.5**	**9.30**	**0.570**	**0.23**	0.0444	**1.38**	0.891	--	--
	08/30/18	**20.1**	**1.24** [E]	<0.151	**0.212**	0.0452	**1.59**	**1.15**	--	--
	02/18/19	**18.2**	**2.15** [G]	<0.151	**0.249**	0.0408	**1.74**	0.577	<0.010	--
	05/20/19	**20**	**1.23**	<0.0755	**0.218**	0.0426	**1.86**	0.937	<0.010	--
	08/29/19	**16.8**	**1.64**	<0.0755	**0.177**	0.0394	**1.69**	0.585	<0.01	**0.561**
	11/19/19	**6.30**	**1.95**	<0.150	**0.0712**	<0.02	**0.709**	0.127	<0.02	**0.163**
	2/25/2020	**15.6**	**4.02** [G]	<0.769	**0.19**	0.0308	**1.74**	0.420	<0.02	**0.340**
	2/25/2020 DUP	**14.8**	**4.35** [G]	<0.769	**0.186**	0.0288	**1.68**	0.405	<0.02	**0.329**
	6/1/2020	**11.3**	**6.92** [BG]	<0.15	**0.163**	0.0286	**1.74**	0.363	<0.01	**0.433**
	8/17/2020	**14.9**	**2.66** [G]	<0.377	**0.166**	0.0345	**1.79**	0.370	<0.01	**0.316**
	11/17/2020	**12.5**	**4.62** [BG]	<0.154	**0.149**	0.0248	**1.85**	0.207	<0.02	**0.279**
	11/17/2020 DUP	**13.7**	**6.93** [BG]	<0.157	**0.163**	0.032	**2.08**	0.398	<0.02	**0.315**

Please refer to notes at end of table.

Cascadia Associates, LLC

Appendix D
Summary of Analytical Results - Monitoring Wells
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Sample Date	TPHg Gasoline (mg/L)	TPHd Diesel (mg/L)	TPHo Heavy Oil (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-7	07/11/16	<0.250	<0.19	<0.29	<0.00050	<0.00050	<0.00050	<0.00015	--	--
	02/19/19	<0.100	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.00015	<0.001	--
	05/20/19	<0.05	<0.0377	<0.0755	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	--
	08/28/19	<0.05	<0.0388	<0.0777	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	<0.002
	11/18/19	<0.100	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	2/24/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/1/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/17/2020	<0.100	<0.187	<0.374	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/16/2020	<0.100	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-8	07/11/16	<0.250	<0.19	<0.29	<0.00050	<0.00050	<0.00050	<0.00015	--	--
	7/11/16 DUP	<0.250	<0.19	<0.29	<0.00050	<0.00050	<0.00050	<0.00015	--	--
	02/18/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.00015	<0.001	--
	05/21/19	<0.05	<0.0374	<0.0748	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	--
	08/28/19	<0.05	<0.0412	<0.0825	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	<0.002
	11/18/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	2/24/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/1/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/17/2020	<0.100	<0.187	<0.374	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/16/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-8D	02/18/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.00015	<0.001	--
	05/21/19	<0.05	<0.0374	<0.0748	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	--
	08/28/19	<0.05	<0.0377	<0.0755	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	<0.002
	11/18/19	<0.100	<0.0762	<0.152	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	2/24/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/1/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/17/2020	<0.100	<0.189	<0.374	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/16/2020	<0.100	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-9	07/11/16	<0.250	<0.19	<0.29	<0.00050	<0.00050	<0.00050	<0.00015	--	--
	02/18/19	<0.100	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	--
	05/21/19	<0.05	<0.0374	<0.0748	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	--
	08/28/19	<0.05	<0.0374	<0.0748	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	<0.002
	11/18/19	<0.100	<0.0762	<0.152	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	2/24/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/2/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/17/2020	<0.100	<0.189	<0.377	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/16/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-10	07/11/16	<0.250	<0.19	<0.29	<0.00050	<0.00050	<0.00050	<0.00015	--	--
	02/19/19	<0.100	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.00015	<0.001	--
	05/21/19	<0.05	<0.0377	<0.0755	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	--
	08/29/19	<0.05	<0.0374	<0.0748	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	<0.002
	11/19/19	<0.100	<0.0762	<0.152	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	2/24/2020	<0.100	<0.0769	<0.154	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	6/1/2020	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	8/19/2020	<0.100	<0.187	<0.374	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.002
	11/16/2020	<0.100	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	<0.004
MW-11	02/19/19	0.727	<0.0748	<0.150	0.00162	0.00176	0.083	0.0652	<0.001	--
	05/21/19	**3.05**	<0.0374	<0.0748	**0.0643**	0.00843	0.359	0.0355	<0.0005	--
	08/29/19	**17.4**	0.094	<0.0748	0.0038	0.24	**1.18**	**2.52**	<0.005	0.121

Please refer to notes at end of table.

Cascadia Associates, LLC

Appendix D
Summary of Analytical Results - Monitoring Wells
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Sample Date	TPHg Gasoline (mg/L)	TPHd Diesel (mg/L)	TPHo Heavy Oil (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-11	11/19/19	**45.0**	0.239	<0.151	**0.0526**	0.159	**4.33**	**7.73**	<0.02	**0.414**
	2/25/2020	**2.65**	0.341 AG	<0.154	0.00397	<0.01	0.292	0.257	<0.01	0.0257
	6/2/2020	**1.59**	0.129 AG	<0.15	**0.0232**	<0.0025	0.352	0.0812	<0.0025	0.0225
	6/2/2020 DUP	**1.62**	<0.0755	<0.151	**0.022**	<0.0025	0.353	0.083	<0.0025	0.022
	8/19/2020	**13.9** R	<0.187	<0.374	0.00337	0.175 R	**0.817** R	**2.93** R	<0.001	0.0906 R
	8/19/2020 DUP	**22.9** R	0.23 E	<0.377	**0.00541**	0.268 R	**1.36** R	**4.81** R	<0.001	0.145 R
	11/17/2020	**23.3**	0.298 AG	<0.151	**0.0359**	0.0705	**2.18**	**3.31**	<0.001	**0.207**
Washington DOE MTCA Method A Cleanup Level		0.8	0.5	0.5	0.005	1	0.7	1	0.02	0.16

Notes:

1. TPHg = Total petroleum hydrocarbons in gasoline carbon range by NW-TPHgx method.
2. TPHd = Total petroleum hydrocarbons in diesel carbon range by NW-TPHdx method.
3. TPHho = Total petroleum hydrocarbons ion heavy oil carbon range NW-TPHdx method.
4. **Bold** values represent concentration that exceeds MTCA Method A cleanup level.
5. Analysis completed without silica gel cleanup. Lab detected hydrocarbons with non-petroleum peaks or elution pattern that suggests the presence of biogenic interference.
6. Hydrocarbon pattern most closely resembles a blend of heavy gas-/light diesel-range components.
7. mg/L (ppm) = Milligrams per liter (parts per million).
8. TPHg cleanup level dependent on presence of benzene in groundwater. Cleanup level = 0.800 mg/L if benzene is present and 1.00 mg/L if benzene is not present.
9. Washington DOE MTCA Method A cleanup level = Washington Department of Ecology Model Toxics Control Act Method A cleanup level.
10. < = Not detected at or above the specified laboratory method reporting limit (MRL).
11. bgs = below ground surface
12. -- = Sample not analyzed for constituent.

Quality Assurance/Quality Control Data Qualifiers

A: Data flagged F-11 = The hydrocarbon pattern indicates possible weathered diesel, mineral oil, or a contribution from a related component.
B: Data flagged F-13 = The chromatographic pattern does not resembel the fuel standard used for quantitation.
C: Data flagged F-16 = Results for oil are estimated due to overlap from the reported diesel result.
D: Data flagged D = Laboratory report noted discrete peaks that are not indicative of diesel. The laboratory chemist confirmed the peaks were from non-petroleum organic material.
E: Data flagged F-18 = Result for Diesel (Diesel Range Organics, C12-C24) is due to overlap from Gasoline or a Gasoline Range product.
F: Data flagged F-19 = Results are estimated due to the presence of multiple duel products.
G: Data flagged F-20 = Result for Diesel is estimated due to overlap from Gasoline Range Organics or other VOCs.
J: Data flagged J = Reported result is an estimated value.
J-: Data flagged J- = Reported result is estimated and biased low.
Q: Data flagged Q = Sample prepared and/or analyzed outside of recommended holding time. Result is considered biased low.
R: Data flagged R = The relative percent difference between the sample and duplicate sample is above 30%.

APPENDIX E

DATA QUALITY REVIEW

1.0 INTRODUCTION

This attachment documents the results of a quality assurance/quality control (QA/QC) review of the analytical data for the groundwater samples collected as part of the 2020 quarterly groundwater monitoring events at the NuStar Terminals Operations Partnership (NuStar) Annex Terminal in Vancouver, Washington (the Facility). Soil and groundwater sample analyses were performed by accredited environmental laboratories; laboratories used during the investigation are listed in the table below. Copies of the laboratory reports are included in this attachment.

Report	Sampling Date	Event	Laboratory
A9B0728	2/24/20-2/25/20	Groundwater monitoring event	Apex Labs - Portland, OR.
A0F0070	6/1/20-6/2/20	Groundwater monitoring event	Apex Labs - Portland, OR.
A0H0521	8/17/20-8/18/20	Groundwater monitoring event	Apex Labs - Portland, OR.
A0K0700	11/16/20-11/17/20	Groundwater monitoring event	Apex Labs - Portland, OR.

2.0 DATA VALIDATION

The QA review included examination and validation of the laboratory data packages for the following:

- Analytical preparation and quantitation methods;
- Analytical method holding times;
- Sample handling;
- Chain-of-custody protocols handling;
- Detection and reporting limits;
- Method blank detections;
- Laboratory control samples, matrix spikes and surrogates to assess laboratory accuracy;
- Laboratory control sample duplicates and matrix spike duplicates to assess laboratory precision; and
- Field duplicates to assess sampling and laboratory precision

The QA/QC review did not include a review of raw data.

2.1 DATA QUALIFIERS

Any data that are found to have possible bias or error were qualified and flagged. The flags used in the data table are below.

F-11	The hydrocarbon pattern indicates possible weathered diesel, mineral oil, or a contribution from a related component.
F-13, F-18 - F-20	Various laboratory notes regarding the hydrocarbon pattern on the NWTPH-Gx and NWTPH-Dx analysis; in general, the chromatograph patterns don't exactly match the standard and/or there is an overlap in hydrocarbon ranges in the samples. Note: while the hydrocarbon overlap was noted on the report tables, the data flags were not carried through to the tables as they don't indicate a quality issue for sample results.
Q-01	Spike recovery and/or RPD is outside acceptance limits.
Q-17	Relative percent difference (RPD) between original and duplicate is outside control limits.
Q-19	Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.
Q-30	Recovery for Lab Control Spike (LCS) is below the lower control limit. Data may be biased low.
Q-41	Estimated results. Recovery of continuing calibration verification sample above upper control limits for this analyte. Results are likely biased high.
Q-42	Matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample and percent recovery or RPD was outside control limits.
R	The relative percent difference between the sample and duplicate sample is above 30%.
T-02	The Batch QC sample was analyzed outside of the method specified 12-hour tine window. Results are estimated.

3.0 ANALYTICAL METHODS

Groundwater analyses included the following:

- Gasoline-range petroleum hydrocarbons (TPHg) by Method NWTPH-Gx;
- Diesel-range petroleum hydrocarbons (TPHd) and oil-range petroleum hydrocarbons (TPHo) by Method NWTPH-Dx; and

- Benzene, toluene, ethylbenzene, and xylenes (collectively BTEX) and Naphthalene by U.S. Environmental Protection Agency (EPA) Method 8260C.

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 soil and groundwater concentration monitoring 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 for the samples were compared to Washington Department of Ecology MTCA Method A Cleanup Levels for each parameter. Precision, accuracy, representativeness, completeness, and comparability parameters used to indicate data quality are defined below.

4.1 HOLDING TIMES AND SAMPLE RECEIPT

The holding time is the minimum amount of time the sample can be stored before analytes start to degrade and are not representative of initial sampling concentrations. Holding times are defined by analytical methods. The groundwater samples included in this QA/QC review were analyzed within the method recommended holding time.

Method	Matrix	Analyte	Preservative	Hold Time
EPA 8260C	Water	BTEX, MTBE and naphthalene	Hydrochloric Acid (HCl) to pH<2; No headspace; Glass VOA	14 days
NWTPH-Gx	Water	Gasoline Range Organics	Hydrochloric Acid (HCl) to pH<2; No headspace; Glass	14 days
NWTPH-Dx	Water	Diesel Range Organics	Hydrochloric Acid (HCl) to pH<2; Amber glass container	14 days

Samples were received on ice below 4°C by the analytical laboratory. Sampling containers arrived intact and unbroken to the laboratories. Groundwater samples to be analyzed for volatile organic compounds (VOCs) were received without headspace in VOA (volatile organic analysis) sampling containers. All chain-of-custody procedures were appropriately relinquished by the Cascadia Associates sampler and received by the analytical laboratory. There were no major discrepancies found between the bottles and the chain-of-custody procedures received.

4.2 REPORTING LIMITS

Reporting limits are the lowest concentration an instrument is capable of accurately detecting an analyte. They are determined by the laboratory and are based on instrumentation capabilities, the matrix of field samples, sample preparation procedures and suggested reporting limits by the EPA

or the Washington Department of Ecology. In some cases, the reporting limits may be raised due to high concentrations of analytes or matrix interferences. Detection limits were generally consistent with industry standards and regulatory standards. Reporting limits for individual samples varied based on the magnitude of the chemical impact.

4.3 METHOD BLANKS

A method—or laboratory—blank is a QC sample prepared by the laboratory from an analyte-free matrix that is analyzed in an analytical batch along with environmental and other QC samples. It is used to assess laboratory contamination or background interferences. Analytes were not detected in the method blanks during the above-referenced analyses, with one exception:

> From report A0H0521, diesel range hydrocarbons were detected above the reporting limit in a laboratory control blank. The associated data is flagged "B-02" if the detected concentration was less than five times the blank detection, indicating the result may be biased high. In the above-referenced analyses, no data were flagged B-02.

4.4 ACCURACY

Accuracy compares the accepted reference concentration of an analyte to the concentration determined analytically. Accuracy is measured as a percent recovery. This recovery must be within a certain range or control limit for the data in an analytical batch to be considered acceptable. The analytical laboratory provides QC samples and surrogates to help determine the accuracy and acceptability of the data reported. These QC samples and surrogates are discussed below.

4.4.1 Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control duplicate samples (LCSD) were analyzed by the laboratory to assess the accuracy of the analytical methods. A minimum of one set of LCS and LCSD was analyzed per analytical batch. The LCS and LCSD are prepared from an analyte-free matrix that is spiked with known levels of compounds of concern. The concentrations are measured and compared to the known spiked levels. This comparison is expressed as percent recovery. The percent recoveries for LCS and LCSD quality control samples were within method control limits with one exception:

> From report A0F0070, an LCS analysis was performed on a blank (batch 0060128) and percent recovery for NWTPH-Dx was outside of control limits. Because a duplicate LCS analysis had percent recovery within method control limits for the same batch, no data were flagged.

4.4.2 Matrix Spikes

A matrix spike QC sample is used to assess the performance of the analytical method by determining potential matrix interferences. MS and 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 percent recoveries for MS and MSD QC samples were within method control limits.

4.4.3 Surrogates

Surrogates are organic compounds that are similar in chemical composition to the analytes of interest but are not likely to be found in the environment. They are spiked at a known concentration into environmental and batch QC samples prior to sample preparation and analysis. Surrogate recoveries for environmental samples are used to evaluate matrix interference, sample preparation efficiency and analysis performance on a sample-specific basis. In some cases, the surrogate recovery was either estimated or not available due to sample dilution required for high analyte concentration and/or matrix interference. Surrogate recoveries were within control limits with the following exception:

> From report A0B0728, recovery of a diesel-range surrogate for samples from wells MW-5 and MW-6 was outside laboratory control limits. The data were flagged F-18 and F-20 respectively.

4.5 PRECISION

Precision is measured by how close values of duplicate analyses are to each other. These duplicate analyses are prepared from separate aliquots of the same sample and are analyzed at the same (or similar) time. Precision in the field ensures that samples taken are representative of field concentrations; this is demonstrated by field duplicates. Analytical precision is the ability of the laboratory to reproduce results that are similar to each other; this is measured through duplicate analysis of environmental and batch QC samples. Precision is estimated by the RPD between the original analysis and the duplicate analysis.

4.5.1 Laboratory Control Sample Duplicates

The analytical batch LCS concentration of an analyte is compared to the LCSD concentration of the same analyte. The RPD is calculated from these two concentrations, which must be below a certain percentage to be considered acceptable. The RPD values for the laboratory control samples of the same batch were within the method control limits.

4.5.2 Matrix Spikes

Like the LCS/LCSD, the MS/MSD analyte concentrations are also compared to each other and expressed as an RPD. The RPD values for analytical batch MS/MSD were within the control limit.

4.5.3 Field Duplicate

A field duplicate is a second field sample collected from a selected sample location. Field duplicate samples serve as a check on laboratory precision, sampling quality, as well as potential variability of the sample matrix. The field duplicate is analyzed and compared to the original sample to assess

precision. This comparison can be expressed by the RPD between the original and duplicate samples. Application of RPD values is appropriate when the analyte result is five times greater than the reporting limit. Laboratory precision decreases as the analytical result approaches the reporting limit. One field duplicate was analyzed during each quarterly monitoring event. RPD values for the field duplicates were within control limits with the following exception:

> From report A0H0521, the RPD between the sample and the duplicate from well MW-11 was greater than 30% for TPH-g, toluene, ethylbenzene, xylenes, and naphthalene. The associated data were flagged R.

5.0 CONCLUSION

The overall QA objectives have been met and the data are of adequate quality for use in this project.

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Wednesday, March 4, 2020

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

RE: A0B0728 - Nustar Vannex - GWM 1Q 20

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 A0B0728, which was received by the laboratory on 2/26/2020 at 12:19:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample reciept, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	0.8 degC	Cooler #2	1.4 degC
Cooler #3	0.8 degC		

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.
All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-7	A0B0728-01	Water	02/24/20 08:57	02/26/20 12:19
MW-10	A0B0728-02	Water	02/24/20 09:54	02/26/20 12:19
MW-5	A0B0728-03	Water	02/24/20 10:46	02/26/20 12:19
MW-5D	A0B0728-04	Water	02/24/20 11:29	02/26/20 12:19
MW-8	A0B0728-05	Water	02/24/20 12:13	02/26/20 12:19
MW-8D	A0B0728-06	Water	02/24/20 13:06	02/26/20 12:19
MW-9	A0B0728-07	Water	02/24/20 14:03	02/26/20 12:19
MW-6	A0B0728-08	Water	02/25/20 07:51	02/26/20 12:19
MW-6 Dup	A0B0728-09	Water	02/25/20 07:51	02/26/20 12:19
MW-1	A0B0728-10	Water	02/25/20 09:12	02/26/20 12:19
MW-11	A0B0728-11	Water	02/25/20 10:05	02/26/20 12:19
MW-3	A0B0728-12	Water	02/25/20 11:18	02/26/20 12:19
MW-2	A0B0728-13	Water	02/25/20 12:27	02/26/20 12:19
MW-4	A0B0728-14	Water	02/25/20 13:39	02/26/20 12:19
Trip Blank	A0B0728-15	Water	02/24/20 00:00	02/26/20 12:19

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 (A0B0728-01)				**Matrix: Water**		**Batch: 0020856**		
Diesel	ND	---	0.0769	mg/L	1	02/28/20 01:35	NWTPH-Dx LL	
Oil	ND	---	0.154	mg/L	1	02/28/20 01:35	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 61 %*		*Limits: 50-150 %*	*1*	*02/28/20 01:35*	*NWTPH-Dx LL*	
MW-10 (A0B0728-02)				**Matrix: Water**		**Batch: 0020856**		
Diesel	ND	---	0.0769	mg/L	1	02/28/20 01:55	NWTPH-Dx LL	
Oil	ND	---	0.154	mg/L	1	02/28/20 01:55	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 70 %*		*Limits: 50-150 %*	*1*	*02/28/20 01:55*	*NWTPH-Dx LL*	
MW-5 (A0B0728-03)				**Matrix: Water**		**Batch: 0020856**		
Diesel	**2.40**	---	0.0769	mg/L	1	02/27/20 21:29	NWTPH-Dx LL	**F-20**
Oil	ND	---	0.154	mg/L	1	02/27/20 21:29	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 65 %*		*Limits: 50-150 %*	*1*	*02/27/20 21:29*	*NWTPH-Dx LL*	
MW-5D (A0B0728-04)				**Matrix: Water**		**Batch: 0020856**		
Diesel	**0.109**	---	0.0769	mg/L	1	02/27/20 21:49	NWTPH-Dx LL	**F-11**
Oil	ND	---	0.154	mg/L	1	02/27/20 21:49	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 70 %*		*Limits: 50-150 %*	*1*	*02/27/20 21:49*	*NWTPH-Dx LL*	
MW-8 (A0B0728-05)				**Matrix: Water**		**Batch: 0020856**		
Diesel	ND	---	0.0769	mg/L	1	02/27/20 22:10	NWTPH-Dx LL	
Oil	ND	---	0.154	mg/L	1	02/27/20 22:10	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 73 %*		*Limits: 50-150 %*	*1*	*02/27/20 22:10*	*NWTPH-Dx LL*	
MW-8D (A0B0728-06)				**Matrix: Water**		**Batch: 0020856**		
Diesel	ND	---	0.0769	mg/L	1	02/27/20 22:30	NWTPH-Dx LL	
Oil	ND	---	0.154	mg/L	1	02/27/20 22:30	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 73 %*		*Limits: 50-150 %*	*1*	*02/27/20 22:30*	*NWTPH-Dx LL*	
MW-9 (A0B0728-07)				**Matrix: Water**		**Batch: 0020856**		
Diesel	ND	---	0.0769	mg/L	1	02/27/20 22:51	NWTPH-Dx LL	
Oil	ND	---	0.154	mg/L	1	02/27/20 22:51	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 72 %*		*Limits: 50-150 %*	*1*	*02/27/20 22:51*	*NWTPH-Dx LL*	
MW-6 (A0B0728-08RE1)				**Matrix: Water**		**Batch: 0020856**		
Diesel	**4.02**	---	0.385	mg/L	5	02/28/20 08:42	NWTPH-Dx LL	**F-20**

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-6 (A0B0728-08RE1)				**Matrix: Water**		**Batch: 0020856**		
Oil	ND	---	0.769	mg/L	5	02/28/20 08:42	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 56 %*		*Limits: 50-150 %*	*5*	*02/28/20 08:42*	*NWTPH-Dx LL*	*S-05*
MW-6 Dup (A0B0728-09RE1)				**Matrix: Water**		**Batch: 0020856**		
Diesel	**4.35**	---	0.385	mg/L	5	02/28/20 09:03	NWTPH-Dx LL	**F-20**
Oil	ND	---	0.769	mg/L	5	02/28/20 09:03	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 58 %*		*Limits: 50-150 %*	*5*	*02/28/20 09:03*	*NWTPH-Dx LL*	*S-05*
MW-1 (A0B0728-10)				**Matrix: Water**		**Batch: 0020856**		
Diesel	**0.201**	---	0.0769	mg/L	1	02/27/20 23:11	NWTPH-Dx LL	**F-11**
Oil	ND	---	0.154	mg/L	1	02/27/20 23:11	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 67 %*		*Limits: 50-150 %*	*1*	*02/27/20 23:11*	*NWTPH-Dx LL*	
MW-11 (A0B0728-11)				**Matrix: Water**		**Batch: 0020856**		
Diesel	**0.341**	---	0.0769	mg/L	1	02/27/20 23:32	NWTPH-Dx LL	**F-11, F-20**
Oil	ND	---	0.154	mg/L	1	02/27/20 23:32	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 65 %*		*Limits: 50-150 %*	*1*	*02/27/20 23:32*	*NWTPH-Dx LL*	
MW-3 (A0B0728-12)				**Matrix: Water**		**Batch: 0020856**		
Diesel	**0.0955**	---	0.0769	mg/L	1	02/27/20 23:52	NWTPH-Dx LL	**F-11**
Oil	ND	---	0.154	mg/L	1	02/27/20 23:52	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 67 %*		*Limits: 50-150 %*	*1*	*02/27/20 23:52*	*NWTPH-Dx LL*	
MW-2 (A0B0728-13)				**Matrix: Water**		**Batch: 0020856**		
Diesel	ND	---	0.0769	mg/L	1	02/28/20 00:13	NWTPH-Dx LL	
Oil	ND	---	0.154	mg/L	1	02/28/20 00:13	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 65 %*		*Limits: 50-150 %*	*1*	*02/28/20 00:13*	*NWTPH-Dx LL*	
MW-4 (A0B0728-14)				**Matrix: Water**		**Batch: 0020856**		
Diesel	ND	---	0.0769	mg/L	1	02/28/20 00:33	NWTPH-Dx LL	
Oil	ND	---	0.154	mg/L	1	02/28/20 00:33	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 76 %*		*Limits: 50-150 %*	*1*	*02/28/20 00:33*	*NWTPH-Dx LL*	

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Lisa Domenighini, Client Services Manager

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6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Silica Gel Column Cleanup

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-5 (A0B0728-03)				**Matrix: Water**		**Batch: 0030047**		
Diesel	**1.02**	---	0.0769	mg/L	1	03/02/20 23:03	NWTPH-Dx/SGC	**F-18**
Oil	ND	---	0.154	mg/L	1	03/02/20 23:03	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		*Recovery: 45 %*		*Limits: 50-150 %*	*1*	*03/02/20 23:03*	*NWTPH-Dx/SGC*	*S-06*
MW-6 (A0B0728-08)				**Matrix: Water**		**Batch: 0030047**		
Diesel	**1.45**	---	0.0769	mg/L	1	03/02/20 23:23	NWTPH-Dx/SGC	**F-20**
Oil	ND	---	0.154	mg/L	1	03/02/20 23:23	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		*Recovery: 46 %*		*Limits: 50-150 %*	*1*	*03/02/20 23:23*	*NWTPH-Dx/SGC*	*S-06*
MW-6 Dup (A0B0728-09)				**Matrix: Water**		**Batch: 0030047**		
Diesel	**1.56**	---	0.0769	mg/L	1	03/02/20 23:42	NWTPH-Dx/SGC	**F-20**
Oil	ND	---	0.154	mg/L	1	03/02/20 23:42	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		*Recovery: 50 %*		*Limits: 50-150 %*	*1*	*03/02/20 23:42*	*NWTPH-Dx/SGC*	

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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 (A0B0728-01)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	02/27/20 13:53	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 97 %*	*Limits: 50-150 %*	*1*	*02/27/20 13:53*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*102 %*	*50-150 %*	*1*	*02/27/20 13:53*	*NWTPH-Gx (MS)*	
MW-10 (A0B0728-02)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	02/27/20 14:20	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 97 %*	*Limits: 50-150 %*	*1*	*02/27/20 14:20*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*102 %*	*50-150 %*	*1*	*02/27/20 14:20*	*NWTPH-Gx (MS)*	
MW-5 (A0B0728-03)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	**23.4**	---	2.00	mg/L	20	02/27/20 18:22	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 99 %*	*Limits: 50-150 %*	*1*	*02/27/20 18:22*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*99 %*	*50-150 %*	*1*	*02/27/20 18:22*	*NWTPH-Gx (MS)*	
MW-5D (A0B0728-04)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	02/27/20 14:47	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 98 %*	*Limits: 50-150 %*	*1*	*02/27/20 14:47*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*100 %*	*50-150 %*	*1*	*02/27/20 14:47*	*NWTPH-Gx (MS)*	
MW-8 (A0B0728-05)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	02/27/20 15:14	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 97 %*	*Limits: 50-150 %*	*1*	*02/27/20 15:14*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*100 %*	*50-150 %*	*1*	*02/27/20 15:14*	*NWTPH-Gx (MS)*	
MW-8D (A0B0728-06)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	02/27/20 15:40	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 97 %*	*Limits: 50-150 %*	*1*	*02/27/20 15:40*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*101 %*	*50-150 %*	*1*	*02/27/20 15:40*	*NWTPH-Gx (MS)*	
MW-9 (A0B0728-07)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	02/27/20 16:07	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 97 %*	*Limits: 50-150 %*	*1*	*02/27/20 16:07*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*101 %*	*50-150 %*	*1*	*02/27/20 16:07*	*NWTPH-Gx (MS)*	
MW-6 (A0B0728-08)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	**15.6**	---	2.00	mg/L	20	02/27/20 19:43	NWTPH-Gx (MS)	

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

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Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-6 (A0B0728-08)				**Matrix: Water**		**Batch: 0020845**		
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 99 %*	*Limits: 50-150 %*	*1*	*02/27/20 19:43*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*100 %*	*50-150 %*	*1*	*02/27/20 19:43*	*NWTPH-Gx (MS)*	
MW-6 Dup (A0B0728-09)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	**14.8**	---	2.00	mg/L	20	02/27/20 20:36	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 99 %*	*Limits: 50-150 %*	*1*	*02/27/20 20:36*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*99 %*	*50-150 %*	*1*	*02/27/20 20:36*	*NWTPH-Gx (MS)*	
MW-1 (A0B0728-10)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	02/27/20 16:34	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 98 %*	*Limits: 50-150 %*	*1*	*02/27/20 16:34*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*101 %*	*50-150 %*	*1*	*02/27/20 16:34*	*NWTPH-Gx (MS)*	
MW-11 (A0B0728-11)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	**2.65**	---	1.00	mg/L	10	02/27/20 21:03	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 98 %*	*Limits: 50-150 %*	*1*	*02/27/20 21:03*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*98 %*	*50-150 %*	*1*	*02/27/20 21:03*	*NWTPH-Gx (MS)*	
MW-3 (A0B0728-12)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	02/27/20 17:01	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 98 %*	*Limits: 50-150 %*	*1*	*02/27/20 17:01*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*100 %*	*50-150 %*	*1*	*02/27/20 17:01*	*NWTPH-Gx (MS)*	
MW-2 (A0B0728-13)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	02/27/20 17:28	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 96 %*	*Limits: 50-150 %*	*1*	*02/27/20 17:28*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*101 %*	*50-150 %*	*1*	*02/27/20 17:28*	*NWTPH-Gx (MS)*	
MW-4 (A0B0728-14)				**Matrix: Water**		**Batch: 0020845**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	02/27/20 17:55	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 96 %*	*Limits: 50-150 %*	*1*	*02/27/20 17:55*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*101 %*	*50-150 %*	*1*	*02/27/20 17:55*	*NWTPH-Gx (MS)*	

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EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 (A0B0728-01)				**Matrix: Water**		**Batch: 0020845**		
Benzene	ND	---	0.200	ug/L	1	02/27/20 13:53	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	02/27/20 13:53	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	02/27/20 13:53	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	02/27/20 13:53	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	02/27/20 13:53	EPA 8260C	
Xylenes, total	ND	---	1.50	ug/L	1	02/27/20 13:53	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*105 %*	*Limits:* *80-120 %*	*1*	*02/27/20 13:53*	*EPA 8260C*	
Toluene-d8 (Surr)			*99 %*	*80-120 %*	*1*	*02/27/20 13:53*	*EPA 8260C*	
4-Bromofluorobenzene (Surr)			*100 %*	*80-120 %*	*1*	*02/27/20 13:53*	*EPA 8260C*	
MW-10 (A0B0728-02)				**Matrix: Water**		**Batch: 0020845**		
Benzene	ND	---	0.200	ug/L	1	02/27/20 14:20	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	02/27/20 14:20	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	02/27/20 14:20	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	02/27/20 14:20	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	02/27/20 14:20	EPA 8260C	
Xylenes, total	ND	---	1.50	ug/L	1	02/27/20 14:20	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*104 %*	*Limits:* *80-120 %*	*1*	*02/27/20 14:20*	*EPA 8260C*	
Toluene-d8 (Surr)			*99 %*	*80-120 %*	*1*	*02/27/20 14:20*	*EPA 8260C*	
4-Bromofluorobenzene (Surr)			*101 %*	*80-120 %*	*1*	*02/27/20 14:20*	*EPA 8260C*	
MW-5 (A0B0728-03)				**Matrix: Water**		**Batch: 0020845**		
Benzene	ND	---	4.00	ug/L	20	02/27/20 18:22	EPA 8260C	
Ethylbenzene	**176**	---	10.0	ug/L	20	02/27/20 18:22	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	20.0	ug/L	20	02/27/20 18:22	EPA 8260C	
Naphthalene	**1520**	---	40.0	ug/L	20	02/27/20 18:22	EPA 8260C	
Toluene	ND	---	20.0	ug/L	20	02/27/20 18:22	EPA 8260C	
Xylenes, total	**809**	---	30.0	ug/L	20	02/27/20 18:22	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*103 %*	*Limits:* *80-120 %*	*1*	*02/27/20 18:22*	*EPA 8260C*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*02/27/20 18:22*	*EPA 8260C*	
4-Bromofluorobenzene (Surr)			*98 %*	*80-120 %*	*1*	*02/27/20 18:22*	*EPA 8260C*	
MW-5D (A0B0728-04)				**Matrix: Water**		**Batch: 0020845**		
Benzene	ND	---	0.200	ug/L	1	02/27/20 14:47	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	02/27/20 14:47	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	02/27/20 14:47	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	02/27/20 14:47	EPA 8260C	

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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-5D (A0B0728-04)				**Matrix: Water**		**Batch: 0020845**		
Toluene	ND	---	1.00	ug/L	1	02/27/20 14:47	EPA 8260C	
Xylenes, total	ND	---	1.50	ug/L	1	02/27/20 14:47	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*103 %*	*Limits: 80-120 %*	*1*	*02/27/20 14:47*	*EPA 8260C*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*02/27/20 14:47*	*EPA 8260C*	
4-Bromofluorobenzene (Surr)			*100 %*	*80-120 %*	*1*	*02/27/20 14:47*	*EPA 8260C*	
MW-8 (A0B0728-05)				**Matrix: Water**		**Batch: 0020845**		
Benzene	ND	---	0.200	ug/L	1	02/27/20 15:14	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	02/27/20 15:14	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	02/27/20 15:14	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	02/27/20 15:14	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	02/27/20 15:14	EPA 8260C	
Xylenes, total	ND	---	1.50	ug/L	1	02/27/20 15:14	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*104 %*	*Limits: 80-120 %*	*1*	*02/27/20 15:14*	*EPA 8260C*	
Toluene-d8 (Surr)			*100 %*	*80-120 %*	*1*	*02/27/20 15:14*	*EPA 8260C*	
4-Bromofluorobenzene (Surr)			*100 %*	*80-120 %*	*1*	*02/27/20 15:14*	*EPA 8260C*	
MW-8D (A0B0728-06)				**Matrix: Water**		**Batch: 0020845**		
Benzene	ND	---	0.200	ug/L	1	02/27/20 15:40	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	02/27/20 15:40	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	02/27/20 15:40	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	02/27/20 15:40	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	02/27/20 15:40	EPA 8260C	
Xylenes, total	ND	---	1.50	ug/L	1	02/27/20 15:40	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*105 %*	*Limits: 80-120 %*	*1*	*02/27/20 15:40*	*EPA 8260C*	
Toluene-d8 (Surr)			*99 %*	*80-120 %*	*1*	*02/27/20 15:40*	*EPA 8260C*	
4-Bromofluorobenzene (Surr)			*100 %*	*80-120 %*	*1*	*02/27/20 15:40*	*EPA 8260C*	
MW-9 (A0B0728-07)				**Matrix: Water**		**Batch: 0020845**		
Benzene	ND	---	0.200	ug/L	1	02/27/20 16:07	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	02/27/20 16:07	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	02/27/20 16:07	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	02/27/20 16:07	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	02/27/20 16:07	EPA 8260C	
Xylenes, total	ND	---	1.50	ug/L	1	02/27/20 16:07	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*104 %*	*Limits: 80-120 %*	*1*	*02/27/20 16:07*	*EPA 8260C*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*02/27/20 16:07*	*EPA 8260C*	

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-9 (A0B0728-07)				**Matrix: Water**		**Batch: 0020845**		
Surrogate: 4-Bromofluorobenzene (Surr)		*Recovery: 100 %*	*Limits: 80-120 %*		*1*	*02/27/20 16:07*	*EPA 8260C*	
MW-6 (A0B0728-08)				**Matrix: Water**		**Batch: 0020845**		
Benzene	**190**	---	4.00	ug/L	20	02/27/20 19:43	EPA 8260C	
Ethylbenzene	**1740**	---	10.0	ug/L	20	02/27/20 19:43	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	20.0	ug/L	20	02/27/20 19:43	EPA 8260C	
Naphthalene	**340**	---	40.0	ug/L	20	02/27/20 19:43	EPA 8260C	
Toluene	**30.8**	---	20.0	ug/L	20	02/27/20 19:43	EPA 8260C	
Xylenes, total	**420**	---	30.0	ug/L	20	02/27/20 19:43	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 101 %*	*Limits: 80-120 %*		*1*	*02/27/20 19:43*	*EPA 8260C*	
Toluene-d8 (Surr)		*97 %*	*80-120 %*		*1*	*02/27/20 19:43*	*EPA 8260C*	
4-Bromofluorobenzene (Surr)		*99 %*	*80-120 %*		*1*	*02/27/20 19:43*	*EPA 8260C*	
MW-6 Dup (A0B0728-09)				**Matrix: Water**		**Batch: 0020845**		
Benzene	**186**	---	4.00	ug/L	20	02/27/20 20:36	EPA 8260C	
Ethylbenzene	**1680**	---	10.0	ug/L	20	02/27/20 20:36	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	20.0	ug/L	20	02/27/20 20:36	EPA 8260C	
Naphthalene	**329**	---	40.0	ug/L	20	02/27/20 20:36	EPA 8260C	
Toluene	**28.8**	---	20.0	ug/L	20	02/27/20 20:36	EPA 8260C	
Xylenes, total	**405**	---	30.0	ug/L	20	02/27/20 20:36	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 102 %*	*Limits: 80-120 %*		*1*	*02/27/20 20:36*	*EPA 8260C*	
Toluene-d8 (Surr)		*98 %*	*80-120 %*		*1*	*02/27/20 20:36*	*EPA 8260C*	
4-Bromofluorobenzene (Surr)		*99 %*	*80-120 %*		*1*	*02/27/20 20:36*	*EPA 8260C*	
MW-1 (A0B0728-10)				**Matrix: Water**		**Batch: 0020845**		
Benzene	ND	---	0.200	ug/L	1	02/27/20 16:34	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	02/27/20 16:34	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	02/27/20 16:34	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	02/27/20 16:34	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	02/27/20 16:34	EPA 8260C	
Xylenes, total	ND	---	1.50	ug/L	1	02/27/20 16:34	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 105 %*	*Limits: 80-120 %*		*1*	*02/27/20 16:34*	*EPA 8260C*	
Toluene-d8 (Surr)		*100 %*	*80-120 %*		*1*	*02/27/20 16:34*	*EPA 8260C*	
4-Bromofluorobenzene (Surr)		*101 %*	*80-120 %*		*1*	*02/27/20 16:34*	*EPA 8260C*	
MW-11 (A0B0728-11)				**Matrix: Water**		**Batch: 0020845**		
Benzene	**3.97**	---	2.00	ug/L	10	02/27/20 21:03	EPA 8260C	

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Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-11 (A0B0728-11)				**Matrix: Water**		**Batch: 0020845**		
Ethylbenzene	**292**	---	5.00	ug/L	10	02/27/20 21:03	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	10.0	ug/L	10	02/27/20 21:03	EPA 8260C	
Naphthalene	**25.7**	---	20.0	ug/L	10	02/27/20 21:03	EPA 8260C	
Toluene	ND	---	10.0	ug/L	10	02/27/20 21:03	EPA 8260C	
Xylenes, total	**257**	---	15.0	ug/L	10	02/27/20 21:03	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*101 %*	*Limits:*	*80-120 %*	*1*	*02/27/20 21:03*	*EPA 8260C*
Toluene-d8 (Surr)			*99 %*		*80-120 %*	*1*	*02/27/20 21:03*	*EPA 8260C*
4-Bromofluorobenzene (Surr)			*99 %*		*80-120 %*	*1*	*02/27/20 21:03*	*EPA 8260C*
MW-3 (A0B0728-12)				**Matrix: Water**		**Batch: 0020845**		
Benzene	ND	---	0.200	ug/L	1	02/27/20 17:01	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	02/27/20 17:01	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	02/27/20 17:01	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	02/27/20 17:01	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	02/27/20 17:01	EPA 8260C	
Xylenes, total	ND	---	1.50	ug/L	1	02/27/20 17:01	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*104 %*	*Limits:*	*80-120 %*	*1*	*02/27/20 17:01*	*EPA 8260C*
Toluene-d8 (Surr)			*99 %*		*80-120 %*	*1*	*02/27/20 17:01*	*EPA 8260C*
4-Bromofluorobenzene (Surr)			*99 %*		*80-120 %*	*1*	*02/27/20 17:01*	*EPA 8260C*
MW-2 (A0B0728-13)				**Matrix: Water**		**Batch: 0020845**		
Benzene	ND	---	0.200	ug/L	1	02/27/20 17:28	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	02/27/20 17:28	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	02/27/20 17:28	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	02/27/20 17:28	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	02/27/20 17:28	EPA 8260C	
Xylenes, total	ND	---	1.50	ug/L	1	02/27/20 17:28	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*104 %*	*Limits:*	*80-120 %*	*1*	*02/27/20 17:28*	*EPA 8260C*
Toluene-d8 (Surr)			*101 %*		*80-120 %*	*1*	*02/27/20 17:28*	*EPA 8260C*
4-Bromofluorobenzene (Surr)			*101 %*		*80-120 %*	*1*	*02/27/20 17:28*	*EPA 8260C*
MW-4 (A0B0728-14)				**Matrix: Water**		**Batch: 0020845**		
Benzene	ND	---	0.200	ug/L	1	02/27/20 17:55	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	02/27/20 17:55	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	02/27/20 17:55	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	02/27/20 17:55	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	02/27/20 17:55	EPA 8260C	

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-4 (A0B0728-14)				**Matrix: Water**		**Batch: 0020845**		
Xylenes, total	ND	---	1.50	ug/L	1	02/27/20 17:55	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*104 %*	*Limits: 80-120 %*	*1*	*02/27/20 17:55*	*EPA 8260C*	
Toluene-d8 (Surr)			*99 %*	*80-120 %*	*1*	*02/27/20 17:55*	*EPA 8260C*	
4-Bromofluorobenzene (Surr)			*100 %*	*80-120 %*	*1*	*02/27/20 17:55*	*EPA 8260C*	

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EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0020856 - EPA 3510C (Fuels/Acid Ext.)												**Water**
Blank (0020856-BLK1)		Prepared: 02/27/20 11:15		Analyzed: 02/27/20 21:29								
NWTPH-Dx LL												
Diesel	ND	---	0.0727	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.145	mg/L	1	---	---	---	---	---	---	
Surr: o-Terphenyl (Surr)		*Recovery: 83 %*		*Limits: 50-150 %*			*Dilution: 1x*					
LCS (0020856-BS1)		Prepared: 02/27/20 11:15		Analyzed: 02/27/20 21:49								
NWTPH-Dx LL												
Diesel	0.407	---	0.0800	mg/L	1	0.500	---	81	58 - 115%	---	---	
Surr: o-Terphenyl (Surr)		*Recovery: 87 %*		*Limits: 50-150 %*			*Dilution: 1x*					
LCS Dup (0020856-BSD1)		Prepared: 02/27/20 11:15		Analyzed: 02/27/20 22:10								**Q-19**
NWTPH-Dx LL												
Diesel	0.361	---	0.0800	mg/L	1	0.500	---	72	58 - 115%	12	20%	
Surr: o-Terphenyl (Surr)		*Recovery: 88 %*		*Limits: 50-150 %*			*Dilution: 1x*					

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Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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6700 S.W. Sandburg Street
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EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Silica Gel Column Cleanup

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0030047 - EPA 3510C (Fuels/Acid Ext.) w/Silica Gel												**Water**
Blank (0030047-BLK1)			Prepared: 02/27/20 11:15		Analyzed: 03/02/20 22:03							
NWTPH-Dx/SGC												
Diesel	ND	---	0.0727	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.145	mg/L	1	---	---	---	---	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 74 %*		*Limits: 50-150 %*			*Dilution: 1x*				
LCS (0030047-BS1)			Prepared: 02/27/20 11:15		Analyzed: 03/02/20 22:23							
NWTPH-Dx/SGC												
Diesel	0.380	---	0.0800	mg/L	1	0.500	---	76	58 - 115%	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 79 %*		*Limits: 50-150 %*			*Dilution: 1x*				
LCS Dup (0030047-BSD1)			Prepared: 02/27/20 11:15		Analyzed: 03/02/20 22:43							**Q-19**
NWTPH-Dx/SGC												
Diesel	0.312	---	0.0800	mg/L	1	0.500	---	62	58 - 115%	20	20%	
Surr: o-Terphenyl (Surr)			*Recovery: 74 %*		*Limits: 50-150 %*			*Dilution: 1x*				

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Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0020845 - EPA 5030B									Water			
Blank (0020845-BLK1)		Prepared: 02/27/20 10:00		Analyzed: 02/27/20 12:32								
NWTPH-Gx (MS)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 95 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)			*100 %*		*50-150 %*			*"*				
LCS (0020845-BS2)		Prepared: 02/27/20 10:00		Analyzed: 02/27/20 12:05								
NWTPH-Gx (MS)												
Gasoline Range Organics	0.455	---	0.100	mg/L	1	0.500	---	91	80 - 120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 100 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)			*99 %*		*50-150 %*			*"*				
Duplicate (0020845-DUP1)		Prepared: 02/27/20 12:11		Analyzed: 02/27/20 18:49								
QC Source Sample: MW-5 (A0B0728-03)												
NWTPH-Gx (MS)												
Gasoline Range Organics	**24.1**	---	2.00	mg/L	20	---	23.4	---	---	3	30%	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 99 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)			*104 %*		*50-150 %*			*"*				
Duplicate (0020845-DUP2)		Prepared: 02/27/20 12:11		Analyzed: 02/27/20 20:10								
QC Source Sample: MW-6 (A0B0728-08)												
NWTPH-Gx (MS)												
Gasoline Range Organics	**16.0**	---	2.00	mg/L	20	---	15.6	---	---	3	30%	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 101 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)			*101 %*		*50-150 %*			*"*				

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Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0020845 - EPA 5030B									Water			
Blank (0020845-BLK1)		Prepared: 02/27/20 10:00		Analyzed: 02/27/20 12:32								
EPA 8260C												
Benzene	ND	---	0.200	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Isopropylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Xylenes, total	ND	---	1.50	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery: 103 %*		*Limits: 80-120 %*			*Dilution: 1x*					
Toluene-d8 (Surr)		*100 %*		*80-120 %*			*"*					
4-Bromofluorobenzene (Surr)		*102 %*		*80-120 %*			*"*					
LCS (0020845-BS1)		Prepared: 02/27/20 10:00		Analyzed: 02/27/20 11:29								
EPA 8260C												
Benzene	20.1	---	0.200	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.8	---	0.500	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	21.6	---	0.500	ug/L	1	20.0	---	108	80 - 120%	---	---	
Ethylbenzene	19.4	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
Isopropylbenzene	19.7	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
Methyl tert-butyl ether (MTBE)	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
Naphthalene	18.7	---	2.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
Toluene	19.1	---	1.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
1,2,4-Trimethylbenzene	19.7	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,3,5-Trimethylbenzene	20.0	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
Xylenes, total	57.8	---	1.50	ug/L	1	60.0	---	96	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery: 102 %*		*Limits: 80-120 %*			*Dilution: 1x*					
Toluene-d8 (Surr)		*97 %*		*80-120 %*			*"*					
4-Bromofluorobenzene (Surr)		*97 %*		*80-120 %*			*"*					
Duplicate (0020845-DUP1)		Prepared: 02/27/20 12:11		Analyzed: 02/27/20 18:49								

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Lisa Domenighini, Client Services Manager

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6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0020845 - EPA 5030B												**Water**
Duplicate (0020845-DUP1)			Prepared: 02/27/20 12:11		Analyzed: 02/27/20 18:49							
QC Source Sample: MW-5 (A0B0728-03)												
EPA 8260C												
Benzene	ND	---	4.00	ug/L	20	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	---	10.0	ug/L	20	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	---	10.0	ug/L	20	---	ND	---	---	---	30%	
Ethylbenzene	**176**	---	10.0	ug/L	20	---	176	---	---	0.3	30%	
Isopropylbenzene	**110**	---	20.0	ug/L	20	---	113	---	---	3	30%	
Methyl tert-butyl ether (MTBE)	ND	---	20.0	ug/L	20	---	ND	---	---	---	30%	
Naphthalene	**1580**	---	40.0	ug/L	20	---	1520	---	---	4	30%	
Toluene	ND	---	20.0	ug/L	20	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	**1070**	---	20.0	ug/L	20	---	1050	---	---	2	30%	
1,3,5-Trimethylbenzene	**958**	---	20.0	ug/L	20	---	950	---	---	0.8	30%	
Xylenes, total	**799**	---	30.0	ug/L	20	---	809	---	---	1	30%	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 102 %*		*Limits: 80-120 %*				*Dilution: 1x*			
Toluene-d8 (Surr)			*101 %*		*80-120 %*				*"*			
4-Bromofluorobenzene (Surr)			*98 %*		*80-120 %*				*"*			
Duplicate (0020845-DUP2)			Prepared: 02/27/20 12:11		Analyzed: 02/27/20 20:10							
QC Source Sample: MW-6 (A0B0728-08)												
EPA 8260C												
Benzene	**192**	---	4.00	ug/L	20	---	190	---	---	0.8	30%	
1,2-Dibromoethane (EDB)	ND	---	10.0	ug/L	20	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	---	10.0	ug/L	20	---	ND	---	---	---	30%	
Ethylbenzene	**1770**	---	10.0	ug/L	20	---	1740	---	---	2	30%	
Isopropylbenzene	**60.9**	---	20.0	ug/L	20	---	58.6	---	---	4	30%	
Methyl tert-butyl ether (MTBE)	ND	---	20.0	ug/L	20	---	ND	---	---	---	30%	
Naphthalene	**352**	---	40.0	ug/L	20	---	340	---	---	4	30%	
Toluene	**30.5**	---	20.0	ug/L	20	---	30.8	---	---	1	30%	
1,2,4-Trimethylbenzene	**166**	---	20.0	ug/L	20	---	160	---	---	3	30%	
1,3,5-Trimethylbenzene	**39.1**	---	20.0	ug/L	20	---	38.5	---	---	2	30%	
Xylenes, total	**426**	---	30.0	ug/L	20	---	420	---	---	2	30%	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 103 %*		*Limits: 80-120 %*				*Dilution: 1x*			
Toluene-d8 (Surr)			*98 %*		*80-120 %*				*"*			

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC
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503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0020845 - EPA 5030B									Water			
Duplicate (0020845-DUP2)		Prepared: 02/27/20 12:11		Analyzed: 02/27/20 20:10								
QC Source Sample: MW-6 (A0B0728-08)												
Surr: 4-Bromofluorobenzene (Surr)			*Recovery: 98 %*	*Limits: 80-120 %*			*Dilution: 1x*					
Matrix Spike (0020845-MS1)		Prepared: 02/27/20 12:11		Analyzed: 02/27/20 21:30								
QC Source Sample: MW-11 (A0B0728-11)												
EPA 8260C												
Benzene	202	---	2.00	ug/L	10	200	3.97	99	79 - 120%	---	---	
1,2-Dibromoethane (EDB)	203	---	5.00	ug/L	10	200	ND	102	77 - 121%	---	---	
1,2-Dichloroethane (EDC)	209	---	5.00	ug/L	10	200	ND	104	73 - 128%	---	---	
Ethylbenzene	483	---	5.00	ug/L	10	200	292	96	79 - 121%	---	---	
Isopropylbenzene	211	---	10.0	ug/L	10	200	9.01	101	72 - 131%	---	---	
Methyl tert-butyl ether (MTBE)	191	---	10.0	ug/L	10	200	ND	96	71 - 124%	---	---	
Naphthalene	210	---	20.0	ug/L	10	200	25.7	92	61 - 128%	---	---	
Toluene	191	---	10.0	ug/L	10	200	ND	95	80 - 121%	---	---	
1,2,4-Trimethylbenzene	313	---	10.0	ug/L	10	200	95.3	109	76 - 124%	---	---	
1,3,5-Trimethylbenzene	199	---	10.0	ug/L	10	200	ND	100	75 - 124%	---	---	
Xylenes, total	851	---	15.0	ug/L	10	600	257	99	79 - 121%	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 101 %*	*Limits: 80-120 %*			*Dilution: 1x*					
Toluene-d8 (Surr)			*97 %*	*80-120 %*			*"*					
4-Bromofluorobenzene (Surr)			*97 %*	*80-120 %*			*"*					

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EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Prep: EPA 3510C (Fuels/Acid Ext.)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0020856							
A0B0728-01	Water	NWTPH-Dx LL	02/24/20 08:57	02/27/20 12:46	1040mL/2mL	1000mL/2mL	0.96
A0B0728-02	Water	NWTPH-Dx LL	02/24/20 09:54	02/27/20 12:46	1040mL/2mL	1000mL/2mL	0.96
A0B0728-03	Water	NWTPH-Dx LL	02/24/20 10:46	02/27/20 12:46	1040mL/2mL	1000mL/2mL	0.96
A0B0728-04	Water	NWTPH-Dx LL	02/24/20 11:29	02/27/20 12:46	1040mL/2mL	1000mL/2mL	0.96
A0B0728-05	Water	NWTPH-Dx LL	02/24/20 12:13	02/27/20 12:46	1040mL/2mL	1000mL/2mL	0.96
A0B0728-06	Water	NWTPH-Dx LL	02/24/20 13:06	02/27/20 12:46	1040mL/2mL	1000mL/2mL	0.96
A0B0728-07	Water	NWTPH-Dx LL	02/24/20 14:03	02/27/20 12:46	1040mL/2mL	1000mL/2mL	0.96
A0B0728-08RE1	Water	NWTPH-Dx LL	02/25/20 07:51	02/27/20 11:15	1040mL/2mL	1000mL/2mL	0.96
A0B0728-09RE1	Water	NWTPH-Dx LL	02/25/20 07:51	02/27/20 11:15	1040mL/2mL	1000mL/2mL	0.96
A0B0728-10	Water	NWTPH-Dx LL	02/25/20 09:12	02/27/20 11:15	1040mL/2mL	1000mL/2mL	0.96
A0B0728-11	Water	NWTPH-Dx LL	02/25/20 10:05	02/27/20 11:15	1040mL/2mL	1000mL/2mL	0.96
A0B0728-12	Water	NWTPH-Dx LL	02/25/20 11:18	02/27/20 11:15	1040mL/2mL	1000mL/2mL	0.96
A0B0728-13	Water	NWTPH-Dx LL	02/25/20 12:27	02/27/20 11:15	1040mL/2mL	1000mL/2mL	0.96
A0B0728-14	Water	NWTPH-Dx LL	02/25/20 13:39	02/27/20 11:15	1040mL/2mL	1000mL/2mL	0.96

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Silica Gel Column Cleanup

Prep: EPA 3510C (Fuels/Acid Ext.) w/Silica Gel

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0030047							
A0B0728-03	Water	NWTPH-Dx/SGC	02/24/20 10:46	02/27/20 12:46			0.96
A0B0728-08	Water	NWTPH-Dx/SGC	02/25/20 07:51	02/27/20 11:15			0.96
A0B0728-09	Water	NWTPH-Dx/SGC	02/25/20 07:51	02/27/20 11:15			0.96

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0020845							
A0B0728-01	Water	NWTPH-Gx (MS)	02/24/20 08:57	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-02	Water	NWTPH-Gx (MS)	02/24/20 09:54	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-03	Water	NWTPH-Gx (MS)	02/24/20 10:46	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-04	Water	NWTPH-Gx (MS)	02/24/20 11:29	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-05	Water	NWTPH-Gx (MS)	02/24/20 12:13	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-06	Water	NWTPH-Gx (MS)	02/24/20 13:06	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-07	Water	NWTPH-Gx (MS)	02/24/20 14:03	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00

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Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

SAMPLE PREPARATION INFORMATION

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A0B0728-08	Water	NWTPH-Gx (MS)	02/25/20 07:51	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-09	Water	NWTPH-Gx (MS)	02/25/20 07:51	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-10	Water	NWTPH-Gx (MS)	02/25/20 09:12	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-11	Water	NWTPH-Gx (MS)	02/25/20 10:05	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-12	Water	NWTPH-Gx (MS)	02/25/20 11:18	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-13	Water	NWTPH-Gx (MS)	02/25/20 12:27	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-14	Water	NWTPH-Gx (MS)	02/25/20 13:39	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00

Selected Volatile Organic Compounds by EPA 8260C

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0020845							
A0B0728-01	Water	EPA 8260C	02/24/20 08:57	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-02	Water	EPA 8260C	02/24/20 09:54	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-03	Water	EPA 8260C	02/24/20 10:46	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-04	Water	EPA 8260C	02/24/20 11:29	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-05	Water	EPA 8260C	02/24/20 12:13	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-06	Water	EPA 8260C	02/24/20 13:06	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-07	Water	EPA 8260C	02/24/20 14:03	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-08	Water	EPA 8260C	02/25/20 07:51	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-09	Water	EPA 8260C	02/25/20 07:51	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-10	Water	EPA 8260C	02/25/20 09:12	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-11	Water	EPA 8260C	02/25/20 10:05	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-12	Water	EPA 8260C	02/25/20 11:18	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-13	Water	EPA 8260C	02/25/20 12:27	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00
A0B0728-14	Water	EPA 8260C	02/25/20 13:39	02/27/20 12:11	5mL/5mL	5mL/5mL	1.00

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Lisa A Domenighini

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Cascadia Associates	Project:	**Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number:	**GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager:	**Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

QUALIFIER DEFINITIONS

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

Apex Laboratories

F-11	The hydrocarbon pattern indicates possible weathered diesel, mineral oil, or a contribution from a related component.
F-18	Result for Diesel (Diesel Range Organics, C12-C24) is due to overlap from Gasoline or a Gasoline Range product.
F-20	Result for Diesel is Estimated due to overlap from Gasoline Range Organics or other VOCs.
Q-19	Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.
S-05	Surrogate recovery is estimated due to sample dilution required for high analyte concentration and/or matrix interference.
S-06	Surrogate recovery is outside of established control limits.

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Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

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 ½ the Reporting Limit (RL).
-For Blank hits falling between ½ 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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5820 SW Kelly Ave Unit B	Project Number:	**GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager:	**Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

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, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

LABORATORY ACCREDITATION INFORMATION

TNI Certification ID: OR100062 (Primary Accreditation) - EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Lisa Domenighini, Client Services Manager

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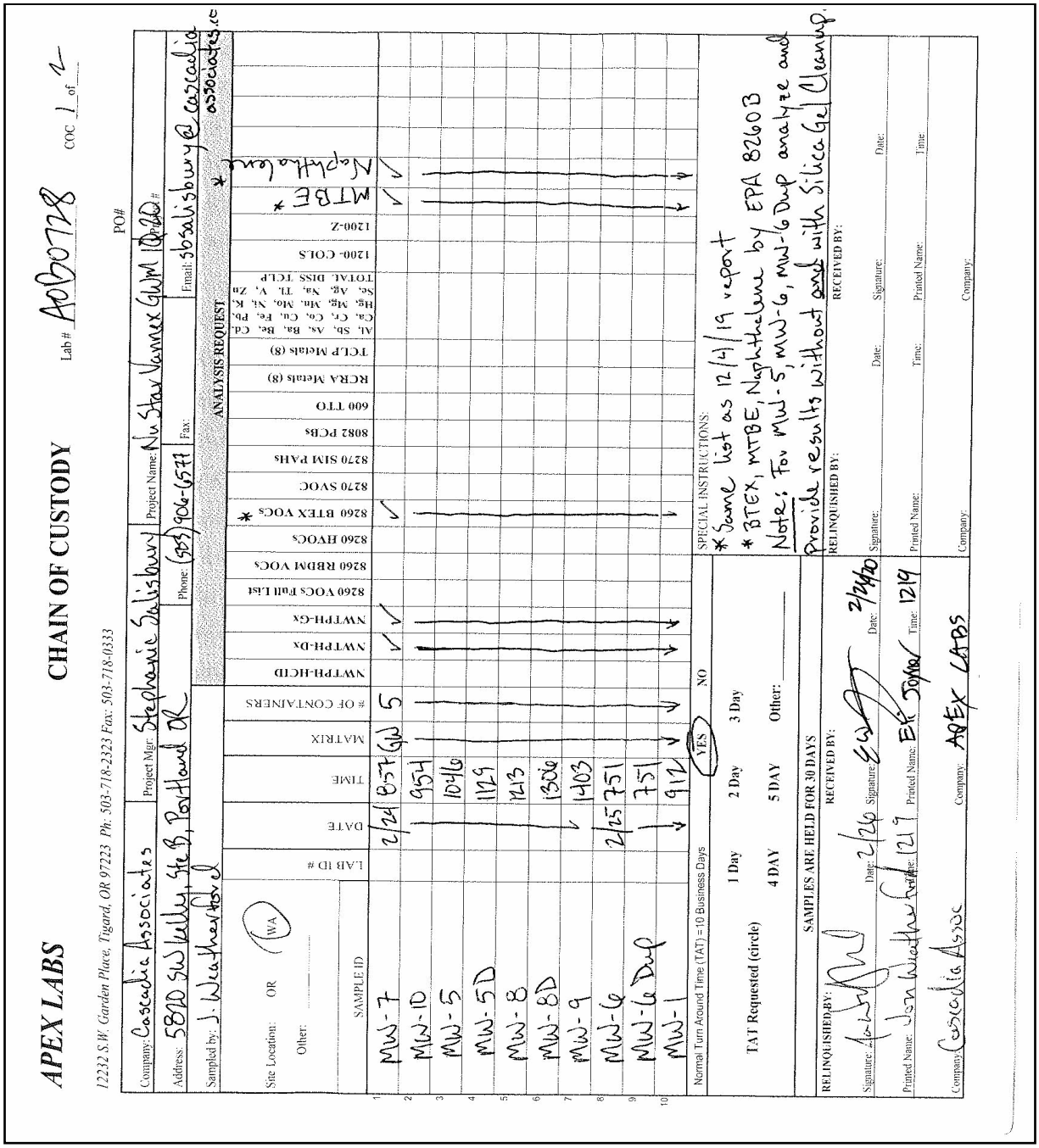

APEX LABS — CHAIN OF CUSTODY — Lab # A0B0728 — COC 1 of 1 — PO#

12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Company: Cascadia Associates — Project Mgr: Stephanie Salisbury — Project Name: Nu Star Vannex GWM 1Q20 #

Address: 5820 SW Kelly Ave B, Portland OR — Phone: (503) 906-6571 — Fax: — Email: ssalisbury@cascadiaassociates.com

Sampled by: J. Weatherford

Site Location: OR (WA) — Other: ____

ANALYSIS REQUEST

#	SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 VOCs Full List	8260 RBDM VOCs	8260 HVOCs	8260 BTEX VOCs *	8270 SVOC	8270 SIM PAHs	8082 PCBs	600 TTO	RCRA Metals (8)	TCLP Metals (8)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTAL DISS TCLP	1200- COLS	1200-Z	MTBE *	Naphthalene *
1	MW-7		2/24	0857	GW	5		✓	✓				✓									✓	✓
2	MW-10			954																			
3	MW-5			1046																			
4	MW-5D			1129																			
5	MW-8			1213																			
6	MW-8D			1306																			
7	MW-9			1403																			
8	MW-6		2/25	751																			
9	MW-6 Dup			751																			
10	MW-1			912	↓	↓	↓	↓	↓	↓			↓									↓	↓

Normal Turn Around Time (TAT) =10 Business Days — YES / NO

TAT Requested (circle): 1 Day — 2 Day — 3 Day — 4 DAY — 5 DAY — Other: ____

SPECIAL INSTRUCTIONS:
* Some list as 12/4/19 report
* BTEX, MTBE, Naphthalene by EPA 8260B
Note: For MW-5, MW-6, MW-6 Dup analyze and Provide results without gel with Silica Gel Cleanup.

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY: Signature: [signature] Date: 2/26 Printed Name: [illegible] Time: 1219 Company: Cascadia Assoc

RECEIVED BY: Signature: [signature] Date: 2/26/20 Printed Name: Eli Jones Time: 1219 Company: APEX LABS

RELINQUISHED BY: Signature: Date: Printed Name: Time: Company:

RECEIVED BY: Signature: Date: Printed Name: Time: Company:

Apex Laboratories

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 1Q 20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0B0728 - 03 04 20 1341**

APEX LABS

CHAIN OF CUSTODY

Lab # A0B0728 COC 2 of 2

12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

PO#

Company: Cascadia Associates | Project Mgr: Stephanie Salisbury | Project Name: NuStar Vannex GWM 1Q20 | Project #

Address: 5820 SW Kelly, Ste B, Portland, OR 97239 | Phone: (503) 906-6577 | Fax: | Email: sbsalisbury@cascadia associates.com

Sampled by: J. Weatherford

Site Location: OR (WA circled) Other:

ANALYSIS REQUEST

	SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 VOCs Full List	8260 RBDM VOCs	8260 HVOCs	8260 BTEX VOCs*	8270 SVOC	8270 SIM PAHs	8082 PCBs	600 TTO	RCRA Metals (8)	TCLP Metals (8)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTAL DISS TCLP	1200- COLS	1200-Z	MTBE*	Naphthalene*				
1	MW-11		2/25	1005	GW	5		✓	✓				✓										✓	✓				
2	MW-3		↓	1118	↓	↓		↓	↓				↓										↓	↓				
3	MW-2		↓	1227	↓	↓		↓	↓				↓										↓	↓				
4	MW-4		↓	1339	↓	↓		↓	↓				↓										↓	↓				
5																												
6																												
7																												
8																												
9																												
10																												

Normal Turn Around Time (TAT) = 10 Business Days (YES circled) NO

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: ______

SAMPLES ARE HELD FOR 30 DAYS

SPECIAL INSTRUCTIONS:
* Same list as 12/4/19 report
* BTEX, MTBE, Naphthalene by EPA 8260B

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date: 2/26	Signature: [signature] Date: 2/26/20	Signature: Date:	Signature: Date:
Printed Name: Jon Weatherford Time: 1219	Printed Name: Eric Joyner Time: 1219	Printed Name: Time:	Printed Name: Time:
Company: Cascadia Assoc.	Company: APEX LABS	Company:	Company:

Cascadia Associates	Project: Nustar Vannex	
5820 SW Kelly Ave Unit B	Project Number: GWM 1Q 20	Report ID:
Portland, OR 97239	Project Manager: Stephanie Salisbury	A0B0728 - 03 04 20 1341

APEX LABS COOLER RECEIPT FORM

Client: Cascadia Element WO#: A0 B0728

Project/Project #: Nustar Vannex GWM 1Q20

Delivery Info:

Date/time received: 2/26/20 @ 1219 By: EJ

Delivered by: Apex X Client ___ ESS ___ FedEx ___ UPS ___ Swift ___ Senvoy ___ SDS ___ Other ___

Cooler Inspection Date/time inspected: 2/26/20 @ 1300 By: EJ

Chain of Custody included? Yes X No ___ Custody seals? Yes ___ No X

Signed/dated by client? Yes X No ___

Signed/dated by Apex? Yes X No ___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	0.8	1.4	0.8				
Received on ice? (Y/N)	Y	Y	Y				
Temp. blanks? (Y/N)	Y	Y	Y				
Ice type: (Gel/Real/Other)	Real	Real	Real				
Condition:	Good	Good	Good				

Cooler out of temp? (Y/(N)) Possible reason why: ___

If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/(NA)

Out of temperature samples form initiated? Yes/No/(NA)

Samples Inspection: Date/time inspected: 2/26/20 @ 16:42 By: MS

All samples intact? Yes X No ___ Comments: ___

Bottle labels/COCs agree? Yes ___ No X Comments: 1/2 HCl Ambers D reads 2/24. Received (w/ 3) 3 trip blanks not listed on COC

COC/container discrepancies form initiated? Yes ___ No ___ NA X

Containers/volumes received appropriate for analysis? Yes X No ___ Comments: ___

Do VOA vials have visible headspace? Yes ___ No X NA ___

Comments sed in 3/3 VOAs on MW-8, MW-8D

Water samples: pH checked: Yes X No ___ NA ___ pH appropriate? Yes X No ___ NA ___

Comments: ___

Additional information: TB # 2252

Labeled by: [signature] Witness: MS Cooler Inspected by: MS See Project Contact Form: (Y)

Apex Laboratories

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[signature]

Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

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

Monday, June 8, 2020

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

RE: A0F0070 - Nustar Vannex - 0060-001-001

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 A0F0070, which was received by the laboratory on 6/2/2020 at 5:16:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample reciept, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler#1	4.9 degC	Cooler#2	4.7 degC
Cooler#3	5.1 degC		

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.
All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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Apex Laboratories, LLC

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

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-7	A0F0070-01	Water	06/01/20 09:46	06/02/20 17:16
MW-10	A0F0070-02	Water	06/01/20 10:27	06/02/20 17:16
MW-5	A0F0070-03	Water	06/01/20 11:16	06/02/20 17:16
MW-5D	A0F0070-04	Water	06/01/20 11:49	06/02/20 17:16
MW-8	A0F0070-05	Water	06/01/20 12:42	06/02/20 17:16
MW-8D	A0F0070-06	Water	06/01/20 13:30	06/02/20 17:16
MW-6	A0F0070-07	Water	06/01/20 14:22	06/02/20 17:16
MW-1	A0F0070-08	Water	06/02/20 08:10	06/02/20 17:16
MW-11	A0F0070-09	Water	06/02/20 08:54	06/02/20 17:16
MW-11 DUP	A0F0070-10	Water	06/02/20 08:54	06/02/20 17:16
MW-3	A0F0070-11	Water	06/02/20 09:51	06/02/20 17:16
MW-4	A0F0070-12	Water	06/02/20 10:41	06/02/20 17:16
MW-2	A0F0070-13	Water	06/02/20 13:43	06/02/20 17:16
MW-9	A0F0070-14	Water	06/02/20 14:35	06/02/20 17:16
Trip Blank	A0F0070-15	Water	06/02/20 00:00	06/02/20 17:16

Apex Laboratories

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 (A0F0070-01RE1)				**Matrix: Water**		**Batch: 0060181**		
Diesel	ND	---	0.0755	mg/L	1	06/05/20 05:11	NWTPH-Dx LL	
Oil	ND	---	0.151	mg/L	1	06/05/20 05:11	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 78 %*		*Limits: 50-150 %*	*1*	*06/05/20 05:11*	*NWTPH-Dx LL*	
MW-10 (A0F0070-02RE1)				**Matrix: Water**		**Batch: 0060181**		
Diesel	ND	---	0.0755	mg/L	1	06/05/20 05:33	NWTPH-Dx LL	
Oil	ND	---	0.151	mg/L	1	06/05/20 05:33	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 84 %*		*Limits: 50-150 %*	*1*	*06/05/20 05:33*	*NWTPH-Dx LL*	
MW-5 (A0F0070-03RE1)				**Matrix: Water**		**Batch: 0060181**		
Diesel	**2.04**	---	0.0762	mg/L	1	06/05/20 05:55	NWTPH-Dx LL	**F-13, F-19**
Oil	**0.193**	---	0.152	mg/L	1	06/05/20 05:55	NWTPH-Dx LL	**F-16**
Surrogate: o-Terphenyl (Surr)		*Recovery: 94 %*		*Limits: 50-150 %*	*1*	*06/05/20 05:55*	*NWTPH-Dx LL*	
MW-5D (A0F0070-04RE1)				**Matrix: Water**		**Batch: 0060181**		
Diesel	**0.0974**	---	0.0762	mg/L	1	06/05/20 06:18	NWTPH-Dx LL	**F-11**
Oil	ND	---	0.152	mg/L	1	06/05/20 06:18	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 74 %*		*Limits: 50-150 %*	*1*	*06/05/20 06:18*	*NWTPH-Dx LL*	
MW-8 (A0F0070-05RE1)				**Matrix: Water**		**Batch: 0060181**		
Diesel	ND	---	0.0755	mg/L	1	06/05/20 06:40	NWTPH-Dx LL	
Oil	ND	---	0.151	mg/L	1	06/05/20 06:40	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 92 %*		*Limits: 50-150 %*	*1*	*06/05/20 06:40*	*NWTPH-Dx LL*	
MW-8D (A0F0070-06RE1)				**Matrix: Water**		**Batch: 0060181**		
Diesel	ND	---	0.0755	mg/L	1	06/05/20 07:03	NWTPH-Dx LL	
Oil	ND	---	0.151	mg/L	1	06/05/20 07:03	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 80 %*		*Limits: 50-150 %*	*1*	*06/05/20 07:03*	*NWTPH-Dx LL*	
MW-6 (A0F0070-07RE1)				**Matrix: Water**		**Batch: 0060181**		
Diesel	**6.92**	---	0.0748	mg/L	1	06/05/20 07:25	NWTPH-Dx LL	**F-13, F-20**
Oil	ND	---	0.150	mg/L	1	06/05/20 07:25	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 91 %*		*Limits: 50-150 %*	*1*	*06/05/20 07:25*	*NWTPH-Dx LL*	
MW-1 (A0F0070-08RE1)				**Matrix: Water**		**Batch: 0060181**		
Diesel	**0.212**	---	0.0755	mg/L	1	06/05/20 07:47	NWTPH-Dx LL	**F-11**

Apex Laboratories

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

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503-718-2323
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-1 (A0F0070-08RE1)				**Matrix: Water**		**Batch: 0060181**		
Oil	ND	---	0.151	mg/L	1	06/05/20 07:47	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 95 %*		*Limits: 50-150 %*	*1*	*06/05/20 07:47*	*NWTPH-Dx LL*	
MW-11 (A0F0070-09)				**Matrix: Water**		**Batch: 0060181**		
Diesel	**0.129**	---	0.0748	mg/L	1	06/05/20 08:10	NWTPH-Dx LL	**F-11, F-20**
Oil	ND	---	0.150	mg/L	1	06/05/20 08:10	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 65 %*		*Limits: 50-150 %*	*1*	*06/05/20 08:10*	*NWTPH-Dx LL*	
MW-11 DUP (A0F0070-10)				**Matrix: Water**		**Batch: 0060181**		
Diesel	ND	---	0.0755	mg/L	1	06/05/20 01:50	NWTPH-Dx LL	
Oil	ND	---	0.151	mg/L	1	06/05/20 01:50	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 72 %*		*Limits: 50-150 %*	*1*	*06/05/20 01:50*	*NWTPH-Dx LL*	
MW-3 (A0F0070-11RE1)				**Matrix: Water**		**Batch: 0060181**		
Diesel	ND	---	0.0762	mg/L	1	06/05/20 02:12	NWTPH-Dx LL	
Oil	ND	---	0.152	mg/L	1	06/05/20 02:12	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 79 %*		*Limits: 50-150 %*	*1*	*06/05/20 02:12*	*NWTPH-Dx LL*	
MW-4 (A0F0070-12RE1)				**Matrix: Water**		**Batch: 0060181**		
Diesel	**0.0914**	---	0.0762	mg/L	1	06/05/20 02:35	NWTPH-Dx LL	**F-11**
Oil	ND	---	0.152	mg/L	1	06/05/20 02:35	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 88 %*		*Limits: 50-150 %*	*1*	*06/05/20 02:35*	*NWTPH-Dx LL*	
MW-2 (A0F0070-13RE1)				**Matrix: Water**		**Batch: 0060181**		
Diesel	ND	---	0.0755	mg/L	1	06/05/20 02:57	NWTPH-Dx LL	
Oil	ND	---	0.151	mg/L	1	06/05/20 02:57	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 76 %*		*Limits: 50-150 %*	*1*	*06/05/20 02:57*	*NWTPH-Dx LL*	
MW-9 (A0F0070-14RE1)				**Matrix: Water**		**Batch: 0060181**		
Diesel	ND	---	0.0755	mg/L	1	06/05/20 03:19	NWTPH-Dx LL	
Oil	ND	---	0.151	mg/L	1	06/05/20 03:19	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 81 %*		*Limits: 50-150 %*	*1*	*06/05/20 03:19*	*NWTPH-Dx LL*	

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 (A0F0070-01)				**Matrix: Water**		**Batch: 0060103**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	06/03/20 19:11	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*101 %*	*Limits: 50-150 %*	*1*	*06/03/20 19:11*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*102 %*	*50-150 %*	*1*	*06/03/20 19:11*	*NWTPH-Gx (MS)*	
MW-10 (A0F0070-02)				**Matrix: Water**		**Batch: 0060103**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	06/03/20 19:38	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*99 %*	*Limits: 50-150 %*	*1*	*06/03/20 19:38*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*102 %*	*50-150 %*	*1*	*06/03/20 19:38*	*NWTPH-Gx (MS)*	
MW-5 (A0F0070-03)				**Matrix: Water**		**Batch: 0060159**		
Gasoline Range Organics	**12.7**	---	2.00	mg/L	20	06/04/20 12:20	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*101 %*	*Limits: 50-150 %*	*1*	*06/04/20 12:20*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*98 %*	*50-150 %*	*1*	*06/04/20 12:20*	*NWTPH-Gx (MS)*	
MW-5D (A0F0070-04)				**Matrix: Water**		**Batch: 0060103**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	06/03/20 20:05	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*103 %*	*Limits: 50-150 %*	*1*	*06/03/20 20:05*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*103 %*	*50-150 %*	*1*	*06/03/20 20:05*	*NWTPH-Gx (MS)*	
MW-8 (A0F0070-05)				**Matrix: Water**		**Batch: 0060159**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	06/04/20 15:30	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*103 %*	*Limits: 50-150 %*	*1*	*06/04/20 15:30*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*102 %*	*50-150 %*	*1*	*06/04/20 15:30*	*NWTPH-Gx (MS)*	
MW-8D (A0F0070-06)				**Matrix: Water**		**Batch: 0060159**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	06/04/20 16:52	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*104 %*	*Limits: 50-150 %*	*1*	*06/04/20 16:52*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*104 %*	*50-150 %*	*1*	*06/04/20 16:52*	*NWTPH-Gx (MS)*	
MW-6 (A0F0070-07)				**Matrix: Water**		**Batch: 0060159**		
Gasoline Range Organics	**11.3**	---	1.00	mg/L	10	06/04/20 13:14	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*104 %*	*Limits: 50-150 %*	*1*	*06/04/20 13:14*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*96 %*	*50-150 %*	*1*	*06/04/20 13:14*	*NWTPH-Gx (MS)*	
MW-1 (A0F0070-08)				**Matrix: Water**		**Batch: 0060159**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	06/04/20 17:19	NWTPH-Gx (MS)	

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Lisa Domenighini, Client Services Manager

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Apex Laboratories, LLC

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

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-1 (A0F0070-08)				**Matrix: Water**		**Batch: 0060159**		
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*102 %*	*Limits: 50-150 %*	*1*	*06/04/20 17:19*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*103 %*	*50-150 %*	*1*	*06/04/20 17:19*	*NWTPH-Gx (MS)*	
MW-11 (A0F0070-09)				**Matrix: Water**		**Batch: 0060159**		
Gasoline Range Organics	**1.59**	---	0.250	mg/L	2.5	06/04/20 13:41	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*102 %*	*Limits: 50-150 %*	*1*	*06/04/20 13:41*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*94 %*	*50-150 %*	*1*	*06/04/20 13:41*	*NWTPH-Gx (MS)*	
MW-11 DUP (A0F0070-10)				**Matrix: Water**		**Batch: 0060159**		
Gasoline Range Organics	**1.62**	---	0.250	mg/L	2.5	06/04/20 14:09	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*103 %*	*Limits: 50-150 %*	*1*	*06/04/20 14:09*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*93 %*	*50-150 %*	*1*	*06/04/20 14:09*	*NWTPH-Gx (MS)*	
MW-3 (A0F0070-11)				**Matrix: Water**		**Batch: 0060159**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	06/04/20 17:46	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*104 %*	*Limits: 50-150 %*	*1*	*06/04/20 17:46*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*104 %*	*50-150 %*	*1*	*06/04/20 17:46*	*NWTPH-Gx (MS)*	
MW-4 (A0F0070-12)				**Matrix: Water**		**Batch: 0060159**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	06/04/20 18:13	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*105 %*	*Limits: 50-150 %*	*1*	*06/04/20 18:13*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*106 %*	*50-150 %*	*1*	*06/04/20 18:13*	*NWTPH-Gx (MS)*	
MW-2 (A0F0070-13)				**Matrix: Water**		**Batch: 0060159**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	06/04/20 18:40	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*104 %*	*Limits: 50-150 %*	*1*	*06/04/20 18:40*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*103 %*	*50-150 %*	*1*	*06/04/20 18:40*	*NWTPH-Gx (MS)*	
MW-9 (A0F0070-14)				**Matrix: Water**		**Batch: 0060159**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	06/04/20 19:07	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery:*	*107 %*	*Limits: 50-150 %*	*1*	*06/04/20 19:07*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*108 %*	*50-150 %*	*1*	*06/04/20 19:07*	*NWTPH-Gx (MS)*	

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503-718-2323
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 (A0F0070-01)				**Matrix: Water**		**Batch: 0060103**		
Benzene	ND	---	0.200	ug/L	1	06/03/20 19:11	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	06/03/20 19:11	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	06/03/20 19:11	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	06/03/20 19:11	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	06/03/20 19:11	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	06/03/20 19:11	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*108 %*	*Limits:* *80-120 %*	*1*	*06/03/20 19:11*	*EPA 8260D*	
Toluene-d8 (Surr)			*99 %*	*80-120 %*	*1*	*06/03/20 19:11*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*103 %*	*80-120 %*	*1*	*06/03/20 19:11*	*EPA 8260D*	
MW-10 (A0F0070-02)				**Matrix: Water**		**Batch: 0060103**		
Benzene	ND	---	0.200	ug/L	1	06/03/20 19:38	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	06/03/20 19:38	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	06/03/20 19:38	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	06/03/20 19:38	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	06/03/20 19:38	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	06/03/20 19:38	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*110 %*	*Limits:* *80-120 %*	*1*	*06/03/20 19:38*	*EPA 8260D*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*06/03/20 19:38*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*102 %*	*80-120 %*	*1*	*06/03/20 19:38*	*EPA 8260D*	
MW-5 (A0F0070-03)				**Matrix: Water**		**Batch: 0060159**		
Benzene	ND	---	4.00	ug/L	20	06/04/20 12:20	EPA 8260D	
Ethylbenzene	**244**	---	10.0	ug/L	20	06/04/20 12:20	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	20.0	ug/L	20	06/04/20 12:20	EPA 8260D	
Naphthalene	**1290**	---	40.0	ug/L	20	06/04/20 12:20	EPA 8260D	
Toluene	ND	---	20.0	ug/L	20	06/04/20 12:20	EPA 8260D	
Xylenes, total	**844**	---	30.0	ug/L	20	06/04/20 12:20	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*104 %*	*Limits:* *80-120 %*	*1*	*06/04/20 12:20*	*EPA 8260D*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*06/04/20 12:20*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*98 %*	*80-120 %*	*1*	*06/04/20 12:20*	*EPA 8260D*	
MW-5D (A0F0070-04)				**Matrix: Water**		**Batch: 0060103**		
Benzene	ND	---	0.200	ug/L	1	06/03/20 20:05	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	06/03/20 20:05	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	06/03/20 20:05	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	06/03/20 20:05	EPA 8260D	

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

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503-718-2323
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-5D (A0F0070-04)				**Matrix: Water**		**Batch: 0060103**		
Toluene	ND	---	1.00	ug/L	1	06/03/20 20:05	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	06/03/20 20:05	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*108 %*	*Limits: 80-120 %*	*1*	*06/03/20 20:05*	*EPA 8260D*	
Toluene-d8 (Surr)			*99 %*	*80-120 %*	*1*	*06/03/20 20:05*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*102 %*	*80-120 %*	*1*	*06/03/20 20:05*	*EPA 8260D*	
MW-8 (A0F0070-05)				**Matrix: Water**		**Batch: 0060159**		
Benzene	ND	---	0.200	ug/L	1	06/04/20 15:30	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	06/04/20 15:30	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	06/04/20 15:30	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	06/04/20 15:30	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	06/04/20 15:30	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	06/04/20 15:30	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*109 %*	*Limits: 80-120 %*	*1*	*06/04/20 15:30*	*EPA 8260D*	
Toluene-d8 (Surr)			*97 %*	*80-120 %*	*1*	*06/04/20 15:30*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*102 %*	*80-120 %*	*1*	*06/04/20 15:30*	*EPA 8260D*	
MW-8D (A0F0070-06)				**Matrix: Water**		**Batch: 0060159**		
Benzene	ND	---	0.200	ug/L	1	06/04/20 16:52	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	06/04/20 16:52	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	06/04/20 16:52	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	06/04/20 16:52	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	06/04/20 16:52	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	06/04/20 16:52	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*109 %*	*Limits: 80-120 %*	*1*	*06/04/20 16:52*	*EPA 8260D*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*06/04/20 16:52*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*102 %*	*80-120 %*	*1*	*06/04/20 16:52*	*EPA 8260D*	
MW-6 (A0F0070-07)				**Matrix: Water**		**Batch: 0060159**		
Benzene	**163**	---	2.00	ug/L	10	06/04/20 13:14	EPA 8260D	
Ethylbenzene	**1740**	---	5.00	ug/L	10	06/04/20 13:14	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	10.0	ug/L	10	06/04/20 13:14	EPA 8260D	
Naphthalene	**433**	---	20.0	ug/L	10	06/04/20 13:14	EPA 8260D	
Toluene	**28.6**	---	10.0	ug/L	10	06/04/20 13:14	EPA 8260D	
Xylenes, total	**363**	---	15.0	ug/L	10	06/04/20 13:14	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*103 %*	*Limits: 80-120 %*	*1*	*06/04/20 13:14*	*EPA 8260D*	
Toluene-d8 (Surr)			*97 %*	*80-120 %*	*1*	*06/04/20 13:14*	*EPA 8260D*	

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503-718-2323
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-6 (A0F0070-07)				**Matrix: Water**		**Batch: 0060159**		
Surrogate: 4-Bromofluorobenzene (Surr)		*Recovery: 100 %*	*Limits: 80-120 %*		*1*	*06/04/20 13:14*	*EPA 8260D*	
MW-1 (A0F0070-08)				**Matrix: Water**		**Batch: 0060159**		
Benzene	ND	---	0.200	ug/L	1	06/04/20 17:19	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	06/04/20 17:19	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	06/04/20 17:19	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	06/04/20 17:19	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	06/04/20 17:19	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	06/04/20 17:19	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 110 %*	*Limits: 80-120 %*		*1*	*06/04/20 17:19*	*EPA 8260D*	
Toluene-d8 (Surr)		*97 %*	*80-120 %*		*1*	*06/04/20 17:19*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)		*102 %*	*80-120 %*		*1*	*06/04/20 17:19*	*EPA 8260D*	
MW-11 (A0F0070-09)				**Matrix: Water**		**Batch: 0060159**		
Benzene	**23.2**	---	0.500	ug/L	2.5	06/04/20 13:41	EPA 8260D	
Ethylbenzene	**352**	---	1.25	ug/L	2.5	06/04/20 13:41	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	2.50	ug/L	2.5	06/04/20 13:41	EPA 8260D	
Naphthalene	**22.5**	---	5.00	ug/L	2.5	06/04/20 13:41	EPA 8260D	
Toluene	ND	---	2.50	ug/L	2.5	06/04/20 13:41	EPA 8260D	
Xylenes, total	**81.2**	---	3.75	ug/L	2.5	06/04/20 13:41	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 99 %*	*Limits: 80-120 %*		*1*	*06/04/20 13:41*	*EPA 8260D*	
Toluene-d8 (Surr)		*98 %*	*80-120 %*		*1*	*06/04/20 13:41*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)		*100 %*	*80-120 %*		*1*	*06/04/20 13:41*	*EPA 8260D*	
MW-11 DUP (A0F0070-10)				**Matrix: Water**		**Batch: 0060159**		
Benzene	**22.0**	---	0.500	ug/L	2.5	06/04/20 14:09	EPA 8260D	
Ethylbenzene	**353**	---	1.25	ug/L	2.5	06/04/20 14:09	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	2.50	ug/L	2.5	06/04/20 14:09	EPA 8260D	
Naphthalene	**22.0**	---	5.00	ug/L	2.5	06/04/20 14:09	EPA 8260D	
Toluene	ND	---	2.50	ug/L	2.5	06/04/20 14:09	EPA 8260D	
Xylenes, total	**83.0**	---	3.75	ug/L	2.5	06/04/20 14:09	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 100 %*	*Limits: 80-120 %*		*1*	*06/04/20 14:09*	*EPA 8260D*	
Toluene-d8 (Surr)		*97 %*	*80-120 %*		*1*	*06/04/20 14:09*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)		*100 %*	*80-120 %*		*1*	*06/04/20 14:09*	*EPA 8260D*	
MW-3 (A0F0070-11)				**Matrix: Water**		**Batch: 0060159**		
Benzene	ND	---	0.200	ug/L	1	06/04/20 17:46	EPA 8260D	

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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-3 (A0F0070-11)				**Matrix: Water**		**Batch: 0060159**		
Ethylbenzene	ND	---	0.500	ug/L	1	06/04/20 17:46	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	06/04/20 17:46	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	06/04/20 17:46	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	06/04/20 17:46	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	06/04/20 17:46	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*110 %*	*Limits: 80-120 %*	*1*	*06/04/20 17:46*	*EPA 8260D*	
Toluene-d8 (Surr)			*99 %*	*80-120 %*	*1*	*06/04/20 17:46*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*103 %*	*80-120 %*	*1*	*06/04/20 17:46*	*EPA 8260D*	
MW-4 (A0F0070-12)				**Matrix: Water**		**Batch: 0060159**		
Benzene	ND	---	0.200	ug/L	1	06/04/20 18:13	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	06/04/20 18:13	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	06/04/20 18:13	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	06/04/20 18:13	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	06/04/20 18:13	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	06/04/20 18:13	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*110 %*	*Limits: 80-120 %*	*1*	*06/04/20 18:13*	*EPA 8260D*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*06/04/20 18:13*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*101 %*	*80-120 %*	*1*	*06/04/20 18:13*	*EPA 8260D*	
MW-2 (A0F0070-13)				**Matrix: Water**		**Batch: 0060159**		
Benzene	ND	---	0.200	ug/L	1	06/04/20 18:40	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	06/04/20 18:40	EPA 8260D	
Methyl tert-butyl ether (MTBE)	**7.74**	---	1.00	ug/L	1	06/04/20 18:40	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	06/04/20 18:40	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	06/04/20 18:40	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	06/04/20 18:40	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*110 %*	*Limits: 80-120 %*	*1*	*06/04/20 18:40*	*EPA 8260D*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*06/04/20 18:40*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*101 %*	*80-120 %*	*1*	*06/04/20 18:40*	*EPA 8260D*	
MW-9 (A0F0070-14)				**Matrix: Water**		**Batch: 0060159**		
Benzene	ND	---	0.200	ug/L	1	06/04/20 19:07	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	06/04/20 19:07	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	06/04/20 19:07	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	06/04/20 19:07	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	06/04/20 19:07	EPA 8260D	

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

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-9 (A0F0070-14)				**Matrix: Water**		**Batch: 0060159**		
Xylenes, total	ND	---	1.50	ug/L	1	06/04/20 19:07	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*111 %*	*Limits: 80-120 %*	*1*	*06/04/20 19:07*	*EPA 8260D*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*06/04/20 19:07*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*101 %*	*80-120 %*	*1*	*06/04/20 19:07*	*EPA 8260D*	

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Lisa Domenighini, Client Services Manager

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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0060128 - EPA 3510C (Fuels/Acid Ext.)									**Water**			
Blank (0060128-BLK1)			Prepared: 06/03/20 11:21		Analyzed: 06/03/20 22:30							
NWTPH-Dx LL												
Diesel	ND	---	0.0727	mg/L	1	---	---	---	---	---	---	Q-30
Oil	ND	---	0.145	mg/L	1	---	---	---	---	---	---	Q-30
Surr: o-Terphenyl (Surr)			*Recovery: 90 %*		*Limits: 50-150 %*		*Dilution: 1x*					
LCS (0060128-BS1)			Prepared: 06/03/20 11:21		Analyzed: 06/03/20 22:53							
NWTPH-Dx LL												
Diesel	0.182	---	0.0800	mg/L	1	0.500	---	**36**	**59 - 115%**	---	---	Q-30
Surr: o-Terphenyl (Surr)			*Recovery: 45 %*		*Limits: 50-150 %*		*Dilution: 1x*					S-06
LCS Dup (0060128-BSD1)			Prepared: 06/03/20 11:21		Analyzed: 06/03/20 23:15							**Q-19**
NWTPH-Dx LL												
Diesel	0.418	---	0.0800	mg/L	1	0.500	---	84	59 - 115%	**78**	**30%**	Q-01
Surr: o-Terphenyl (Surr)			*Recovery: 96 %*		*Limits: 50-150 %*		*Dilution: 1x*					
Batch 0060181 - EPA 3510C (Fuels/Acid Ext.)									**Water**			
Blank (0060181-BLK1)			Prepared: 06/04/20 11:59		Analyzed: 06/04/20 23:13							
NWTPH-Dx LL												
Diesel	ND	---	0.0727	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.145	mg/L	1	---	---	---	---	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 85 %*		*Limits: 50-150 %*		*Dilution: 1x*					
LCS (0060181-BS1)			Prepared: 06/04/20 11:59		Analyzed: 06/04/20 23:35							
NWTPH-Dx LL												
Diesel	0.399	---	0.0800	mg/L	1	0.500	---	80	59 - 115%	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 87 %*		*Limits: 50-150 %*		*Dilution: 1x*					
LCS Dup (0060181-BSD1)			Prepared: 06/04/20 11:59		Analyzed: 06/04/20 23:58							**Q-19**
NWTPH-Dx LL												
Diesel	0.391	---	0.0800	mg/L	1	0.500	---	78	59 - 115%	2	30%	
Surr: o-Terphenyl (Surr)			*Recovery: 88 %*		*Limits: 50-150 %*		*Dilution: 1x*					

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5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0060103 - EPA 5030B												**Water**
Blank (0060103-BLK1)		Prepared: 06/03/20 07:30		Analyzed: 06/03/20 09:13								
NWTPH-Gx (MS)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 105 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)		*109 %*		*50-150 %*			*"*					
LCS (0060103-BS2)		Prepared: 06/03/20 07:30		Analyzed: 06/03/20 08:46								
NWTPH-Gx (MS)												
Gasoline Range Organics	0.449	---	0.100	mg/L	1	0.500	---	90	80 - 120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 102 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)		*99 %*		*50-150 %*			*"*					
Duplicate (0060103-DUP2)		Prepared: 06/03/20 15:00		Analyzed: 06/03/20 20:32								**T-02**
QC Source Sample: MW-5D (A0F0070-04)												
NWTPH-Gx (MS)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	ND	---	---	---	30%	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 103 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)		*104 %*		*50-150 %*			*"*					

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5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0060159 - EPA 5030B												**Water**
Blank (0060159-BLK1)		Prepared: 06/04/20 07:30 Analyzed: 06/04/20 09:37										
NWTPH-Gx (MS)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 103 %*	*Limits: 50-150 %*		*Dilution: 1x*							
1,4-Difluorobenzene (Sur)		*104 %*	*50-150 %*		*"*							
LCS (0060159-BS2)		Prepared: 06/04/20 07:30 Analyzed: 06/04/20 09:10										
NWTPH-Gx (MS)												
Gasoline Range Organics	0.445	---	0.100	mg/L	1	0.500	---	89	80 - 120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 99 %*	*Limits: 50-150 %*		*Dilution: 1x*							
1,4-Difluorobenzene (Sur)		*97 %*	*50-150 %*		*"*							
Duplicate (0060159-DUP1)		Prepared: 06/04/20 09:37 Analyzed: 06/04/20 12:47										
QC Source Sample: MW-5 (A0F0070-03)												
NWTPH-Gx (MS)												
Gasoline Range Organics	**12.8**	---	2.00	mg/L	20	---	12.7	---	---	0.5	30%	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 101 %*	*Limits: 50-150 %*		*Dilution: 1x*							
1,4-Difluorobenzene (Sur)		*99 %*	*50-150 %*		*"*							
Duplicate (0060159-DUP2)		Prepared: 06/04/20 09:37 Analyzed: 06/04/20 19:34										
QC Source Sample: MW-9 (A0F0070-14)												
NWTPH-Gx (MS)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	ND	---	---	---	30%	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 106 %*	*Limits: 50-150 %*		*Dilution: 1x*							
1,4-Difluorobenzene (Sur)		*106 %*	*50-150 %*		*"*							

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Tigard, OR 97223
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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0060103 - EPA 5030B												**Water**
Blank (0060103-BLK1)			Prepared: 06/03/20 07:30		Analyzed: 06/03/20 09:13							
EPA 8260D												
Benzene	ND	---	0.200	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Xylenes, total	ND	---	1.50	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 113 %*		*Limits: 80-120 %*			*Dilution: 1x*				
Toluene-d8 (Surr)			*99 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*103 %*		*80-120 %*			*"*				
LCS (0060103-BS1)			Prepared: 06/03/20 07:30		Analyzed: 06/03/20 08:19							
EPA 8260D												
Benzene	20.3	---	0.200	ug/L	1	20.0	---	102	80 - 120%	---	---	
Ethylbenzene	20.1	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
Methyl tert-butyl ether (MTBE)	21.6	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Naphthalene	17.1	---	2.00	ug/L	1	20.0	---	86	80 - 120%	---	---	
Toluene	18.9	---	1.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
Xylenes, total	57.0	---	1.50	ug/L	1	60.0	---	95	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 102 %*		*Limits: 80-120 %*			*Dilution: 1x*				
Toluene-d8 (Surr)			*96 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*95 %*		*80-120 %*			*"*				
Duplicate (0060103-DUP2)			Prepared: 06/03/20 15:00		Analyzed: 06/03/20 20:32							**T-02**
QC Source Sample: MW-5D (A0F0070-04)												
EPA 8260D												
Benzene	ND	---	0.200	ug/L	1	---	ND	---	---	---	30%	
Ethylbenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Naphthalene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Xylenes, total	ND	---	1.50	ug/L	1	---	ND	---	---	---	30%	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 109 %*		*Limits: 80-120 %*			*Dilution: 1x*				
Toluene-d8 (Surr)			*99 %*		*80-120 %*			*"*				

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5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0060103 - EPA 5030B												**Water**
Duplicate (0060103-DUP2)			Prepared: 06/03/20 15:00 Analyzed: 06/03/20 20:32									**T-02**
QC Source Sample: MW-5D (A0F0070-04)												
Surr: 4-Bromofluorobenzene (Surr)			*Recovery: 102 %*	*Limits: 80-120 %*			*Dilution: 1x*					

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Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0060159 - EPA 5030B									Water			
Blank (0060159-BLK1)			Prepared: 06/04/20 07:30		Analyzed: 06/04/20 09:37							
EPA 8260D												
Benzene	ND	---	0.200	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Xylenes, total	ND	---	1.50	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 110 %*		*Limits: 80-120 %*			*Dilution: 1x*				
Toluene-d8 (Surr)			*98 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*102 %*		*80-120 %*			*"*				
LCS (0060159-BS1)			Prepared: 06/04/20 07:30		Analyzed: 06/04/20 08:43							
EPA 8260D												
Benzene	20.7	---	0.200	ug/L	1	20.0	---	103	80 - 120%	---	---	
Ethylbenzene	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Methyl tert-butyl ether (MTBE)	22.8	---	1.00	ug/L	1	20.0	---	114	80 - 120%	---	---	
Naphthalene	18.5	---	2.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
Toluene	19.2	---	1.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
Xylenes, total	58.0	---	1.50	ug/L	1	60.0	---	97	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 102 %*		*Limits: 80-120 %*			*Dilution: 1x*				
Toluene-d8 (Surr)			*95 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*95 %*		*80-120 %*			*"*				
Duplicate (0060159-DUP1)			Prepared: 06/04/20 09:37		Analyzed: 06/04/20 12:47							
QC Source Sample: MW-5 (A0F0070-03)												
EPA 8260D												
Benzene	ND	---	4.00	ug/L	20	---	ND	---	---	---	30%	
Ethylbenzene	**246**	---	10.0	ug/L	20	---	244	---	---	0.9	30%	
Methyl tert-butyl ether (MTBE)	ND	---	20.0	ug/L	20	---	ND	---	---	---	30%	
Naphthalene	**1250**	---	40.0	ug/L	20	---	1290	---	---	3	30%	
Toluene	ND	---	20.0	ug/L	20	---	ND	---	---	---	30%	
Xylenes, total	**851**	---	30.0	ug/L	20	---	844	---	---	0.8	30%	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 104 %*		*Limits: 80-120 %*			*Dilution: 1x*				
Toluene-d8 (Surr)			*97 %*		*80-120 %*			*"*				

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Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0060159 - EPA 5030B												**Water**
Duplicate (0060159-DUP1)			Prepared: 06/04/20 09:37 Analyzed: 06/04/20 12:47									
QC Source Sample: MW-5 (A0F0070-03)												
Surr: 4-Bromofluorobenzene (Surr)			*Recovery: 98 %*	*Limits: 80-120 %*			*Dilution: 1x*					
Duplicate (0060159-DUP2)			Prepared: 06/04/20 09:37 Analyzed: 06/04/20 19:34									
QC Source Sample: MW-9 (A0F0070-14)												
EPA 8260D												
Benzene	ND	---	0.200	ug/L	1	---	ND	---	---	---	30%	
Ethylbenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Naphthalene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
Toluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Xylenes, total	ND	---	1.50	ug/L	1	---	ND	---	---	---	30%	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 113 %*	*Limits: 80-120 %*			*Dilution: 1x*					
Toluene-d8 (Surr)			*98 %*	*80-120 %*			*"*					
4-Bromofluorobenzene (Surr)			*103 %*	*80-120 %*			*"*					
Matrix Spike (0060159-MS1)			Prepared: 06/04/20 09:37 Analyzed: 06/04/20 15:57									
QC Source Sample: MW-8 (A0F0070-05)												
EPA 8260D												
Benzene	22.5	---	0.200	ug/L	1	20.0	ND	113	79 - 120%	---	---	
Ethylbenzene	22.6	---	0.500	ug/L	1	20.0	ND	113	79 - 121%	---	---	
Methyl tert-butyl ether (MTBE)	24.2	---	1.00	ug/L	1	20.0	ND	121	71 - 124%	---	---	
Naphthalene	20.2	---	2.00	ug/L	1	20.0	ND	96	61 - 128%	---	---	
Toluene	20.9	---	1.00	ug/L	1	20.0	ND	105	80 - 121%	---	---	
Xylenes, total	64.3	---	1.50	ug/L	1	60.0	ND	107	79 - 121%	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 100 %*	*Limits: 80-120 %*			*Dilution: 1x*					
Toluene-d8 (Surr)			*95 %*	*80-120 %*			*"*					
4-Bromofluorobenzene (Surr)			*94 %*	*80-120 %*			*"*					

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

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

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Prep: EPA 3510C (Fuels/Acid Ext.)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0060181							
A0F0070-01RE1	Water	NWTPH-Dx LL	06/01/20 09:46	06/04/20 13:00	1060mL/2mL	1000mL/2mL	0.94
A0F0070-02RE1	Water	NWTPH-Dx LL	06/01/20 10:27	06/04/20 13:00	1060mL/2mL	1000mL/2mL	0.94
A0F0070-03RE1	Water	NWTPH-Dx LL	06/01/20 11:16	06/04/20 13:00	1050mL/2mL	1000mL/2mL	0.95
A0F0070-04RE1	Water	NWTPH-Dx LL	06/01/20 11:49	06/04/20 13:00	1050mL/2mL	1000mL/2mL	0.95
A0F0070-05RE1	Water	NWTPH-Dx LL	06/01/20 12:42	06/04/20 13:00	1060mL/2mL	1000mL/2mL	0.94
A0F0070-06RE1	Water	NWTPH-Dx LL	06/01/20 13:30	06/04/20 13:00	1060mL/2mL	1000mL/2mL	0.94
A0F0070-07RE1	Water	NWTPH-Dx LL	06/01/20 14:22	06/04/20 13:00	1070mL/2mL	1000mL/2mL	0.94
A0F0070-08RE1	Water	NWTPH-Dx LL	06/02/20 08:10	06/04/20 13:00	1060mL/2mL	1000mL/2mL	0.94
A0F0070-09	Water	NWTPH-Dx LL	06/02/20 08:54	06/04/20 13:00	1070mL/2mL	1000mL/2mL	0.94
A0F0070-10	Water	NWTPH-Dx LL	06/02/20 08:54	06/04/20 11:59	1060mL/2mL	1000mL/2mL	0.94
A0F0070-11RE1	Water	NWTPH-Dx LL	06/02/20 09:51	06/04/20 11:59	1050mL/2mL	1000mL/2mL	0.95
A0F0070-12RE1	Water	NWTPH-Dx LL	06/02/20 10:41	06/04/20 11:59	1050mL/2mL	1000mL/2mL	0.95
A0F0070-13RE1	Water	NWTPH-Dx LL	06/02/20 13:43	06/04/20 11:59	1060mL/2mL	1000mL/2mL	0.94
A0F0070-14RE1	Water	NWTPH-Dx LL	06/02/20 14:35	06/04/20 11:59	1060mL/2mL	1000mL/2mL	0.94

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0060103							
A0F0070-01	Water	NWTPH-Gx (MS)	06/01/20 09:46	06/03/20 15:00	5mL/5mL	5mL/5mL	1.00
A0F0070-02	Water	NWTPH-Gx (MS)	06/01/20 10:27	06/03/20 15:00	5mL/5mL	5mL/5mL	1.00
A0F0070-04	Water	NWTPH-Gx (MS)	06/01/20 11:49	06/03/20 15:00	5mL/5mL	5mL/5mL	1.00
Batch: 0060159							
A0F0070-03	Water	NWTPH-Gx (MS)	06/01/20 11:16	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-05	Water	NWTPH-Gx (MS)	06/01/20 12:42	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-06	Water	NWTPH-Gx (MS)	06/01/20 13:30	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-07	Water	NWTPH-Gx (MS)	06/01/20 14:22	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-08	Water	NWTPH-Gx (MS)	06/02/20 08:10	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-09	Water	NWTPH-Gx (MS)	06/02/20 08:54	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-10	Water	NWTPH-Gx (MS)	06/02/20 08:54	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-11	Water	NWTPH-Gx (MS)	06/02/20 09:51	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-12	Water	NWTPH-Gx (MS)	06/02/20 10:41	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-13	Water	NWTPH-Gx (MS)	06/02/20 13:43	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-14	Water	NWTPH-Gx (MS)	06/02/20 14:35	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00

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Lisa Domenighini, Client Services Manager

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503-718-2323
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

SAMPLE PREPARATION INFORMATION

Selected Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0060103							
A0F0070-01	Water	EPA 8260D	06/01/20 09:46	06/03/20 15:00	5mL/5mL	5mL/5mL	1.00
A0F0070-02	Water	EPA 8260D	06/01/20 10:27	06/03/20 15:00	5mL/5mL	5mL/5mL	1.00
A0F0070-04	Water	EPA 8260D	06/01/20 11:49	06/03/20 15:00	5mL/5mL	5mL/5mL	1.00
Batch: 0060159							
A0F0070-03	Water	EPA 8260D	06/01/20 11:16	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-05	Water	EPA 8260D	06/01/20 12:42	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-06	Water	EPA 8260D	06/01/20 13:30	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-07	Water	EPA 8260D	06/01/20 14:22	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-08	Water	EPA 8260D	06/02/20 08:10	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-09	Water	EPA 8260D	06/02/20 08:54	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-10	Water	EPA 8260D	06/02/20 08:54	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-11	Water	EPA 8260D	06/02/20 09:51	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-12	Water	EPA 8260D	06/02/20 10:41	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-13	Water	EPA 8260D	06/02/20 13:43	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00
A0F0070-14	Water	EPA 8260D	06/02/20 14:35	06/04/20 09:37	5mL/5mL	5mL/5mL	1.00

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

QUALIFIER DEFINITIONS

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

Apex Laboratories

F-11	The hydrocarbon pattern indicates possible weathered diesel, mineral oil, or a contribution from a related component.
F-13	The chromatographic pattern does not resemble the fuel standard used for quantitation
F-16	Results for oil are estimated due to overlap from the reported diesel result.
F-19	Results are Estimated due to the presence of multiple fuel products.
F-20	Result for Diesel is Estimated due to overlap from Gasoline Range Organics or other VOCs.
Q-01	Spike recovery and/or RPD is outside acceptance limits.
Q-19	Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.
Q-30	Recovery for Lab Control Spike (LCS) is below the lower control limit. Data may be biased low.
S-06	Surrogate recovery is outside of established control limits.
T-02	This Batch QC sample was analyzed outside of the method specified 12 hour tune window. Results are estimated.

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5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

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 ½ the Reporting Limit (RL).
-For Blank hits falling between ½ 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.

Apex Laboratories

Lisa Domenighini, Client Services Manager

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

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

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, LLC

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5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation)
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Lisa Domenighini, Client Services Manager

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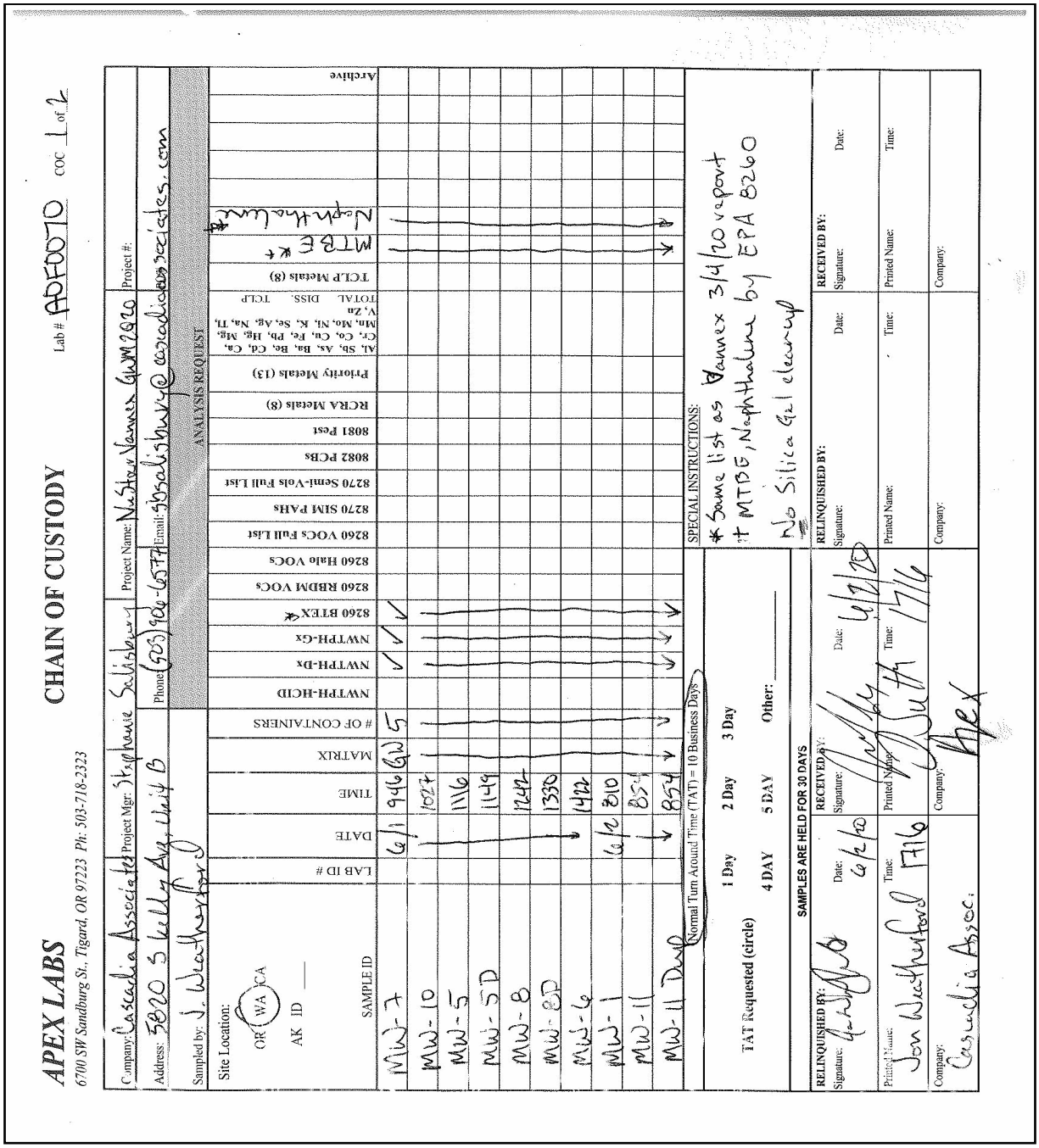
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**



APEX LABS — CHAIN OF CUSTODY — Lab # A0F0070 — COC 1 of 2
6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

Company: Cascadia Associates — Project Mgr: Stephanie Salisbury — Project Name: NuStar Vannex GWM2020 — Project #:
Address: 5820 S Kelly Ave, Unit B — Phone: (503) 906-6577 — Email: ssalisbury@cascadiaassociates.com
Sampled by: J. Weatherford — ANALYSIS REQUEST
Site Location: OR (WA) CA AK ID ____

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 BTEX *	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTAL DISS. TCLP	TCLP Metals (8)	MTBE **	Archive
MW-7		6/1	946	GW	5	✓	✓	✓	✓													
MW-10			1027																			
MW-5			1116																			
MW-5D			1149																			
MW-8			1242																			
MW-8D			1330																			
MW-6			1422																			
MW-1		6/2	810																			
MW-11			854																			
MW-11 Dup		↓	854	↓	↓			↓	↓												✓	

Normal Turn Around Time (TAT) = 10 Business Days

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: ____

SPECIAL INSTRUCTIONS:
* Same list as Vannex 3/4/20 report
** MTBE, Naphthalene by EPA 8260
No Silica Gel cleanup

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY: Signature: [signature] Date: 6/2/20 Time: 1716 Printed Name: Jon Weatherford Company: Cascadia Assoc.

RECEIVED BY: Signature: [signature] Date: 6/2/20 Time: 1716 Printed Name: [illegible] Company: Apex

RELINQUISHED BY: Signature: [signature] Date: 6/2/20 Time: 1716 Printed Name: [illegible] Company: Apex

RECEIVED BY: Signature: ____ Date: ____ Time: ____ Printed Name: ____ Company: ____

RELINQUISHED BY: Signature: ____ Date: ____ Time: ____ Printed Name: ____ Company: ____

RECEIVED BY: Signature: ____ Date: ____ Time: ____ Printed Name: ____ Company: ____

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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Apex Laboratories, LLC
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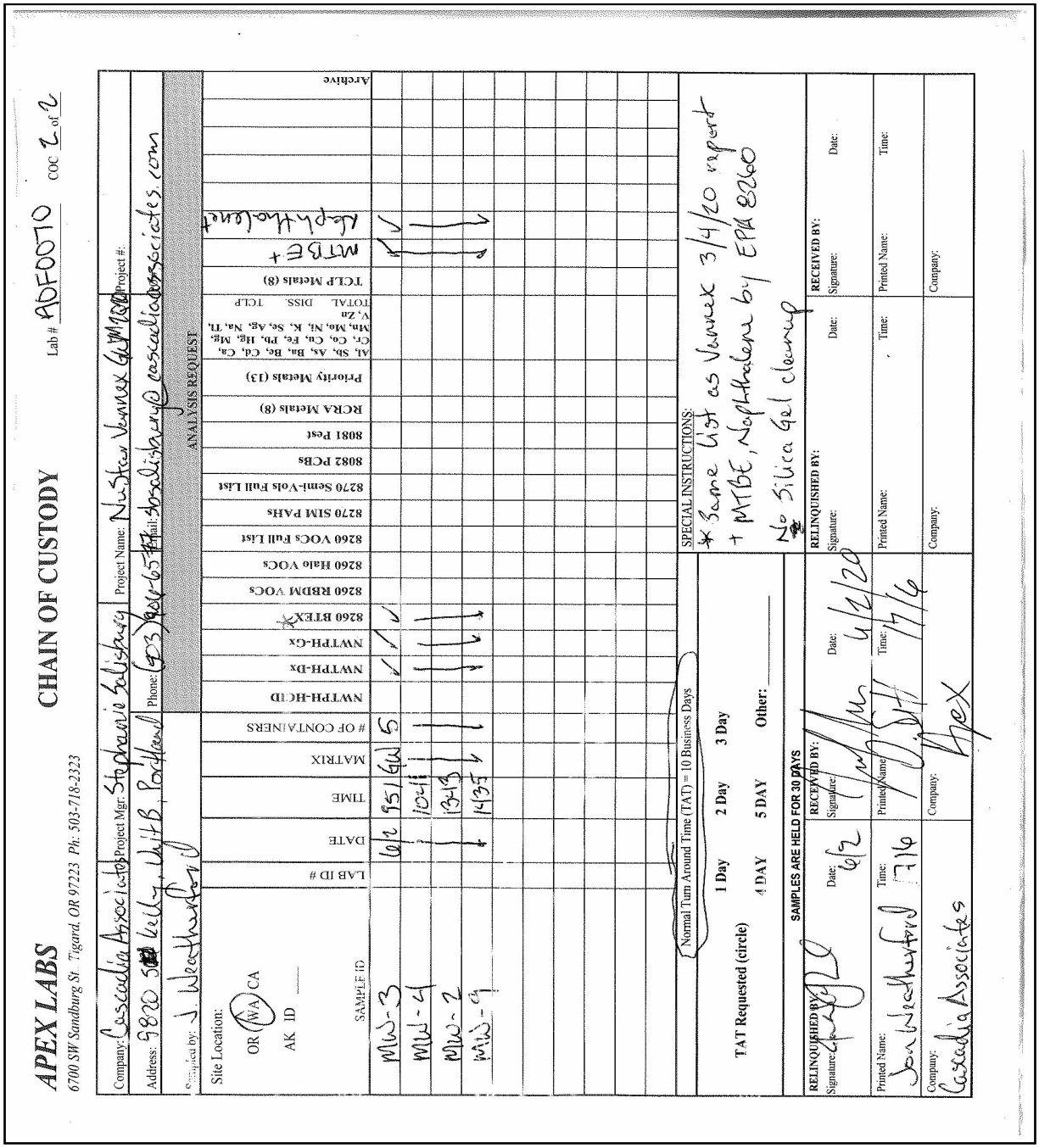
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**



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

CHAIN OF CUSTODY

Lab # A0F0070 COC 1 of 2

Company: Cascadia Associates Project Mgr: Stephanie Salisbury Project Name: Nustar Vannex GW Monitoring Project #:
Address: 9820 SW Kelly, Unit B, Portland Phone: (503) 961-6535 Email: ssalisbury@cascadiaassociates.com
Sampled by: J. Weathersford

Site Location: OR (WA) CA AK ID ____

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 BTEX*	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTAL DISS. TCLP	TCLP Metals (8)	MTBE+	Archive
MW-3		6/2	951	GW	5		✓	✓	✓												✓
MW-4			1011		1																
MW-2			1343																		
MW-6			1435																		

Normal Turn Around Time (TAT) = 10 Business Days

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: ____

SPECIAL INSTRUCTIONS:
* Same list as Vannex 3/4/20 report
+ MTBE, Naphthalene by EPA 8260
No Silica Gel cleanup

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature:	Signature:	Signature:	Signature:
Date:	Date: 6/2	Date: 6/2/20	Date:
Printed Name:	Printed Name:	Printed Name:	Printed Name:
Time:	Time: 1716	Time: 1716	Time:
Company:	Company: Apex	Company:	Company:

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Lisa Domenighini

Lisa Domenighini, Client Services Manager

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503-718-2323
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0F0070 - 06 08 20 1024**

APEX LABS COOLER RECEIPT FORM

Client: Cascadia Associates Element WO#: A0F0070

Project/Project #: NuStar Vannex

Delivery Info:

Date/time received: 6/2/20 @ 1716 By: JS

Delivered by: Apex___ Client X ESS___ FedEx___ UPS___ Swift___ Senvoy___ SDS___ Other___

Cooler Inspection Date/time inspected: 6/2/20 @ 1716 By: JS

Chain of Custody included? Yes X No___ Custody seals? Yes___ No X

Signed/dated by client? Yes X No___

Signed/dated by Apex? Yes X No___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	4.9	4.7	5.1				
Received on ice? (Y/N)	Y	Y	Y				
Temp. blanks? (Y/N)	N	N	N				
Ice type: (Gel/Real/Other)	Real	Real	Real				
Condition:	good	good	good				

Cooler out of temp? (Y/N) Possible reason why:

If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA

Out of temperature samples form initiated? Yes/No/NA

Samples Inspection: Date/time inspected: 6-2-20 @ 18:04 By: TAM

All samples intact? Yes Y No___ Comments:

Bottle labels/COCs agree? Yes X TAM 6-2-20 No X Comments: TB provided not on COC

COC/container discrepancies form initiated? Yes___ No N/A

Containers/volumes received appropriate for analysis? Yes Y No___ Comments:

Do VOA vials have visible headspace? Yes___ No X NA___

Comments

Water samples: pH checked: Yes X No___ NA___ pH appropriate? Yes X No___ NA___

Comments:

Additional information: TB # 2310

Labeled by: TAM Witness: TAM Cooler Inspected by: TAM See Project Contact Form: Y

Apex Laboratories

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Lisa A Domenighini

Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

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

Thursday, September 3, 2020

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

RE: A0H0521 - Shore Terminal-Vancouver Annex - GWM 3Q20

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A0H0521, which was received by the laboratory on 8/19/2020 at 3:07:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample reciept, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	5.6 degC	Cooler #2	3.6 degC
Cooler #3	0.1 degC		

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.
All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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503-718-2323
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-5	A0H0521-01	Water	08/17/20 09:57	08/19/20 15:07
MW-5 Dup	A0H0521-02	Water	08/17/20 09:57	08/19/20 15:07
MW-5D	A0H0521-03	Water	08/17/20 10:36	08/19/20 15:07
MW-8	A0H0521-04	Water	08/17/20 11:14	08/19/20 15:07
MW-8D	A0H0521-05	Water	08/17/20 11:51	08/19/20 15:07
MW-7	A0H0521-06	Water	08/17/20 12:28	08/19/20 15:07
MW-9	A0H0521-07	Water	08/17/20 13:34	08/19/20 15:07
MW-6	A0H0521-08	Water	08/17/20 14:27	08/19/20 15:07
MW-3	A0H0521-09	Water	08/18/20 08:00	08/19/20 15:07
MW-4	A0H0521-10	Water	08/18/20 09:09	08/19/20 15:07
MW-2	A0H0521-11	Water	08/18/20 10:51	08/19/20 15:07
MW-1	A0H0521-12	Water	08/19/20 08:27	08/19/20 15:07
MW-11	A0H0521-13	Water	08/19/20 09:02	08/19/20 15:07
MW-11 Dup	A0H0521-14	Water	08/19/20 09:02	08/19/20 15:07
MW-10	A0H0521-15	Water	08/19/20 11:40	08/19/20 15:07

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503-718-2323
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-5 (A0H0521-01RE1)				**Matrix: Water**		**Batch: 0080922**		
Diesel	**2.17**	---	0.189	mg/L	1	09/01/20 01:08	NWTPH-Dx	**F-18**
Oil	ND	---	0.377	mg/L	1	09/01/20 01:08	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 103 %*		*Limits: 50-150 %*	*1*	*09/01/20 01:08*	*NWTPH-Dx*	
MW-5 Dup (A0H0521-02RE1)				**Matrix: Water**		**Batch: 0080922**		
Diesel	**2.10**	---	0.189	mg/L	1	09/01/20 01:30	NWTPH-Dx	**F-18**
Oil	ND	---	0.377	mg/L	1	09/01/20 01:30	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 101 %*		*Limits: 50-150 %*	*1*	*09/01/20 01:30*	*NWTPH-Dx*	
MW-5D (A0H0521-03RE1)				**Matrix: Water**		**Batch: 0080922**		
Diesel	ND	---	0.187	mg/L	1	09/01/20 01:53	NWTPH-Dx	
Oil	ND	---	0.374	mg/L	1	09/01/20 01:53	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 104 %*		*Limits: 50-150 %*	*1*	*09/01/20 01:53*	*NWTPH-Dx*	
MW-8 (A0H0521-04)				**Matrix: Water**		**Batch: 0080739**		
Diesel	ND	---	0.187	mg/L	1	08/25/20 23:43	NWTPH-Dx	
Oil	ND	---	0.374	mg/L	1	08/25/20 23:43	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 97 %*		*Limits: 50-150 %*	*1*	*08/25/20 23:43*	*NWTPH-Dx*	
MW-8D (A0H0521-05RE1)				**Matrix: Water**		**Batch: 0080922**		
Diesel	ND	---	0.189	mg/L	1	09/01/20 02:16	NWTPH-Dx	
Oil	ND	---	0.377	mg/L	1	09/01/20 02:16	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 109 %*		*Limits: 50-150 %*	*1*	*09/01/20 02:16*	*NWTPH-Dx*	
MW-7 (A0H0521-06)				**Matrix: Water**		**Batch: 0080739**		
Diesel	ND	---	0.187	mg/L	1	08/26/20 00:28	NWTPH-Dx	
Oil	ND	---	0.374	mg/L	1	08/26/20 00:28	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 102 %*		*Limits: 50-150 %*	*1*	*08/26/20 00:28*	*NWTPH-Dx*	
MW-9 (A0H0521-07RE1)				**Matrix: Water**		**Batch: 0080922**		
Diesel	ND	---	0.189	mg/L	1	09/01/20 02:39	NWTPH-Dx	
Oil	ND	---	0.377	mg/L	1	09/01/20 02:39	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 103 %*		*Limits: 50-150 %*	*1*	*09/01/20 02:39*	*NWTPH-Dx*	
MW-6 (A0H0521-08)				**Matrix: Water**		**Batch: 0080793**		
Diesel	**2.66**	---	0.189	mg/L	1	08/27/20 00:59	NWTPH-Dx	**F-20**

Apex Laboratories

Lisa Domenighini, Client Services Manager

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Apex Laboratories, LLC

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

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-6 (A0H0521-08)				**Matrix: Water**		**Batch: 0080793**		
Oil	ND	---	0.377	mg/L	1	08/27/20 00:59	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 103 %*	*Limits: 50-150 %*		*1*	*08/27/20 00:59*	*NWTPH-Dx*	
MW-3 (A0H0521-09)				**Matrix: Water**		**Batch: 0080922**		
Diesel	ND	---	0.189	mg/L	1	09/01/20 03:02	NWTPH-Dx	
Oil	ND	---	0.377	mg/L	1	09/01/20 03:02	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 108 %*	*Limits: 50-150 %*		*1*	*09/01/20 03:02*	*NWTPH-Dx*	
MW-4 (A0H0521-10)				**Matrix: Water**		**Batch: 0080922**		
Diesel	ND	---	0.189	mg/L	1	09/01/20 03:24	NWTPH-Dx	
Oil	ND	---	0.377	mg/L	1	09/01/20 03:24	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 106 %*	*Limits: 50-150 %*		*1*	*09/01/20 03:24*	*NWTPH-Dx*	
MW-2 (A0H0521-11)				**Matrix: Water**		**Batch: 0080922**		
Diesel	ND	---	0.189	mg/L	1	09/01/20 03:47	NWTPH-Dx	
Oil	ND	---	0.377	mg/L	1	09/01/20 03:47	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 112 %*	*Limits: 50-150 %*		*1*	*09/01/20 03:47*	*NWTPH-Dx*	
MW-1 (A0H0521-12)				**Matrix: Water**		**Batch: 0080922**		
Diesel	ND	---	0.189	mg/L	1	09/01/20 05:41	NWTPH-Dx	
Oil	ND	---	0.377	mg/L	1	09/01/20 05:41	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 109 %*	*Limits: 50-150 %*		*1*	*09/01/20 05:41*	*NWTPH-Dx*	
MW-11 (A0H0521-13)				**Matrix: Water**		**Batch: 0080922**		
Diesel	ND	---	0.187	mg/L	1	09/01/20 06:04	NWTPH-Dx	
Oil	ND	---	0.374	mg/L	1	09/01/20 06:04	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 110 %*	*Limits: 50-150 %*		*1*	*09/01/20 06:04*	*NWTPH-Dx*	
MW-11 Dup (A0H0521-14)				**Matrix: Water**		**Batch: 0080922**		
Diesel	**0.230**	---	0.189	mg/L	1	09/01/20 06:27	NWTPH-Dx	**F-18**
Oil	ND	---	0.377	mg/L	1	09/01/20 06:27	NWTPH-Dx	
Surrogate: o-Terphenyl (Surr)		*Recovery: 113 %*	*Limits: 50-150 %*		*1*	*09/01/20 06:27*	*NWTPH-Dx*	
MW-10 (A0H0521-15)				**Matrix: Water**		**Batch: 0080922**		
Diesel	ND	---	0.187	mg/L	1	09/01/20 06:50	NWTPH-Dx	
Oil	ND	---	0.374	mg/L	1	09/01/20 06:50	NWTPH-Dx	

Apex Laboratories

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503-718-2323
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-10 (A0H0521-15)				**Matrix: Water**		**Batch: 0080922**		
Surrogate: o-Terphenyl (Surr)		*Recovery: 104 %*		*Limits: 50-150 %*	*1*	*09/01/20 06:50*	*NWTPH-Dx*	

Apex Laboratories

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-5 (A0H0521-01)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	**18.8**	---	1.00	mg/L	10	08/20/20 14:22	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 100 %*	*Limits: 50-150 %*		*1*	*08/20/20 14:22*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*98 %*	*50-150 %*	*1*	*08/20/20 14:22*	*NWTPH-Gx (MS)*	
MW-5 Dup (A0H0521-02)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	**22.6**	---	1.00	mg/L	10	08/20/20 15:16	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 97 %*	*Limits: 50-150 %*		*1*	*08/20/20 15:16*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*98 %*	*50-150 %*	*1*	*08/20/20 15:16*	*NWTPH-Gx (MS)*	
MW-5D (A0H0521-03)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/20/20 17:06	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 93 %*	*Limits: 50-150 %*		*1*	*08/20/20 17:06*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*98 %*	*50-150 %*	*1*	*08/20/20 17:06*	*NWTPH-Gx (MS)*	
MW-8 (A0H0521-04)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/20/20 17:33	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 92 %*	*Limits: 50-150 %*		*1*	*08/20/20 17:33*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*99 %*	*50-150 %*	*1*	*08/20/20 17:33*	*NWTPH-Gx (MS)*	
MW-8D (A0H0521-05)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/20/20 18:01	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 92 %*	*Limits: 50-150 %*		*1*	*08/20/20 18:01*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*99 %*	*50-150 %*	*1*	*08/20/20 18:01*	*NWTPH-Gx (MS)*	
MW-7 (A0H0521-06)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/20/20 18:28	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 97 %*	*Limits: 50-150 %*		*1*	*08/20/20 18:28*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*101 %*	*50-150 %*	*1*	*08/20/20 18:28*	*NWTPH-Gx (MS)*	
MW-9 (A0H0521-07)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/20/20 18:55	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 95 %*	*Limits: 50-150 %*		*1*	*08/20/20 18:55*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*96 %*	*50-150 %*	*1*	*08/20/20 18:55*	*NWTPH-Gx (MS)*	
MW-6 (A0H0521-08)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	**14.9**	---	1.00	mg/L	10	08/20/20 19:22	NWTPH-Gx (MS)	

Apex Laboratories

Lisa Domenighini, Client Services Manager

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-6 (A0H0521-08)				**Matrix: Water**		**Batch: 0080571**		
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 97 %*	*Limits: 50-150 %*	*1*	*08/20/20 19:22*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*95 %*	*50-150 %*	*1*	*08/20/20 19:22*	*NWTPH-Gx (MS)*	
MW-3 (A0H0521-09)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/20/20 19:50	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 93 %*	*Limits: 50-150 %*	*1*	*08/20/20 19:50*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*98 %*	*50-150 %*	*1*	*08/20/20 19:50*	*NWTPH-Gx (MS)*	
MW-4 (A0H0521-10)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/20/20 20:17	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 96 %*	*Limits: 50-150 %*	*1*	*08/20/20 20:17*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*101 %*	*50-150 %*	*1*	*08/20/20 20:17*	*NWTPH-Gx (MS)*	
MW-2 (A0H0521-11)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/20/20 20:44	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 92 %*	*Limits: 50-150 %*	*1*	*08/20/20 20:44*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*96 %*	*50-150 %*	*1*	*08/20/20 20:44*	*NWTPH-Gx (MS)*	
MW-1 (A0H0521-12)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/20/20 21:11	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 94 %*	*Limits: 50-150 %*	*1*	*08/20/20 21:11*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*99 %*	*50-150 %*	*1*	*08/20/20 21:11*	*NWTPH-Gx (MS)*	
MW-11 (A0H0521-13RE1)				**Matrix: Water**		**Batch: 0080657**		
Gasoline Range Organics	**13.9**	---	1.00	mg/L	10	08/24/20 12:58	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 100 %*	*Limits: 50-150 %*	*1*	*08/24/20 12:58*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*95 %*	*50-150 %*	*1*	*08/24/20 12:58*	*NWTPH-Gx (MS)*	
MW-11 Dup (A0H0521-14RE1)				**Matrix: Water**		**Batch: 0080657**		
Gasoline Range Organics	**22.9**	---	5.00	mg/L	50	08/24/20 13:25	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 97 %*	*Limits: 50-150 %*	*1*	*08/24/20 13:25*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*95 %*	*50-150 %*	*1*	*08/24/20 13:25*	*NWTPH-Gx (MS)*	
MW-10 (A0H0521-15)				**Matrix: Water**		**Batch: 0080571**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	08/20/20 15:44	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)			*Recovery: 92 %*	*Limits: 50-150 %*	*1*	*08/20/20 15:44*	*NWTPH-Gx (MS)*	

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Lisa Domenighini, Client Services Manager

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

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-10 (A0H0521-15)				**Matrix: Water**		**Batch: 0080571**		
Surrogate: 1,4-Difluorobenzene (Sur)		*Recovery: 93 %*	*Limits: 50-150 %*		*1*	*08/20/20 15:44*	*NWTPH-Gx (MS)*	

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Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-5 (A0H0521-01)				**Matrix: Water**		**Batch: 0080571**		
Benzene	ND	---	2.00	ug/L	10	08/20/20 14:22	EPA 8260D	
Ethylbenzene	**154**	---	5.00	ug/L	10	08/20/20 14:22	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	10.0	ug/L	10	08/20/20 14:22	EPA 8260D	
Naphthalene	**1400**	---	20.0	ug/L	10	08/20/20 14:22	EPA 8260D	
Toluene	ND	---	10.0	ug/L	10	08/20/20 14:22	EPA 8260D	
Xylenes, total	**704**	---	15.0	ug/L	10	08/20/20 14:22	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*96 %*	*Limits: 80-120 %*	*1*	*08/20/20 14:22*	*EPA 8260D*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*08/20/20 14:22*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*95 %*	*80-120 %*	*1*	*08/20/20 14:22*	*EPA 8260D*	
MW-5 Dup (A0H0521-02)				**Matrix: Water**		**Batch: 0080571**		
Benzene	ND	---	2.00	ug/L	10	08/20/20 15:16	EPA 8260D	
Ethylbenzene	**210**	---	5.00	ug/L	10	08/20/20 15:16	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	10.0	ug/L	10	08/20/20 15:16	EPA 8260D	
Naphthalene	**1740**	---	20.0	ug/L	10	08/20/20 15:16	EPA 8260D	
Toluene	ND	---	10.0	ug/L	10	08/20/20 15:16	EPA 8260D	
Xylenes, total	**940**	---	15.0	ug/L	10	08/20/20 15:16	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*98 %*	*Limits: 80-120 %*	*1*	*08/20/20 15:16*	*EPA 8260D*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*08/20/20 15:16*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*95 %*	*80-120 %*	*1*	*08/20/20 15:16*	*EPA 8260D*	
MW-5D (A0H0521-03)				**Matrix: Water**		**Batch: 0080571**		
Benzene	ND	---	0.200	ug/L	1	08/20/20 17:06	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	08/20/20 17:06	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	08/20/20 17:06	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	08/20/20 17:06	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	08/20/20 17:06	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	08/20/20 17:06	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*96 %*	*Limits: 80-120 %*	*1*	*08/20/20 17:06*	*EPA 8260D*	
Toluene-d8 (Surr)			*100 %*	*80-120 %*	*1*	*08/20/20 17:06*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*103 %*	*80-120 %*	*1*	*08/20/20 17:06*	*EPA 8260D*	
MW-8 (A0H0521-04)				**Matrix: Water**		**Batch: 0080571**		
Benzene	ND	---	0.200	ug/L	1	08/20/20 17:33	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	08/20/20 17:33	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	08/20/20 17:33	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	08/20/20 17:33	EPA 8260D	

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Lisa Domenighini, Client Services Manager

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-8 (A0H0521-04)				**Matrix: Water**		**Batch: 0080571**		
Toluene	ND	---	1.00	ug/L	1	08/20/20 17:33	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	08/20/20 17:33	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 97 %*		*Limits: 80-120 %*	*1*	*08/20/20 17:33*	*EPA 8260D*	
Toluene-d8 (Surr)			*101 %*	*80-120 %*	*1*	*08/20/20 17:33*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*103 %*	*80-120 %*	*1*	*08/20/20 17:33*	*EPA 8260D*	
MW-8D (A0H0521-05)				**Matrix: Water**		**Batch: 0080571**		
Benzene	ND	---	0.200	ug/L	1	08/20/20 18:01	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	08/20/20 18:01	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	08/20/20 18:01	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	08/20/20 18:01	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	08/20/20 18:01	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	08/20/20 18:01	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 98 %*		*Limits: 80-120 %*	*1*	*08/20/20 18:01*	*EPA 8260D*	
Toluene-d8 (Surr)			*101 %*	*80-120 %*	*1*	*08/20/20 18:01*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*102 %*	*80-120 %*	*1*	*08/20/20 18:01*	*EPA 8260D*	
MW-7 (A0H0521-06)				**Matrix: Water**		**Batch: 0080571**		
Benzene	ND	---	0.200	ug/L	1	08/20/20 18:28	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	08/20/20 18:28	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	08/20/20 18:28	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	08/20/20 18:28	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	08/20/20 18:28	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	08/20/20 18:28	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 100 %*		*Limits: 80-120 %*	*1*	*08/20/20 18:28*	*EPA 8260D*	
Toluene-d8 (Surr)			*100 %*	*80-120 %*	*1*	*08/20/20 18:28*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*103 %*	*80-120 %*	*1*	*08/20/20 18:28*	*EPA 8260D*	
MW-9 (A0H0521-07)				**Matrix: Water**		**Batch: 0080571**		
Benzene	ND	---	0.200	ug/L	1	08/20/20 18:55	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	08/20/20 18:55	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	08/20/20 18:55	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	08/20/20 18:55	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	08/20/20 18:55	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	08/20/20 18:55	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 96 %*		*Limits: 80-120 %*	*1*	*08/20/20 18:55*	*EPA 8260D*	
Toluene-d8 (Surr)			*100 %*	*80-120 %*	*1*	*08/20/20 18:55*	*EPA 8260D*	

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-9 (A0H0521-07)				**Matrix: Water**		**Batch: 0080571**		
Surrogate: 4-Bromofluorobenzene (Surr)		*Recovery: 106 %*	*Limits: 80-120 %*		*1*	*08/20/20 18:55*	*EPA 8260D*	
MW-6 (A0H0521-08)				**Matrix: Water**		**Batch: 0080571**		
Benzene	**166**	---	2.00	ug/L	10	08/20/20 19:22	EPA 8260D	
Ethylbenzene	**1790**	---	5.00	ug/L	10	08/20/20 19:22	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	10.0	ug/L	10	08/20/20 19:22	EPA 8260D	
Naphthalene	**316**	---	20.0	ug/L	10	08/20/20 19:22	EPA 8260D	
Toluene	**34.5**	---	10.0	ug/L	10	08/20/20 19:22	EPA 8260D	
Xylenes, total	**370**	---	15.0	ug/L	10	08/20/20 19:22	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 94 %*	*Limits: 80-120 %*		*1*	*08/20/20 19:22*	*EPA 8260D*	
Toluene-d8 (Surr)		*98 %*	*80-120 %*		*1*	*08/20/20 19:22*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)		*96 %*	*80-120 %*		*1*	*08/20/20 19:22*	*EPA 8260D*	
MW-3 (A0H0521-09)				**Matrix: Water**		**Batch: 0080571**		
Benzene	ND	---	0.200	ug/L	1	08/20/20 19:50	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	08/20/20 19:50	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	08/20/20 19:50	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	08/20/20 19:50	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	08/20/20 19:50	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	08/20/20 19:50	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 97 %*	*Limits: 80-120 %*		*1*	*08/20/20 19:50*	*EPA 8260D*	
Toluene-d8 (Surr)		*100 %*	*80-120 %*		*1*	*08/20/20 19:50*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)		*102 %*	*80-120 %*		*1*	*08/20/20 19:50*	*EPA 8260D*	
MW-4 (A0H0521-10)				**Matrix: Water**		**Batch: 0080571**		
Benzene	ND	---	0.200	ug/L	1	08/20/20 20:17	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	08/20/20 20:17	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	08/20/20 20:17	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	08/20/20 20:17	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	08/20/20 20:17	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	08/20/20 20:17	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 101 %*	*Limits: 80-120 %*		*1*	*08/20/20 20:17*	*EPA 8260D*	
Toluene-d8 (Surr)		*100 %*	*80-120 %*		*1*	*08/20/20 20:17*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)		*101 %*	*80-120 %*		*1*	*08/20/20 20:17*	*EPA 8260D*	
MW-2 (A0H0521-11)				**Matrix: Water**		**Batch: 0080571**		
Benzene	ND	---	0.200	ug/L	1	08/20/20 20:44	EPA 8260D	

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Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-2 (A0H0521-11)				**Matrix: Water**		**Batch: 0080571**		
Ethylbenzene	ND	---	0.500	ug/L	1	08/20/20 20:44	EPA 8260D	
Methyl tert-butyl ether (MTBE)	**5.21**	---	1.00	ug/L	1	08/20/20 20:44	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	08/20/20 20:44	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	08/20/20 20:44	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	08/20/20 20:44	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*94 %*	*Limits: 80-120 %*	*1*	*08/20/20 20:44*	*EPA 8260D*	
Toluene-d8 (Surr)			*100 %*	*80-120 %*	*1*	*08/20/20 20:44*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*103 %*	*80-120 %*	*1*	*08/20/20 20:44*	*EPA 8260D*	
MW-1 (A0H0521-12)				**Matrix: Water**		**Batch: 0080571**		
Benzene	ND	---	0.200	ug/L	1	08/20/20 21:11	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	08/20/20 21:11	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	08/20/20 21:11	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	08/20/20 21:11	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	08/20/20 21:11	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	08/20/20 21:11	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*95 %*	*Limits: 80-120 %*	*1*	*08/20/20 21:11*	*EPA 8260D*	
Toluene-d8 (Surr)			*101 %*	*80-120 %*	*1*	*08/20/20 21:11*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*102 %*	*80-120 %*	*1*	*08/20/20 21:11*	*EPA 8260D*	
MW-11 (A0H0521-13)				**Matrix: Water**		**Batch: 0080571**		
Benzene	**3.37**	---	0.200	ug/L	1	08/20/20 21:39	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	08/20/20 21:39	EPA 8260D	
Naphthalene	**90.6**	---	2.00	ug/L	1	08/20/20 21:39	EPA 8260D	
Toluene	**175**	---	1.00	ug/L	1	08/20/20 21:39	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*96 %*	*Limits: 80-120 %*	*1*	*08/20/20 21:39*	*EPA 8260D*	
Toluene-d8 (Surr)			*100 %*	*80-120 %*	*1*	*08/20/20 21:39*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*97 %*	*80-120 %*	*1*	*08/20/20 21:39*	*EPA 8260D*	
MW-11 (A0H0521-13RE1)				**Matrix: Water**		**Batch: 0080657**		
Ethylbenzene	**817**	---	5.00	ug/L	10	08/24/20 12:58	EPA 8260D	
Xylenes, total	**2930**	---	15.0	ug/L	10	08/24/20 12:58	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*98 %*	*Limits: 80-120 %*	*1*	*08/24/20 12:58*	*EPA 8260D*	
Toluene-d8 (Surr)			*96 %*	*80-120 %*	*1*	*08/24/20 12:58*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*100 %*	*80-120 %*	*1*	*08/24/20 12:58*	*EPA 8260D*	
MW-11 Dup (A0H0521-14)				**Matrix: Water**		**Batch: 0080571**		

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Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-11 Dup (A0H0521-14)				**Matrix: Water**		**Batch: 0080571**		
Benzene	**5.41**	---	0.200	ug/L	1	08/20/20 22:06	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	08/20/20 22:06	EPA 8260D	
Naphthalene	**145**	---	2.00	ug/L	1	08/20/20 22:06	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*97 %*	*Limits: 80-120 %*	*1*	*08/20/20 22:06*	*EPA 8260D*	
Toluene-d8 (Surr)			*98 %*	*80-120 %*	*1*	*08/20/20 22:06*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*98 %*	*80-120 %*	*1*	*08/20/20 22:06*	*EPA 8260D*	
MW-11 Dup (A0H0521-14RE1)				**Matrix: Water**		**Batch: 0080657**		
Ethylbenzene	**1360**	---	25.0	ug/L	50	08/24/20 13:25	EPA 8260D	
Toluene	**268**	---	50.0	ug/L	50	08/24/20 13:25	EPA 8260D	
Xylenes, total	**4810**	---	75.0	ug/L	50	08/24/20 13:25	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*94 %*	*Limits: 80-120 %*	*1*	*08/24/20 13:25*	*EPA 8260D*	
Toluene-d8 (Surr)			*99 %*	*80-120 %*	*1*	*08/24/20 13:25*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*104 %*	*80-120 %*	*1*	*08/24/20 13:25*	*EPA 8260D*	
MW-10 (A0H0521-15)				**Matrix: Water**		**Batch: 0080571**		
Benzene	ND	---	0.200	ug/L	1	08/20/20 15:44	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	08/20/20 15:44	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	08/20/20 15:44	EPA 8260D	
Naphthalene	ND	---	2.00	ug/L	1	08/20/20 15:44	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	08/20/20 15:44	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	08/20/20 15:44	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*97 %*	*Limits: 80-120 %*	*1*	*08/20/20 15:44*	*EPA 8260D*	
Toluene-d8 (Surr)			*100 %*	*80-120 %*	*1*	*08/20/20 15:44*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*104 %*	*80-120 %*	*1*	*08/20/20 15:44*	*EPA 8260D*	

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

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0080739 - EPA 3510C (Fuels/Acid Ext.)									**Water**			
Blank (0080739-BLK1)		Prepared: 08/25/20 13:05		Analyzed: 08/25/20 21:03								
NWTPH-Dx												
Diesel	**0.202**	---	0.182	mg/L	1	---	---	---	---	---	---	B
Oil	ND	---	0.364	mg/L	1	---	---	---	---	---	---	B-02
Surr: o-Terphenyl (Surr)		*Recovery: 105 %*		*Limits: 50-150 %*			*Dilution: 1x*					
LCS (0080739-BS1)		Prepared: 08/25/20 13:05		Analyzed: 08/25/20 21:26								
NWTPH-Dx												
Diesel	1.07	---	0.200	mg/L	1	1.25	---	86	59 - 115%	---	---	B
Surr: o-Terphenyl (Surr)		*Recovery: 111 %*		*Limits: 50-150 %*			*Dilution: 1x*					
LCS Dup (0080739-BSD1)		Prepared: 08/25/20 13:05		Analyzed: 08/25/20 21:49								**Q-19**
NWTPH-Dx												
Diesel	1.23	---	0.200	mg/L	1	1.25	---	98	59 - 115%	14	30%	B
Surr: o-Terphenyl (Surr)		*Recovery: 113 %*		*Limits: 50-150 %*			*Dilution: 1x*					
Batch 0080793 - EPA 3510C (Fuels/Acid Ext.)									**Water**			
Blank (0080793-BLK1)		Prepared: 08/26/20 15:29		Analyzed: 08/26/20 23:51								
NWTPH-Dx												
Diesel	ND	---	0.0182	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.0364	mg/L	1	---	---	---	---	---	---	
Surr: o-Terphenyl (Surr)		*Recovery: 87 %*		*Limits: 50-150 %*			*Dilution: 1x*					
LCS (0080793-BS1)		Prepared: 08/26/20 15:29		Analyzed: 08/27/20 00:13								
NWTPH-Dx												
Diesel	1.15	---	0.200	mg/L	1	1.25	---	92	59 - 115%	---	---	
Surr: o-Terphenyl (Surr)		*Recovery: 105 %*		*Limits: 50-150 %*			*Dilution: 1x*					
LCS Dup (0080793-BSD1)		Prepared: 08/26/20 15:29		Analyzed: 08/27/20 00:36								**Q-19**
NWTPH-Dx												
Diesel	1.15	---	0.200	mg/L	1	1.25	---	92	59 - 115%	0.7	30%	
Surr: o-Terphenyl (Surr)		*Recovery: 102 %*		*Limits: 50-150 %*			*Dilution: 1x*					

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Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0080922 - EPA 3510C (Fuels/Acid Ext.)												**Water**
Blank (0080922-BLK1)		Prepared: 08/31/20 11:00		Analyzed: 09/01/20 23:59								
NWTPH-Dx												
Diesel	ND	---	0.182	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.364	mg/L	1	---	---	---	---	---	---	
Surr: o-Terphenyl (Surr)		*Recovery: 87 %*		*Limits: 50-150 %*		*Dilution: 1x*						
LCS (0080922-BS1)		Prepared: 08/31/20 11:00		Analyzed: 09/01/20 00:22								
NWTPH-Dx												
Diesel	1.14	---	0.200	mg/L	1	1.25	---	92	59 - 115%	---	---	
Surr: o-Terphenyl (Surr)		*Recovery: 111 %*		*Limits: 50-150 %*		*Dilution: 1x*						
LCS Dup (0080922-BSD1)		Prepared: 08/31/20 11:00		Analyzed: 09/01/20 00:45								**Q-19**
NWTPH-Dx												
Diesel	1.17	---	0.200	mg/L	1	1.25	---	93	59 - 115%	2	30%	
Surr: o-Terphenyl (Surr)		*Recovery: 110 %*		*Limits: 50-150 %*		*Dilution: 1x*						

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Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0080571 - EPA 5030B									Water			
Blank (0080571-BLK1)		Prepared: 08/20/20 09:00		Analyzed: 08/20/20 11:38								
NWTPH-Gx (MS)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 93 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)		*92 %*		*50-150 %*			*"*					
LCS (0080571-BS2)		Prepared: 08/20/20 09:00		Analyzed: 08/20/20 11:11								
NWTPH-Gx (MS)												
Gasoline Range Organics	0.592	---	0.100	mg/L	1	0.500	---	118	80 - 120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 100 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)		*98 %*		*50-150 %*			*"*					
Duplicate (0080571-DUP2)		Prepared: 08/20/20 11:22		Analyzed: 08/20/20 14:49								
QC Source Sample: MW-5 (A0H0521-01)												
NWTPH-Gx (MS)												
Gasoline Range Organics	**18.7**	---	1.00	mg/L	10	---	18.8	---	---	0.8	30%	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 100 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)		*96 %*		*50-150 %*			*"*					

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Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0080657 - EPA 5030B									Water			
Blank (0080657-BLK1)		Prepared: 08/24/20 07:10		Analyzed: 08/24/20 09:58								
NWTPH-Gx (MS)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 98 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)			*100 %*		*50-150 %*			*"*				
LCS (0080657-BS2)		Prepared: 08/24/20 07:10		Analyzed: 08/24/20 08:37								
NWTPH-Gx (MS)												
Gasoline Range Organics	0.517	---	0.100	mg/L	1	0.500	---	103	80 - 120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 100 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)			*95 %*		*50-150 %*			*"*				

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Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0080571 - EPA 5030B									Water			
Blank (0080571-BLK1)			Prepared: 08/20/20 09:00		Analyzed: 08/20/20 11:38							
EPA 8260D												
Benzene	ND	---	0.200	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Xylenes, total	ND	---	1.50	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 94 %*		*Limits: 80-120 %*				*Dilution: 1x*			
Toluene-d8 (Surr)			*98 %*		*80-120 %*				*"*			
4-Bromofluorobenzene (Surr)			*104 %*		*80-120 %*				*"*			
LCS (0080571-BS1)			Prepared: 08/20/20 09:00		Analyzed: 08/20/20 10:44							
EPA 8260D												
Benzene	20.8	---	0.200	ug/L	1	20.0	---	104	80 - 120%	---	---	
Ethylbenzene	20.6	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
Methyl tert-butyl ether (MTBE)	21.4	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
Naphthalene	19.6	---	2.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
Toluene	19.6	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
Xylenes, total	63.6	---	1.50	ug/L	1	60.0	---	106	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 94 %*		*Limits: 80-120 %*				*Dilution: 1x*			
Toluene-d8 (Surr)			*96 %*		*80-120 %*				*"*			
4-Bromofluorobenzene (Surr)			*96 %*		*80-120 %*				*"*			
Duplicate (0080571-DUP2)			Prepared: 08/20/20 11:22		Analyzed: 08/20/20 14:49							
QC Source Sample: MW-5 (A0H0521-01)												
EPA 8260D												
Benzene	ND	---	2.00	ug/L	10	---	ND	---	---	---	30%	
Ethylbenzene	**158**	---	5.00	ug/L	10	---	154	---	---	3	30%	
Methyl tert-butyl ether (MTBE)	ND	---	10.0	ug/L	10	---	ND	---	---	---	30%	
Naphthalene	**1430**	---	20.0	ug/L	10	---	1400	---	---	2	30%	
Toluene	ND	---	10.0	ug/L	10	---	ND	---	---	---	30%	
Xylenes, total	**713**	---	15.0	ug/L	10	---	704	---	---	1	30%	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 97 %*		*Limits: 80-120 %*				*Dilution: 1x*			
Toluene-d8 (Surr)			*99 %*		*80-120 %*				*"*			

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Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0080571 - EPA 5030B							**Water**					
Duplicate (0080571-DUP2)		Prepared: 08/20/20 11:22 Analyzed: 08/20/20 14:49										
QC Source Sample: MW-5 (A0H0521-01)												
Surr: 4-Bromofluorobenzene (Surr)			*Recovery: 95 %*	*Limits: 80-120 %*			*Dilution: 1x*					
Matrix Spike (0080571-MS1)		Prepared: 08/20/20 11:22 Analyzed: 08/20/20 16:11										
QC Source Sample: MW-10 (A0H0521-15)												
EPA 8260D												
Benzene	21.1	---	0.200	ug/L	1	20.0	ND	106	79 - 120%	---	---	
Ethylbenzene	21.0	---	0.500	ug/L	1	20.0	ND	105	79 - 121%	---	---	
Methyl tert-butyl ether (MTBE)	21.6	---	1.00	ug/L	1	20.0	ND	108	71 - 124%	---	---	
Naphthalene	19.8	---	2.00	ug/L	1	20.0	ND	90	61 - 128%	---	---	
Toluene	20.1	---	1.00	ug/L	1	20.0	ND	101	80 - 121%	---	---	
Xylenes, total	65.0	---	1.50	ug/L	1	60.0	ND	108	79 - 121%	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 96 %*	*Limits: 80-120 %*			*Dilution: 1x*					
Toluene-d8 (Surr)			*99 %*	*80-120 %*			*"*					
4-Bromofluorobenzene (Surr)			*97 %*	*80-120 %*			*"*					

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5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0080657 - EPA 5030B							**Water**					
Blank (0080657-BLK1)		Prepared: 08/24/20 07:10		Analyzed: 08/24/20 09:58								
EPA 8260D												
Benzene	ND	---	0.200	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Isopropylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Xylenes, total	ND	---	1.50	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 98 %*		*Limits: 80-120 %*			*Dilution: 1x*				
Toluene-d8 (Surr)			*98 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*107 %*		*80-120 %*			*"*				
LCS (0080657-BS1)		Prepared: 08/24/20 07:10		Analyzed: 08/24/20 08:09								
EPA 8260D												
Benzene	20.4	---	0.200	ug/L	1	20.0	---	102	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	21.6	---	0.500	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	22.0	---	0.500	ug/L	1	20.0	---	110	80 - 120%	---	---	
Ethylbenzene	21.3	---	0.500	ug/L	1	20.0	---	106	80 - 120%	---	---	
Isopropylbenzene	23.4	---	1.00	ug/L	1	20.0	---	117	80 - 120%	---	---	
Methyl tert-butyl ether (MTBE)	22.2	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
Naphthalene	17.4	---	2.00	ug/L	1	20.0	---	87	80 - 120%	---	---	
Toluene	19.6	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,2,4-Trimethylbenzene	23.1	---	1.00	ug/L	1	20.0	---	115	80 - 120%	---	---	
1,3,5-Trimethylbenzene	23.4	---	1.00	ug/L	1	20.0	---	117	80 - 120%	---	---	
Xylenes, total	65.0	---	1.50	ug/L	1	60.0	---	108	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr)			*Recovery: 96 %*		*Limits: 80-120 %*			*Dilution: 1x*				
Toluene-d8 (Surr)			*97 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*96 %*		*80-120 %*			*"*				

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5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Prep: EPA 3510C (Fuels/Acid Ext.)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0080739							
A0H0521-04	Water	NWTPH-Dx	08/17/20 11:14	08/25/20 13:05	1070mL/5mL	1000mL/5mL	0.94
A0H0521-06	Water	NWTPH-Dx	08/17/20 12:28	08/25/20 13:05	1070mL/5mL	1000mL/5mL	0.94
Batch: 0080793							
A0H0521-08	Water	NWTPH-Dx	08/17/20 14:27	08/26/20 15:29	1060mL/5mL	1000mL/5mL	0.94
Batch: 0080922							
A0H0521-01RE1	Water	NWTPH-Dx	08/17/20 09:57	08/31/20 11:00	1060mL/5mL	1000mL/5mL	0.94
A0H0521-02RE1	Water	NWTPH-Dx	08/17/20 09:57	08/31/20 13:55	1060mL/5mL	1000mL/5mL	0.94
A0H0521-03RE1	Water	NWTPH-Dx	08/17/20 10:36	08/31/20 13:55	1070mL/5mL	1000mL/5mL	0.94
A0H0521-05RE1	Water	NWTPH-Dx	08/17/20 11:51	08/31/20 13:55	1060mL/5mL	1000mL/5mL	0.94
A0H0521-07RE1	Water	NWTPH-Dx	08/17/20 13:34	08/31/20 13:55	1060mL/5mL	1000mL/5mL	0.94
A0H0521-09	Water	NWTPH-Dx	08/18/20 08:00	08/31/20 13:55	1060mL/5mL	1000mL/5mL	0.94
A0H0521-10	Water	NWTPH-Dx	08/18/20 09:09	08/31/20 13:55	1060mL/5mL	1000mL/5mL	0.94
A0H0521-11	Water	NWTPH-Dx	08/18/20 10:51	08/31/20 13:55	1060mL/5mL	1000mL/5mL	0.94
A0H0521-12	Water	NWTPH-Dx	08/19/20 08:27	08/31/20 13:55	1060mL/5mL	1000mL/5mL	0.94
A0H0521-13	Water	NWTPH-Dx	08/19/20 09:02	08/31/20 13:55	1070mL/5mL	1000mL/5mL	0.94
A0H0521-14	Water	NWTPH-Dx	08/19/20 09:02	08/31/20 13:55	1060mL/5mL	1000mL/5mL	0.94
A0H0521-15	Water	NWTPH-Dx	08/19/20 11:40	08/31/20 13:55	1070mL/5mL	1000mL/5mL	0.94

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0080571							
A0H0521-01	Water	NWTPH-Gx (MS)	08/17/20 09:57	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-02	Water	NWTPH-Gx (MS)	08/17/20 09:57	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-03	Water	NWTPH-Gx (MS)	08/17/20 10:36	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-04	Water	NWTPH-Gx (MS)	08/17/20 11:14	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-05	Water	NWTPH-Gx (MS)	08/17/20 11:51	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-06	Water	NWTPH-Gx (MS)	08/17/20 12:28	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-07	Water	NWTPH-Gx (MS)	08/17/20 13:34	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-08	Water	NWTPH-Gx (MS)	08/17/20 14:27	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-09	Water	NWTPH-Gx (MS)	08/18/20 08:00	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-10	Water	NWTPH-Gx (MS)	08/18/20 09:09	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-11	Water	NWTPH-Gx (MS)	08/18/20 10:51	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-12	Water	NWTPH-Gx (MS)	08/19/20 08:27	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00

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Lisa Domenighini, Client Services Manager

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Apex Laboratories, LLC

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

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

SAMPLE PREPARATION INFORMATION

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A0H0521-15	Water	NWTPH-Gx (MS)	08/19/20 11:40	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
Batch: 0080657							
A0H0521-13RE1	Water	NWTPH-Gx (MS)	08/19/20 09:02	08/24/20 09:35	5mL/5mL	5mL/5mL	1.00
A0H0521-14RE1	Water	NWTPH-Gx (MS)	08/19/20 09:02	08/24/20 09:35	5mL/5mL	5mL/5mL	1.00

Selected Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0080571							
A0H0521-01	Water	EPA 8260D	08/17/20 09:57	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-02	Water	EPA 8260D	08/17/20 09:57	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-03	Water	EPA 8260D	08/17/20 10:36	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-04	Water	EPA 8260D	08/17/20 11:14	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-05	Water	EPA 8260D	08/17/20 11:51	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-06	Water	EPA 8260D	08/17/20 12:28	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-07	Water	EPA 8260D	08/17/20 13:34	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-08	Water	EPA 8260D	08/17/20 14:27	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-09	Water	EPA 8260D	08/18/20 08:00	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-10	Water	EPA 8260D	08/18/20 09:09	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-11	Water	EPA 8260D	08/18/20 10:51	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-12	Water	EPA 8260D	08/19/20 08:27	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-13	Water	EPA 8260D	08/19/20 09:02	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-14	Water	EPA 8260D	08/19/20 09:02	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
A0H0521-15	Water	EPA 8260D	08/19/20 11:40	08/20/20 11:22	5mL/5mL	5mL/5mL	1.00
Batch: 0080657							
A0H0521-13RE1	Water	EPA 8260D	08/19/20 09:02	08/24/20 09:35	5mL/5mL	5mL/5mL	1.00
A0H0521-14RE1	Water	EPA 8260D	08/19/20 09:02	08/24/20 09:35	5mL/5mL	5mL/5mL	1.00

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

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503-718-2323
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

QUALIFIER DEFINITIONS

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

Apex Laboratories

B	Analyte detected in an associated blank at a level above the MRL. (See Notes and Conventions below.)
B-02	Analyte detected in an associated blank at a level between one-half the MRL and the MRL. (See Notes and Conventions below.)
F-18	Result for Diesel (Diesel Range Organics, C12-C24) is due to overlap from Gasoline or a Gasoline Range product.
F-20	Result for Diesel is Estimated due to overlap from Gasoline Range Organics or other VOCs.
Q-19	Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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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 ½ the Reporting Limit (RL).
-For Blank hits falling between ½ 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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Portland, OR 97239	Project Manager:	**Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

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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Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation)
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Lisa Domenighini, Client Services Manager

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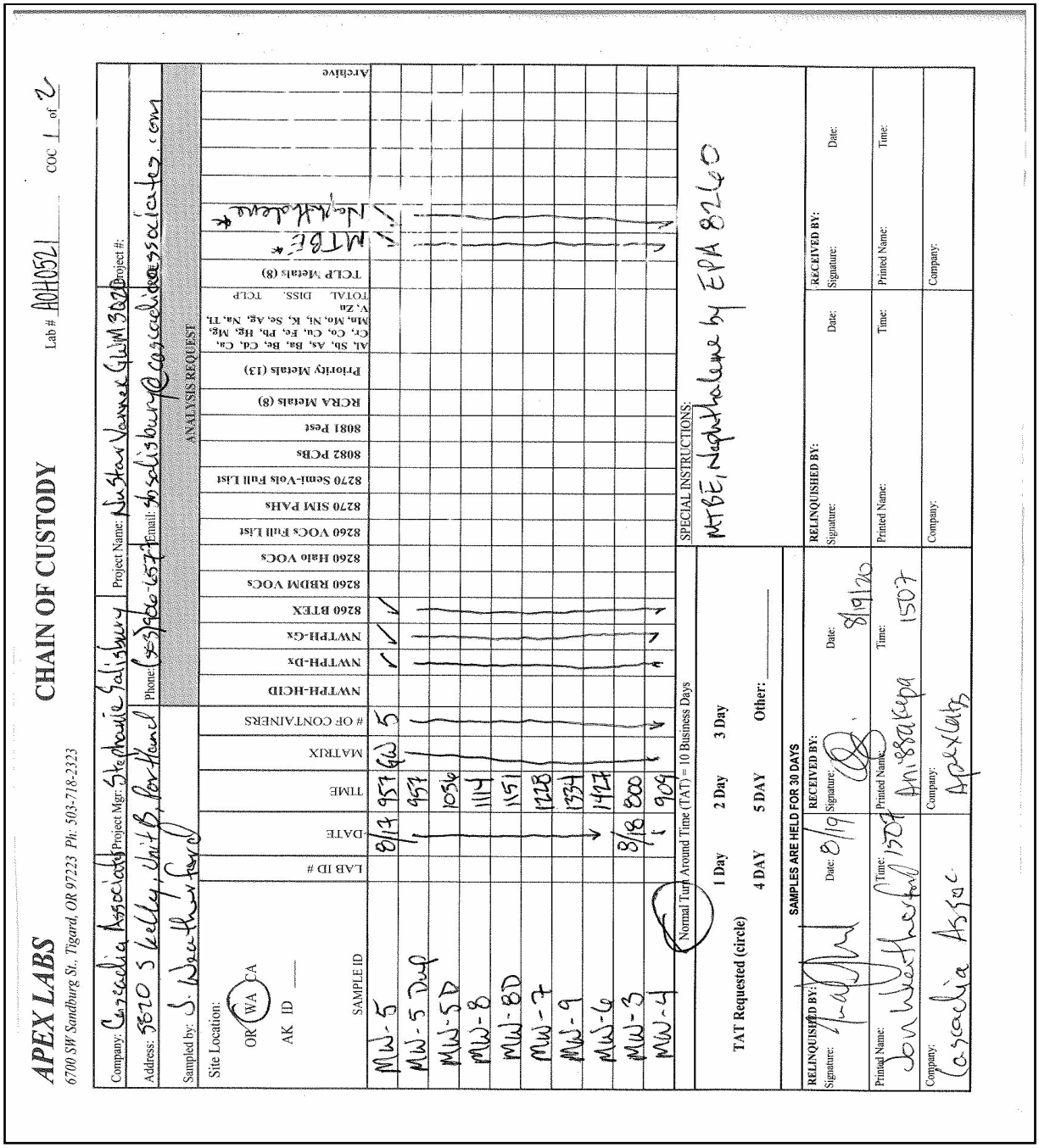
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**



APEX LABS — CHAIN OF CUSTODY — Lab # A0H0521 — COC 1 of 2
6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

Company: Cascadia Associates Project Mgr: Stephanie Salisbury Project Name: Shore Terminal Vancouver GWM 3Q20 Project #:
Address: 5820 S Kelly, Unit B, Portland Phone: (503)960-6577 Email: ssalisbury@cascadiaassociates.com
Sampled by: J. Weathersford

Site Location: OR (WA) CA AK ID ____

ANALYSIS REQUEST

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 BTEX	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTAL DISS. TCLP	TCLP Metals (8)	MTBE*	Naphthalene*	Archive
MW-5		8/19	957	GW	5		✓	✓	✓												✓	
MW-5 Dup		"	957																			
MW-5D		"	1056																			
MW-8		"	1114																			
MW-8D		"	1151																			
MW-7		"	1228																			
MW-9		"	1334																			
MW-6		"	1427																			
MW-3		8/18	800																			
MW-4		"	909	↓	↓		↓	↓	↓												↓	

Normal Turn Around Time (TAT) = 10 Business Days

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: ____

SPECIAL INSTRUCTIONS: MTBE, Naphthalene by EPA 8260

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY: Signature:	Date: 8/19	RECEIVED BY: Signature:	Date: 8/19/20	RELINQUISHED BY: Signature:	Date:	RECEIVED BY: Signature:	Date:
Printed Name:	Time: 1507	Printed Name:	Time: 1507	Printed Name:	Time:	Printed Name:	Time:
Company: Cascadia Assoc.		Company: Apex Labs		Company:		Company:	

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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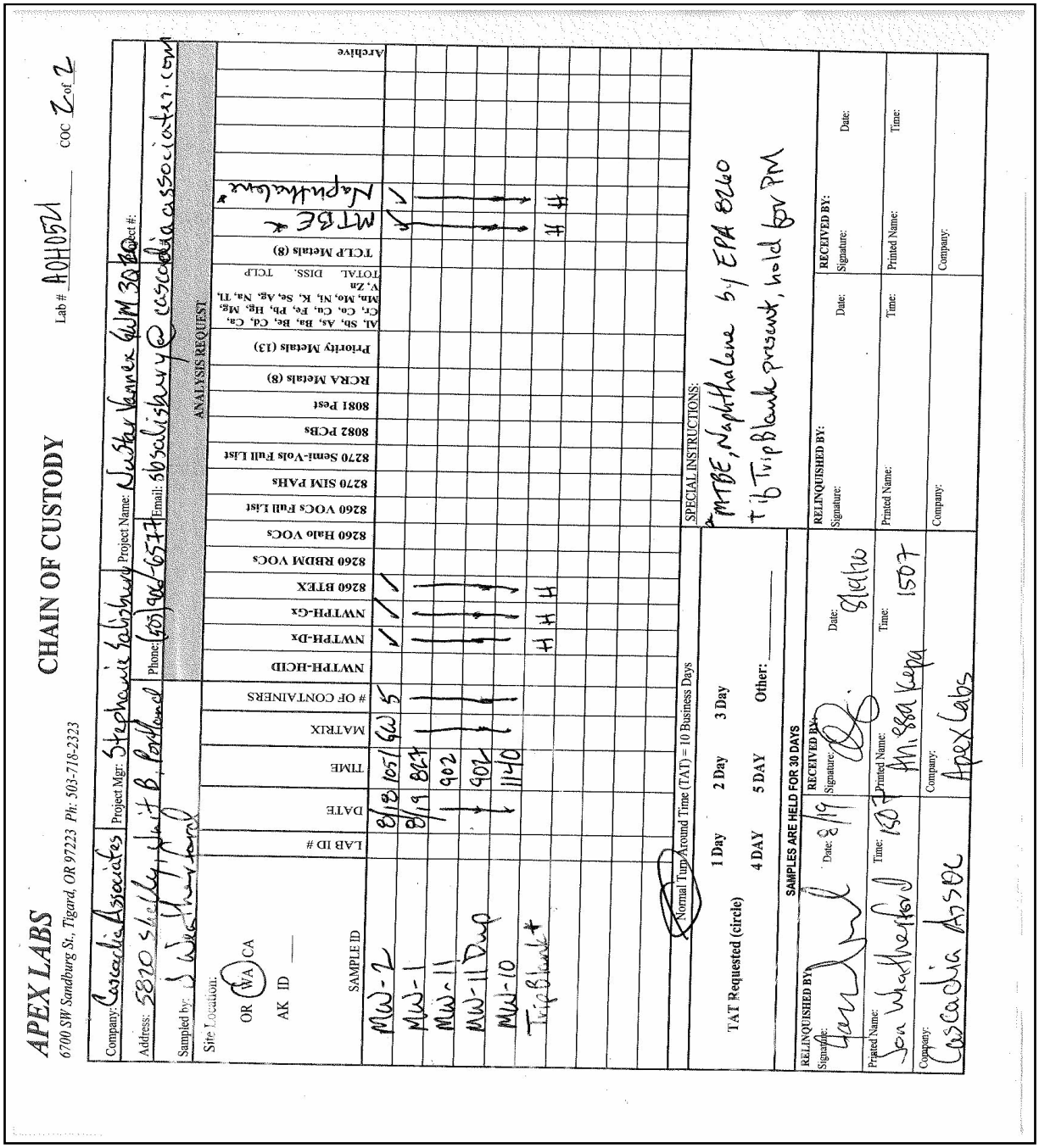
ORELAP ID: **OR100062**

Cascadia Associates	Project: **Shore Terminal-Vancouver Annex**	
5820 SW Kelly Ave Unit B	Project Number: **GWM 3Q20**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**



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Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0H0521 - 09 03 20 0816**

APEX LABS COOLER RECEIPT FORM

Client: Cascadia Associates Element WO#: A0H0521

Project/Project #: Nustar Vancouver GWM 3Q20

Delivery Info:

Date/time received: 8/19/20 @ 1507 By: AKK

Delivered by: Apex___Client X ESS___FedEx___UPS___Swift___Senvoy___SDS___Other_____

Cooler Inspection Date/time inspected: 8/19/20 @ 1515 By: AKK

Chain of Custody included? Yes X No ___ Custody seals? Yes_____ No X

Signed/dated by client? Yes Y No ___

Signed/dated by Apex? Yes Y No ___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	5.6	3.6	0.1				
Received on ice? (Y/N)	Y	Y	Y				
Temp. blanks? (Y/N)	Y	Y	Y				
Ice type: (Gel/Real/Other)	Real	Real	Real				
Condition:	Melty	Melty	Melty				

Cooler out of temp? (Y/N) Possible reason why:

If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA

Out of temperature samples form initiated? Yes/No/NA

Samples Inspection: Date/time inspected: 8/20/20 @ 1000 By: 8

All samples intact? Yes X No ___ Comments:

Bottle labels/COCs agree? Yes Y No ___ Comments:

COC/container discrepancies form initiated? Yes ___ No X

Containers/volumes received appropriate for analysis? Yes X No ___ Comments:

Do VOA vials have visible headspace? Yes ___ No X NA ___

Comments

Water samples: pH checked: Yes X No___NA___ pH appropriate? Yes X No___NA___

Comments:

Additional information: TB not provided

Labeled by: 8 Witness: AKK Cooler Inspected by: CFH See Project Contact Form: Y

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

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

Thursday, December 3, 2020

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

RE: A0K0700 - Nustar Vannex - 0060-001-001

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 A0K0700, which was received by the laboratory on 11/17/2020 at 5:00:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample reciept, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler#1	5.9 degC	Cooler#2	5.5 degC
Cooler#3	5.4 degC		

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.
All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.

Apex Laboratories

Lisa A Domenighini

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-5	A0K0700-01	Water	11/16/20 09:58	11/17/20 17:00
MW-5D	A0K0700-02	Water	11/16/20 10:29	11/17/20 17:00
MW-8	A0K0700-03	Water	11/16/20 11:02	11/17/20 17:00
MW-8D	A0K0700-04	Water	11/16/20 11:39	11/17/20 17:00
MW-9	A0K0700-05	Water	11/16/20 12:24	11/17/20 17:00
MW-7	A0K0700-06	Water	11/16/20 13:12	11/17/20 17:00
MW-10	A0K0700-07	Water	11/16/20 14:20	11/17/20 17:00
MW-2	A0K0700-08	Water	11/17/20 08:06	11/17/20 17:00
MW-1	A0K0700-09	Water	11/17/20 09:10	11/17/20 17:00
MW-11	A0K0700-10	Water	11/17/20 09:54	11/17/20 17:00
MW-4	A0K0700-11	Water	11/17/20 10:42	11/17/20 17:00
MW-3	A0K0700-12	Water	11/17/20 11:24	11/17/20 17:00
MW-6	A0K0700-13	Water	11/17/20 12:14	11/17/20 17:00
MW-6 Dup	A0K0700-14	Water	11/17/20 12:14	11/17/20 17:00

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-5 (A0K0700-01)				**Matrix: Water**		**Batch: 0110768**		
Diesel	**1.92**	---	0.0755	mg/L	1	11/20/20 23:55	NWTPH-Dx LL	**F-18**
Oil	ND	---	0.151	mg/L	1	11/20/20 23:55	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 89 %*		*Limits: 50-150 %*	*1*	*11/20/20 23:55*	*NWTPH-Dx LL*	
MW-5D (A0K0700-02)				**Matrix: Water**		**Batch: 0110834**		
Diesel	ND	---	0.0748	mg/L	1	11/23/20 23:24	NWTPH-Dx LL	
Oil	ND	---	0.150	mg/L	1	11/23/20 23:24	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 95 %*		*Limits: 50-150 %*	*1*	*11/23/20 23:24*	*NWTPH-Dx LL*	*Q-41*
MW-8 (A0K0700-03)				**Matrix: Water**		**Batch: 0110834**		
Diesel	ND	---	0.0755	mg/L	1	11/23/20 23:45	NWTPH-Dx LL	
Oil	ND	---	0.151	mg/L	1	11/23/20 23:45	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 89 %*		*Limits: 50-150 %*	*1*	*11/23/20 23:45*	*NWTPH-Dx LL*	*Q-41*
MW-8D (A0K0700-04)				**Matrix: Water**		**Batch: 0110834**		
Diesel	ND	---	0.0748	mg/L	1	11/24/20 00:07	NWTPH-Dx LL	
Oil	ND	---	0.150	mg/L	1	11/24/20 00:07	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 109 %*		*Limits: 50-150 %*	*1*	*11/24/20 00:07*	*NWTPH-Dx LL*	*Q-41*
MW-9 (A0K0700-05)				**Matrix: Water**		**Batch: 0111007**		
Diesel	ND	---	0.0755	mg/L	1	12/01/20 00:06	NWTPH-Dx LL	
Oil	ND	---	0.151	mg/L	1	12/01/20 00:06	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 91 %*		*Limits: 50-150 %*	*1*	*12/01/20 00:06*	*NWTPH-Dx LL*	
MW-7 (A0K0700-06)				**Matrix: Water**		**Batch: 0111007**		
Diesel	ND	---	0.0748	mg/L	1	12/01/20 00:28	NWTPH-Dx LL	
Oil	ND	---	0.150	mg/L	1	12/01/20 00:28	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 94 %*		*Limits: 50-150 %*	*1*	*12/01/20 00:28*	*NWTPH-Dx LL*	
MW-10 (A0K0700-07)				**Matrix: Water**		**Batch: 0111007**		
Diesel	ND	---	0.0748	mg/L	1	12/01/20 00:50	NWTPH-Dx LL	
Oil	ND	---	0.150	mg/L	1	12/01/20 00:50	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 91 %*		*Limits: 50-150 %*	*1*	*12/01/20 00:50*	*NWTPH-Dx LL*	
MW-2 (A0K0700-08)				**Matrix: Water**		**Batch: 0120007**		
Diesel	ND	---	0.0755	mg/L	1	12/01/20 23:07	NWTPH-Dx LL	

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

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

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

ANALYTICAL SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-2 (A0K0700-08)				**Matrix: Water**		**Batch: 0120007**		
Oil	ND	---	0.151	mg/L	1	12/01/20 23:07	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 86 %*		*Limits: 50-150 %*	*1*	*12/01/20 23:07*	*NWTPH-Dx LL*	
MW-1 (A0K0700-09)				**Matrix: Water**		**Batch: 0120007**		
Diesel	**0.0998**	---	0.0748	mg/L	1	12/01/20 23:29	NWTPH-Dx LL	**F-11**
Oil	ND	---	0.150	mg/L	1	12/01/20 23:29	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 84 %*		*Limits: 50-150 %*	*1*	*12/01/20 23:29*	*NWTPH-Dx LL*	
MW-11 (A0K0700-10)				**Matrix: Water**		**Batch: 0120007**		
Diesel	**0.298**	---	0.0755	mg/L	1	12/01/20 23:51	NWTPH-Dx LL	**F-11, F-20**
Oil	ND	---	0.151	mg/L	1	12/01/20 23:51	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 78 %*		*Limits: 50-150 %*	*1*	*12/01/20 23:51*	*NWTPH-Dx LL*	
MW-4 (A0K0700-11)				**Matrix: Water**		**Batch: 0120007**		
Diesel	**0.0783**	---	0.0755	mg/L	1	12/02/20 00:13	NWTPH-Dx LL	**F-11**
Oil	ND	---	0.151	mg/L	1	12/02/20 00:13	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 100 %*		*Limits: 50-150 %*	*1*	*12/02/20 00:13*	*NWTPH-Dx LL*	
MW-3 (A0K0700-12)				**Matrix: Water**		**Batch: 0120007**		
Diesel	ND	---	0.0748	mg/L	1	12/02/20 00:34	NWTPH-Dx LL	
Oil	ND	---	0.150	mg/L	1	12/02/20 00:34	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 107 %*		*Limits: 50-150 %*	*1*	*12/02/20 00:34*	*NWTPH-Dx LL*	
MW-6 (A0K0700-13)				**Matrix: Water**		**Batch: 0120007**		**PRES**
Diesel	**4.62**	---	0.0769	mg/L	1	12/02/20 00:56	NWTPH-Dx LL	**F-13, F-20**
Oil	ND	---	0.154	mg/L	1	12/02/20 00:56	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 110 %*		*Limits: 50-150 %*	*1*	*12/02/20 00:56*	*NWTPH-Dx LL*	
MW-6 Dup (A0K0700-14)				**Matrix: Water**		**Batch: 0120007**		**PRES**
Diesel	**6.93**	---	0.0784	mg/L	1	12/02/20 01:18	NWTPH-Dx LL	**F-13, F-20**
Oil	ND	---	0.157	mg/L	1	12/02/20 01:18	NWTPH-Dx LL	
Surrogate: o-Terphenyl (Surr)		*Recovery: 106 %*		*Limits: 50-150 %*	*1*	*12/02/20 01:18*	*NWTPH-Dx LL*	

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Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-5 (A0K0700-01)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	**18.5**	---	2.00	mg/L	20	11/19/20 18:35	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 100 %*	*Limits: 50-150 %*		*1*	*11/19/20 18:35*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*112 %*	*50-150 %*	*1*	*11/19/20 18:35*	*NWTPH-Gx (MS)*	
MW-5D (A0K0700-02)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	**0.200**	---	0.100	mg/L	1	11/19/20 12:15	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 99 %*	*Limits: 50-150 %*		*1*	*11/19/20 12:15*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*109 %*	*50-150 %*	*1*	*11/19/20 12:15*	*NWTPH-Gx (MS)*	
MW-8 (A0K0700-03)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	11/19/20 12:42	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 100 %*	*Limits: 50-150 %*		*1*	*11/19/20 12:42*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*111 %*	*50-150 %*	*1*	*11/19/20 12:42*	*NWTPH-Gx (MS)*	
MW-8D (A0K0700-04)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	11/19/20 13:10	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 99 %*	*Limits: 50-150 %*		*1*	*11/19/20 13:10*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*110 %*	*50-150 %*	*1*	*11/19/20 13:10*	*NWTPH-Gx (MS)*	
MW-9 (A0K0700-05)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	11/19/20 13:37	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 102 %*	*Limits: 50-150 %*		*1*	*11/19/20 13:37*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*112 %*	*50-150 %*	*1*	*11/19/20 13:37*	*NWTPH-Gx (MS)*	
MW-7 (A0K0700-06)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	11/19/20 14:04	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 100 %*	*Limits: 50-150 %*		*1*	*11/19/20 14:04*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*113 %*	*50-150 %*	*1*	*11/19/20 14:04*	*NWTPH-Gx (MS)*	
MW-10 (A0K0700-07)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	11/19/20 14:31	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 103 %*	*Limits: 50-150 %*		*1*	*11/19/20 14:31*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)			*114 %*	*50-150 %*	*1*	*11/19/20 14:31*	*NWTPH-Gx (MS)*	
MW-2 (A0K0700-08)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	11/19/20 14:58	NWTPH-Gx (MS)	

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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

ANALYTICAL SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-2 (A0K0700-08)				**Matrix: Water**		**Batch: 0110686**		
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 92 %*	*Limits: 50-150 %*		*1*	*11/19/20 14:58*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)		*105 %*	*50-150 %*		*1*	*11/19/20 14:58*	*NWTPH-Gx (MS)*	
MW-1 (A0K0700-09)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	11/19/20 15:25	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 99 %*	*Limits: 50-150 %*		*1*	*11/19/20 15:25*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)		*111 %*	*50-150 %*		*1*	*11/19/20 15:25*	*NWTPH-Gx (MS)*	
MW-11 (A0K0700-10)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	**23.3**	---	1.00	mg/L	10	11/19/20 19:29	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 99 %*	*Limits: 50-150 %*		*1*	*11/19/20 19:29*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)		*102 %*	*50-150 %*		*1*	*11/19/20 19:29*	*NWTPH-Gx (MS)*	
MW-4 (A0K0700-11)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	11/19/20 15:52	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 101 %*	*Limits: 50-150 %*		*1*	*11/19/20 15:52*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)		*115 %*	*50-150 %*		*1*	*11/19/20 15:52*	*NWTPH-Gx (MS)*	
MW-3 (A0K0700-12)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	ND	---	0.100	mg/L	1	11/19/20 16:19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 96 %*	*Limits: 50-150 %*		*1*	*11/19/20 16:19*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)		*113 %*	*50-150 %*		*1*	*11/19/20 16:19*	*NWTPH-Gx (MS)*	
MW-6 (A0K0700-13)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	**12.5**	---	2.00	mg/L	20	11/19/20 19:56	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 100 %*	*Limits: 50-150 %*		*1*	*11/19/20 19:56*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)		*104 %*	*50-150 %*		*1*	*11/19/20 19:56*	*NWTPH-Gx (MS)*	
MW-6 Dup (A0K0700-14)				**Matrix: Water**		**Batch: 0110686**		
Gasoline Range Organics	**13.7**	---	2.00	mg/L	20	11/19/20 20:50	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		*Recovery: 96 %*	*Limits: 50-150 %*		*1*	*11/19/20 20:50*	*NWTPH-Gx (MS)*	
1,4-Difluorobenzene (Sur)		*101 %*	*50-150 %*		*1*	*11/19/20 20:50*	*NWTPH-Gx (MS)*	

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-5 (A0K0700-01)				**Matrix: Water**		**Batch: 0110686**		
Benzene	ND	---	4.00	ug/L	20	11/19/20 18:35	EPA 8260D	
Toluene	ND	---	20.0	ug/L	20	11/19/20 18:35	EPA 8260D	
Ethylbenzene	**206**	---	10.0	ug/L	20	11/19/20 18:35	EPA 8260D	
Xylenes, total	**1050**	---	30.0	ug/L	20	11/19/20 18:35	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	20.0	ug/L	20	11/19/20 18:35	EPA 8260D	
Naphthalene	**1420**	---	80.0	ug/L	20	11/19/20 18:35	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*111 %*	*Limits: 80-120 %*	*1*	*11/19/20 18:35*	*EPA 8260D*	
Toluene-d8 (Surr)			*104 %*	*80-120 %*	*1*	*11/19/20 18:35*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*88 %*	*80-120 %*	*1*	*11/19/20 18:35*	*EPA 8260D*	
MW-5D (A0K0700-02)				**Matrix: Water**		**Batch: 0110686**		
Benzene	ND	---	0.200	ug/L	1	11/19/20 12:15	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	11/19/20 12:15	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	11/19/20 12:15	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	11/19/20 12:15	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	11/19/20 12:15	EPA 8260D	
Naphthalene	ND	---	4.00	ug/L	1	11/19/20 12:15	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*108 %*	*Limits: 80-120 %*	*1*	*11/19/20 12:15*	*EPA 8260D*	
Toluene-d8 (Surr)			*101 %*	*80-120 %*	*1*	*11/19/20 12:15*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*94 %*	*80-120 %*	*1*	*11/19/20 12:15*	*EPA 8260D*	
MW-8 (A0K0700-03)				**Matrix: Water**		**Batch: 0110686**		
Benzene	ND	---	0.200	ug/L	1	11/19/20 12:42	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	11/19/20 12:42	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	11/19/20 12:42	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	11/19/20 12:42	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	11/19/20 12:42	EPA 8260D	
Naphthalene	ND	---	4.00	ug/L	1	11/19/20 12:42	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*109 %*	*Limits: 80-120 %*	*1*	*11/19/20 12:42*	*EPA 8260D*	
Toluene-d8 (Surr)			*102 %*	*80-120 %*	*1*	*11/19/20 12:42*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*94 %*	*80-120 %*	*1*	*11/19/20 12:42*	*EPA 8260D*	
MW-8D (A0K0700-04)				**Matrix: Water**		**Batch: 0110686**		
Benzene	ND	---	0.200	ug/L	1	11/19/20 13:10	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	11/19/20 13:10	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	11/19/20 13:10	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	11/19/20 13:10	EPA 8260D	

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-8D (A0K0700-04)				**Matrix: Water**		**Batch: 0110686**		
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	11/19/20 13:10	EPA 8260D	
Naphthalene	ND	---	4.00	ug/L	1	11/19/20 13:10	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*109 %*	*Limits: 80-120 %*	*1*	*11/19/20 13:10*	*EPA 8260D*	
Toluene-d8 (Surr)			*102 %*	*80-120 %*	*1*	*11/19/20 13:10*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*96 %*	*80-120 %*	*1*	*11/19/20 13:10*	*EPA 8260D*	
MW-9 (A0K0700-05)				**Matrix: Water**		**Batch: 0110686**		
Benzene	ND	---	0.200	ug/L	1	11/19/20 13:37	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	11/19/20 13:37	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	11/19/20 13:37	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	11/19/20 13:37	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	11/19/20 13:37	EPA 8260D	
Naphthalene	ND	---	4.00	ug/L	1	11/19/20 13:37	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*111 %*	*Limits: 80-120 %*	*1*	*11/19/20 13:37*	*EPA 8260D*	
Toluene-d8 (Surr)			*102 %*	*80-120 %*	*1*	*11/19/20 13:37*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*95 %*	*80-120 %*	*1*	*11/19/20 13:37*	*EPA 8260D*	
MW-7 (A0K0700-06)				**Matrix: Water**		**Batch: 0110686**		
Benzene	ND	---	0.200	ug/L	1	11/19/20 14:04	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	11/19/20 14:04	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	11/19/20 14:04	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	11/19/20 14:04	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	11/19/20 14:04	EPA 8260D	
Naphthalene	ND	---	4.00	ug/L	1	11/19/20 14:04	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*111 %*	*Limits: 80-120 %*	*1*	*11/19/20 14:04*	*EPA 8260D*	
Toluene-d8 (Surr)			*102 %*	*80-120 %*	*1*	*11/19/20 14:04*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*95 %*	*80-120 %*	*1*	*11/19/20 14:04*	*EPA 8260D*	
MW-10 (A0K0700-07)				**Matrix: Water**		**Batch: 0110686**		
Benzene	ND	---	0.200	ug/L	1	11/19/20 14:31	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	11/19/20 14:31	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	11/19/20 14:31	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	11/19/20 14:31	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	11/19/20 14:31	EPA 8260D	
Naphthalene	ND	---	4.00	ug/L	1	11/19/20 14:31	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*112 %*	*Limits: 80-120 %*	*1*	*11/19/20 14:31*	*EPA 8260D*	
Toluene-d8 (Surr)			*102 %*	*80-120 %*	*1*	*11/19/20 14:31*	*EPA 8260D*	

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Apex Laboratories, LLC

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

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-10 (A0K0700-07)				**Matrix: Water**		**Batch: 0110686**		
Surrogate: 4-Bromofluorobenzene (Surr)		*Recovery: 95 %*	*Limits: 80-120 %*		*1*	*11/19/20 14:31*	*EPA 8260D*	
MW-2 (A0K0700-08)				**Matrix: Water**		**Batch: 0110686**		
Benzene	ND	---	0.200	ug/L	1	11/19/20 14:58	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	11/19/20 14:58	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	11/19/20 14:58	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	11/19/20 14:58	EPA 8260D	
Methyl tert-butyl ether (MTBE)	**2.43**	---	1.00	ug/L	1	11/19/20 14:58	EPA 8260D	
Naphthalene	ND	---	4.00	ug/L	1	11/19/20 14:58	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 105 %*	*Limits: 80-120 %*		*1*	*11/19/20 14:58*	*EPA 8260D*	
Toluene-d8 (Surr)		*104 %*	*80-120 %*		*1*	*11/19/20 14:58*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)		*94 %*	*80-120 %*		*1*	*11/19/20 14:58*	*EPA 8260D*	
MW-1 (A0K0700-09)				**Matrix: Water**		**Batch: 0110686**		
Benzene	ND	---	0.200	ug/L	1	11/19/20 15:25	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	11/19/20 15:25	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	11/19/20 15:25	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	11/19/20 15:25	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	11/19/20 15:25	EPA 8260D	
Naphthalene	ND	---	4.00	ug/L	1	11/19/20 15:25	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 109 %*	*Limits: 80-120 %*		*1*	*11/19/20 15:25*	*EPA 8260D*	
Toluene-d8 (Surr)		*102 %*	*80-120 %*		*1*	*11/19/20 15:25*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)		*93 %*	*80-120 %*		*1*	*11/19/20 15:25*	*EPA 8260D*	
MW-11 (A0K0700-10)				**Matrix: Water**		**Batch: 0110686**		
Benzene	**35.9**	---	2.00	ug/L	10	11/19/20 19:29	EPA 8260D	
Toluene	**70.5**	---	10.0	ug/L	10	11/19/20 19:29	EPA 8260D	
Xylenes, total	**3310**	---	15.0	ug/L	10	11/19/20 19:29	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	10.0	ug/L	10	11/19/20 19:29	EPA 8260D	
Naphthalene	**207**	---	40.0	ug/L	10	11/19/20 19:29	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 101 %*	*Limits: 80-120 %*		*1*	*11/19/20 19:29*	*EPA 8260D*	
Toluene-d8 (Surr)		*102 %*	*80-120 %*		*1*	*11/19/20 19:29*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)		*92 %*	*80-120 %*		*1*	*11/19/20 19:29*	*EPA 8260D*	
MW-11 (A0K0700-10RE1)				**Matrix: Water**		**Batch: 0110747**		
Ethylbenzene	**2180**	---	50.0	ug/L	100	11/20/20 21:58	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery: 100 %*	*Limits: 80-120 %*		*1*	*11/20/20 21:58*	*EPA 8260D*	

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-11 (A0K0700-10RE1)				**Matrix: Water**		**Batch: 0110747**		
Surrogate: Toluene-d8 (Surr)		*Recovery:*	*105 %*	*Limits: 80-120 %*	*1*	*11/20/20 21:58*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*98 %*	*80-120 %*	*1*	*11/20/20 21:58*	*EPA 8260D*	
MW-4 (A0K0700-11)				**Matrix: Water**		**Batch: 0110686**		
Benzene	ND	---	0.200	ug/L	1	11/19/20 15:52	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	11/19/20 15:52	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	11/19/20 15:52	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	11/19/20 15:52	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	11/19/20 15:52	EPA 8260D	
Naphthalene	ND	---	4.00	ug/L	1	11/19/20 15:52	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*113 %*	*Limits: 80-120 %*	*1*	*11/19/20 15:52*	*EPA 8260D*	
Toluene-d8 (Surr)			*103 %*	*80-120 %*	*1*	*11/19/20 15:52*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*95 %*	*80-120 %*	*1*	*11/19/20 15:52*	*EPA 8260D*	
MW-3 (A0K0700-12)				**Matrix: Water**		**Batch: 0110686**		
Benzene	ND	---	0.200	ug/L	1	11/19/20 16:19	EPA 8260D	
Toluene	ND	---	1.00	ug/L	1	11/19/20 16:19	EPA 8260D	
Ethylbenzene	ND	---	0.500	ug/L	1	11/19/20 16:19	EPA 8260D	
Xylenes, total	ND	---	1.50	ug/L	1	11/19/20 16:19	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	11/19/20 16:19	EPA 8260D	
Naphthalene	ND	---	4.00	ug/L	1	11/19/20 16:19	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*111 %*	*Limits: 80-120 %*	*1*	*11/19/20 16:19*	*EPA 8260D*	
Toluene-d8 (Surr)			*104 %*	*80-120 %*	*1*	*11/19/20 16:19*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*94 %*	*80-120 %*	*1*	*11/19/20 16:19*	*EPA 8260D*	
MW-6 (A0K0700-13)				**Matrix: Water**		**Batch: 0110686**		
Benzene	**149**	---	4.00	ug/L	20	11/19/20 19:56	EPA 8260D	
Toluene	**24.8**	---	20.0	ug/L	20	11/19/20 19:56	EPA 8260D	
Ethylbenzene	**1850**	---	10.0	ug/L	20	11/19/20 19:56	EPA 8260D	
Xylenes, total	**207**	---	30.0	ug/L	20	11/19/20 19:56	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	20.0	ug/L	20	11/19/20 19:56	EPA 8260D	
Naphthalene	**279**	---	80.0	ug/L	20	11/19/20 19:56	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*103 %*	*Limits: 80-120 %*	*1*	*11/19/20 19:56*	*EPA 8260D*	
Toluene-d8 (Surr)			*102 %*	*80-120 %*	*1*	*11/19/20 19:56*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*96 %*	*80-120 %*	*1*	*11/19/20 19:56*	*EPA 8260D*	
MW-6 Dup (A0K0700-14)				**Matrix: Water**		**Batch: 0110686**		

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

ANALYTICAL SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-6 Dup (A0K0700-14)				**Matrix: Water**		**Batch: 0110686**		
Benzene	**163**	---	4.00	ug/L	20	11/19/20 20:50	EPA 8260D	
Toluene	**30.2**	---	20.0	ug/L	20	11/19/20 20:50	EPA 8260D	
Ethylbenzene	**2080**	---	10.0	ug/L	20	11/19/20 20:50	EPA 8260D	
Xylenes, total	**398**	---	30.0	ug/L	20	11/19/20 20:50	EPA 8260D	
Methyl tert-butyl ether (MTBE)	ND	---	20.0	ug/L	20	11/19/20 20:50	EPA 8260D	
Naphthalene	**315**	---	80.0	ug/L	20	11/19/20 20:50	EPA 8260D	
Surrogate: 1,4-Difluorobenzene (Surr)		*Recovery:*	*102 %*	*Limits:* *80-120 %*	*1*	*11/19/20 20:50*	*EPA 8260D*	
Toluene-d8 (Surr)			*101 %*	*80-120 %*	*1*	*11/19/20 20:50*	*EPA 8260D*	
4-Bromofluorobenzene (Surr)			*94 %*	*80-120 %*	*1*	*11/19/20 20:50*	*EPA 8260D*	

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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0110768 - EPA 3510C (Fuels/Acid Ext.)									**Water**			
Blank (0110768-BLK1)			Prepared: 11/20/20 12:42		Analyzed: 11/20/20 22:28							
NWTPH-Dx LL												
Diesel	ND	---	0.0727	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.145	mg/L	1	---	---	---	---	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 101 %*		*Limits: 50-150 %*		*Dilution: 1x*					
LCS (0110768-BS1)			Prepared: 11/20/20 12:42		Analyzed: 11/20/20 22:50							
NWTPH-Dx LL												
Diesel	0.439	---	0.0800	mg/L	1	0.500	---	88	59 - 115%	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 106 %*		*Limits: 50-150 %*		*Dilution: 1x*					
LCS Dup (0110768-BSD1)			Prepared: 11/20/20 12:42		Analyzed: 11/20/20 23:11							**Q-19**
NWTPH-Dx LL												
Diesel	0.459	---	0.0800	mg/L	1	0.500	---	92	59 - 115%	4	30%	
Surr: o-Terphenyl (Surr)			*Recovery: 108 %*		*Limits: 50-150 %*		*Dilution: 1x*					
Batch 0110834 - EPA 3510C (Fuels/Acid Ext.)									**Water**			
Blank (0110834-BLK1)			Prepared: 11/23/20 11:50		Analyzed: 11/23/20 22:19							
NWTPH-Dx LL												
Diesel	ND	---	0.0727	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.145	mg/L	1	---	---	---	---	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 110 %*		*Limits: 50-150 %*		*Dilution: 1x*					Q-41
LCS (0110834-BS1)			Prepared: 11/23/20 11:50		Analyzed: 11/23/20 22:40							
NWTPH-Dx LL												
Diesel	0.426	---	0.0800	mg/L	1	0.500	---	85	59 - 115%	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 111 %*		*Limits: 50-150 %*		*Dilution: 1x*					Q-41
LCS Dup (0110834-BSD1)			Prepared: 11/23/20 11:50		Analyzed: 11/23/20 23:02							**Q-19**
NWTPH-Dx LL												
Diesel	0.458	---	0.0800	mg/L	1	0.500	---	92	59 - 115%	7	30%	
Surr: o-Terphenyl (Surr)			*Recovery: 116 %*		*Limits: 50-150 %*		*Dilution: 1x*					Q-41

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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0111007 - EPA 3510C (Fuels/Acid Ext.)									Water			
Blank (0111007-BLK1)			Prepared: 11/30/20 12:44		Analyzed: 12/01/20 01:33							
NWTPH-Dx LL												
Diesel	ND	---	0.0727	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.145	mg/L	1	---	---	---	---	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 99 %*		*Limits: 50-150 %*		*Dilution: 1x*					
LCS (0111007-BS1)			Prepared: 11/30/20 12:44		Analyzed: 12/01/20 01:55							
NWTPH-Dx LL												
Diesel	0.415	---	0.0800	mg/L	1	0.500	---	83	59 - 115%	---	---	
Surr: o-Terphenyl (Surr)			*Recovery: 105 %*		*Limits: 50-150 %*		*Dilution: 1x*					
LCS Dup (0111007-BSD1)			Prepared: 11/30/20 12:44		Analyzed: 12/01/20 02:17							**Q-19**
NWTPH-Dx LL												
Diesel	0.433	---	0.0800	mg/L	1	0.500	---	87	59 - 115%	4	30%	
Surr: o-Terphenyl (Surr)			*Recovery: 102 %*		*Limits: 50-150 %*		*Dilution: 1x*					

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5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120007 - EPA 3510C (Fuels/Acid Ext.)												**Water**
Blank (0120007-BLK1)		Prepared: 12/01/20 07:58		Analyzed: 12/01/20 22:02								
NWTPH-Dx LL												
Diesel	ND	---	0.0727	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.145	mg/L	1	---	---	---	---	---	---	
Surr: o-Terphenyl (Surr)		*Recovery: 99 %*		*Limits: 50-150 %*			*Dilution: 1x*					
LCS (0120007-BS1)		Prepared: 12/01/20 07:58		Analyzed: 12/01/20 22:24								
NWTPH-Dx LL												
Diesel	0.434	---	0.0800	mg/L	1	0.500	---	87	59 - 115%	---	---	
Surr: o-Terphenyl (Surr)		*Recovery: 100 %*		*Limits: 50-150 %*			*Dilution: 1x*					
LCS Dup (0120007-BSD1)		Prepared: 12/01/20 07:58		Analyzed: 12/01/20 22:45								**Q-19**
NWTPH-Dx LL												
Diesel	0.394	---	0.0800	mg/L	1	0.500	---	79	59 - 115%	10	30%	
Surr: o-Terphenyl (Surr)		*Recovery: 99 %*		*Limits: 50-150 %*			*Dilution: 1x*					

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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

QUALITY CONTROL (QC) SAMPLE RESULTS

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0110686 - EPA 5030B									Water			
Blank (0110686-BLK1)		Prepared: 11/19/20 10:00		Analyzed: 11/19/20 11:48								
NWTPH-Gx (MS)												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	---	---	---	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 95 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)		*108 %*		*50-150 %*			*"*					
LCS (0110686-BS2)		Prepared: 11/19/20 10:00		Analyzed: 11/19/20 11:21								
NWTPH-Gx (MS)												
Gasoline Range Organics	0.454	---	0.100	mg/L	1	0.500	---	91	80 - 120%	---	---	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 95 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)		*102 %*		*50-150 %*			*"*					
Duplicate (0110686-DUP1)		Prepared: 11/19/20 11:04		Analyzed: 11/19/20 19:02								
QC Source Sample: MW-5 (A0K0700-01)												
NWTPH-Gx (MS)												
Gasoline Range Organics	**18.2**	---	2.00	mg/L	20	---	18.5	---	---	2	30%	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 96 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)		*108 %*		*50-150 %*			*"*					
Duplicate (0110686-DUP2)		Prepared: 11/19/20 11:04		Analyzed: 11/19/20 20:23								
QC Source Sample: MW-6 (A0K0700-13)												
NWTPH-Gx (MS)												
Gasoline Range Organics	**12.5**	---	2.00	mg/L	20	---	12.5	---	---	0.4	30%	
Surr: 4-Bromofluorobenzene (Sur)		*Recovery: 100 %*		*Limits: 50-150 %*			*Dilution: 1x*					
1,4-Difluorobenzene (Sur)		*102 %*		*50-150 %*			*"*					

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Lisa Domenighini, Client Services Manager

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

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0110686 - EPA 5030B									Water			
Blank (0110686-BLK1)		Prepared: 11/19/20 10:00		Analyzed: 11/19/20 11:48								
EPA 8260D												
Benzene	ND	---	0.200	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Xylenes, total	ND	---	1.50	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	---	4.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Isopropylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery:*	*107 %*	*Limits:*	*80-120 %*		*Dilution:*	*1x*				
Toluene-d8 (Surr)			*102 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*96 %*		*80-120 %*			*"*				
LCS (0110686-BS1)		Prepared: 11/19/20 10:00		Analyzed: 11/19/20 10:45								
EPA 8260D												
Benzene	21.8	---	0.200	ug/L	1	20.0	---	109	80 - 120%	---	---	
Toluene	20.8	---	1.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
Ethylbenzene	21.8	---	0.500	ug/L	1	20.0	---	109	80 - 120%	---	---	
Xylenes, total	65.9	---	1.50	ug/L	1	60.0	---	110	80 - 120%	---	---	
Methyl tert-butyl ether (MTBE)	21.6	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Naphthalene	16.0	---	4.00	ug/L	1	20.0	---	80	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	21.6	---	0.500	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	22.0	---	0.500	ug/L	1	20.0	---	110	80 - 120%	---	---	
Isopropylbenzene	19.1	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
1,2,4-Trimethylbenzene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,3,5-Trimethylbenzene	20.0	---	2.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery:*	*101 %*	*Limits:*	*80-120 %*		*Dilution:*	*1x*				
Toluene-d8 (Surr)			*100 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*93 %*		*80-120 %*			*"*				
Duplicate (0110686-DUP1)		Prepared: 11/19/20 11:04		Analyzed: 11/19/20 19:02								

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Lisa Domenighini, Client Services Manager

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Tigard, OR 97223
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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0110686 - EPA 5030B							**Water**					
Duplicate (0110686-DUP1)		Prepared: 11/19/20 11:04 Analyzed: 11/19/20 19:02										
QC Source Sample: MW-5 (A0K0700-01)												
EPA 8260D												
Benzene	ND	---	4.00	ug/L	20	---	ND	---	---	---	30%	
Toluene	ND	---	20.0	ug/L	20	---	ND	---	---	---	30%	
Ethylbenzene	**209**	---	10.0	ug/L	20	---	206	---	---	2	30%	
Xylenes, total	**1050**	---	30.0	ug/L	20	---	1050	---	---	0.5	30%	
Methyl tert-butyl ether (MTBE)	ND	---	20.0	ug/L	20	---	ND	---	---	---	30%	
Naphthalene	**1520**	---	80.0	ug/L	20	---	1420	---	---	7	30%	
1,2-Dibromoethane (EDB)	ND	---	10.0	ug/L	20	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	---	10.0	ug/L	20	---	ND	---	---	---	30%	
Isopropylbenzene	**70.2**	---	20.0	ug/L	20	---	67.2	---	---	4	30%	
1,2,4-Trimethylbenzene	**322**	---	20.0	ug/L	20	---	306	---	---	5	30%	
1,3,5-Trimethylbenzene	**793**	---	40.0	ug/L	20	---	766	---	---	3	30%	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery: 108 %*		*Limits: 80-120 %*			*Dilution: 1x*					
Toluene-d8 (Surr)		*103 %*		*80-120 %*			*"*					
4-Bromofluorobenzene (Surr)		*91 %*		*80-120 %*			*"*					
Duplicate (0110686-DUP2)		Prepared: 11/19/20 11:04 Analyzed: 11/19/20 20:23										
QC Source Sample: MW-6 (A0K0700-13)												
EPA 8260D												
Benzene	**151**	---	4.00	ug/L	20	---	149	---	---	1	30%	
Toluene	**24.6**	---	20.0	ug/L	20	---	24.8	---	---	0.8	30%	
Ethylbenzene	**1810**	---	10.0	ug/L	20	---	1850	---	---	2	30%	
Xylenes, total	**196**	---	30.0	ug/L	20	---	207	---	---	6	30%	
Methyl tert-butyl ether (MTBE)	ND	---	20.0	ug/L	20	---	ND	---	---	---	30%	
Naphthalene	**290**	---	80.0	ug/L	20	---	279	---	---	4	30%	
1,2-Dibromoethane (EDB)	ND	---	10.0	ug/L	20	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	---	10.0	ug/L	20	---	ND	---	---	---	30%	
Isopropylbenzene	**40.2**	---	20.0	ug/L	20	---	40.2	---	---	0	30%	
1,2,4-Trimethylbenzene	**30.0**	---	20.0	ug/L	20	---	32.4	---	---	8	30%	
1,3,5-Trimethylbenzene	ND	---	40.0	ug/L	20	---	25.8	---	---	***	30%	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery: 102 %*		*Limits: 80-120 %*			*Dilution: 1x*					
Toluene-d8 (Surr)		*101 %*		*80-120 %*			*"*					

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ORELAP ID: **OR100062**

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0110686 - EPA 5030B												**Water**
Duplicate (0110686-DUP2)			Prepared: 11/19/20 11:04 Analyzed: 11/19/20 20:23									
QC Source Sample: MW-6 (A0K0700-13)												
Surr: 4-Bromofluorobenzene (Surr)			*Recovery: 94 %*	*Limits: 80-120 %*			*Dilution: 1x*					

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Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

QUALITY CONTROL (QC) SAMPLE RESULTS

Selected Volatile Organic Compounds by EPA 8260D

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0110747 - EPA 5030B							**Water**					
Blank (0110747-BLK1)		Prepared: 11/20/20 09:30		Analyzed: 11/20/20 13:20								
EPA 8260D												
Benzene	ND	---	0.200	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Xylenes, total	ND	---	1.50	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Isopropylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery:*	*100 %*	*Limits:*	*80-120 %*		*Dilution:*	*1x*				
Toluene-d8 (Surr)			*105 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*100 %*		*80-120 %*			*"*				
LCS (0110747-BS1)		Prepared: 11/20/20 09:30		Analyzed: 11/20/20 11:32								
EPA 8260D												
Benzene	20.8	---	0.200	ug/L	1	20.0	---	104	80 - 120%	---	---	
Toluene	20.1	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Ethylbenzene	20.3	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Xylenes, total	61.1	---	1.50	ug/L	1	60.0	---	102	80 - 120%	---	---	
Methyl tert-butyl ether (MTBE)	19.1	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
Naphthalene	17.9	---	2.00	ug/L	1	20.0	---	90	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	19.5	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	22.3	---	0.500	ug/L	1	20.0	---	111	80 - 120%	---	---	
Isopropylbenzene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,2,4-Trimethylbenzene	21.7	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,3,5-Trimethylbenzene	21.1	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
Surr: 1,4-Difluorobenzene (Surr)		*Recovery:*	*100 %*	*Limits:*	*80-120 %*		*Dilution:*	*1x*				
Toluene-d8 (Surr)			*100 %*		*80-120 %*			*"*				
4-Bromofluorobenzene (Surr)			*93 %*		*80-120 %*			*"*				

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6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx

Prep: EPA 3510C (Fuels/Acid Ext.)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0110768							
A0K0700-01	Water	NWTPH-Dx LL	11/16/20 09:58	11/20/20 12:42	1060mL/2mL	1000mL/2mL	0.94
Batch: 0110834							
A0K0700-02	Water	NWTPH-Dx LL	11/16/20 10:29	11/23/20 11:55	1070mL/2mL	1000mL/2mL	0.94
A0K0700-03	Water	NWTPH-Dx LL	11/16/20 11:02	11/23/20 11:55	1060mL/2mL	1000mL/2mL	0.94
A0K0700-04	Water	NWTPH-Dx LL	11/16/20 11:39	11/23/20 11:55	1070mL/2mL	1000mL/2mL	0.94
Batch: 0111007							
A0K0700-05	Water	NWTPH-Dx LL	11/16/20 12:24	11/30/20 14:50	1060mL/2mL	1000mL/2mL	0.94
A0K0700-06	Water	NWTPH-Dx LL	11/16/20 13:12	11/30/20 14:50	1070mL/2mL	1000mL/2mL	0.94
A0K0700-07	Water	NWTPH-Dx LL	11/16/20 14:20	11/30/20 14:50	1070mL/2mL	1000mL/2mL	0.94
Batch: 0120007							
A0K0700-08	Water	NWTPH-Dx LL	11/17/20 08:06	12/01/20 07:58	1060mL/2mL	1000mL/2mL	0.94
A0K0700-09	Water	NWTPH-Dx LL	11/17/20 09:10	12/01/20 07:58	1070mL/2mL	1000mL/2mL	0.94
A0K0700-10	Water	NWTPH-Dx LL	11/17/20 09:54	12/01/20 07:58	1060mL/2mL	1000mL/2mL	0.94
A0K0700-11	Water	NWTPH-Dx LL	11/17/20 10:42	12/01/20 07:58	1060mL/2mL	1000mL/2mL	0.94
A0K0700-12	Water	NWTPH-Dx LL	11/17/20 11:24	12/01/20 12:40	1070mL/2mL	1000mL/2mL	0.94
A0K0700-13	Water	NWTPH-Dx LL	11/17/20 12:14	12/01/20 12:40	1040mL/2mL	1000mL/2mL	0.96
A0K0700-14	Water	NWTPH-Dx LL	11/17/20 12:14	12/01/20 12:40	1020mL/2mL	1000mL/2mL	0.98

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0110686							
A0K0700-01	Water	NWTPH-Gx (MS)	11/16/20 09:58	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-02	Water	NWTPH-Gx (MS)	11/16/20 10:29	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-03	Water	NWTPH-Gx (MS)	11/16/20 11:02	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-04	Water	NWTPH-Gx (MS)	11/16/20 11:39	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-05	Water	NWTPH-Gx (MS)	11/16/20 12:24	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-06	Water	NWTPH-Gx (MS)	11/16/20 13:12	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-07	Water	NWTPH-Gx (MS)	11/16/20 14:20	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-08	Water	NWTPH-Gx (MS)	11/17/20 08:06	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-09	Water	NWTPH-Gx (MS)	11/17/20 09:10	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-10	Water	NWTPH-Gx (MS)	11/17/20 09:54	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-11	Water	NWTPH-Gx (MS)	11/17/20 10:42	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-12	Water	NWTPH-Gx (MS)	11/17/20 11:24	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00

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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

SAMPLE PREPARATION INFORMATION

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A0K0700-13	Water	NWTPH-Gx (MS)	11/17/20 12:14	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-14	Water	NWTPH-Gx (MS)	11/17/20 12:14	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00

Selected Volatile Organic Compounds by EPA 8260D

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0110686							
A0K0700-01	Water	EPA 8260D	11/16/20 09:58	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-02	Water	EPA 8260D	11/16/20 10:29	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-03	Water	EPA 8260D	11/16/20 11:02	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-04	Water	EPA 8260D	11/16/20 11:39	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-05	Water	EPA 8260D	11/16/20 12:24	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-06	Water	EPA 8260D	11/16/20 13:12	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-07	Water	EPA 8260D	11/16/20 14:20	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-08	Water	EPA 8260D	11/17/20 08:06	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-09	Water	EPA 8260D	11/17/20 09:10	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-10	Water	EPA 8260D	11/17/20 09:54	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-11	Water	EPA 8260D	11/17/20 10:42	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-12	Water	EPA 8260D	11/17/20 11:24	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-13	Water	EPA 8260D	11/17/20 12:14	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
A0K0700-14	Water	EPA 8260D	11/17/20 12:14	11/19/20 11:04	5mL/5mL	5mL/5mL	1.00
Batch: 0110747							
A0K0700-10RE1	Water	EPA 8260D	11/17/20 09:54	11/20/20 12:11	5mL/5mL	5mL/5mL	1.00

Apex Laboratories

Lisa Domenighini, Client Services Manager

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Apex Laboratories, LLC

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

Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

QUALIFIER DEFINITIONS

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

Apex Laboratories

F-11	The hydrocarbon pattern indicates possible weathered diesel, mineral oil, or a contribution from a related component.
F-13	The chromatographic pattern does not resemble the fuel standard used for quantitation
F-18	Result for Diesel (Diesel Range Organics, C12-C24) is due to overlap from Gasoline or a Gasoline Range product.
F-20	Result for Diesel is Estimated due to overlap from Gasoline Range Organics or other VOCs.
PRES	Incomplete field preservation. Additional preservative was added to adjust the pH within the appropriate range for this analysis.
Q-19	Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.
Q-41	Estimated Results. Recovery of Continuing Calibration Verification sample above upper control limit for this analyte. Results are likely biased high.

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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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 ½ the Reporting Limit (RL).
-For Blank hits falling between ½ 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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LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation)
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Lisa Domenighini, Client Services Manager

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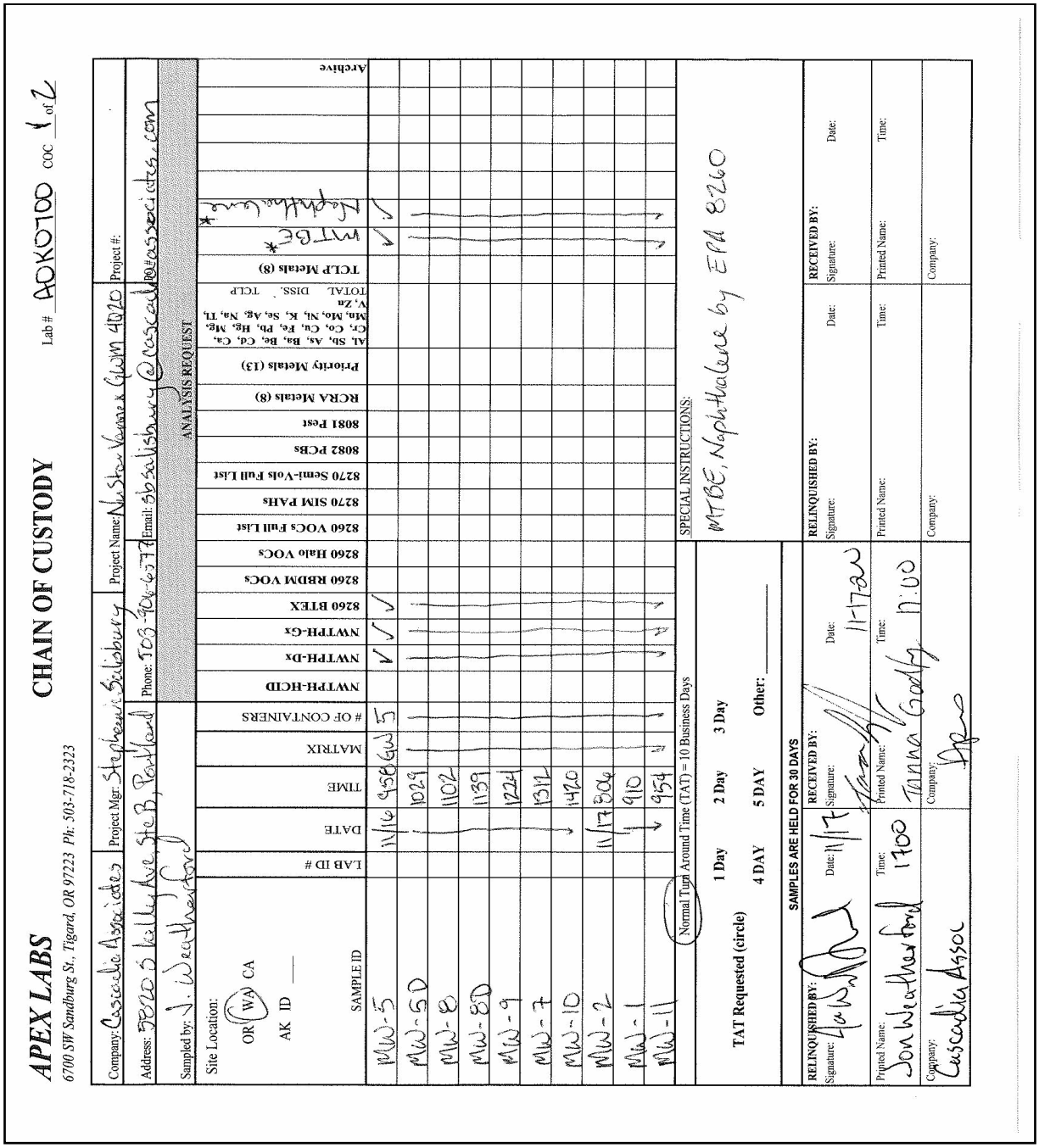

APEX LABS — CHAIN OF CUSTODY — Lab # A0K0700 COC 1 of 2

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

Company: Cascadia Associates | Project Mgr: Stephanie Salisbury | Project Name: NuStar Vannex GWM 4Q20 | Project #:

Address: 5820 SW Kelly Ave, Ste B, Portland | Phone: 503-706-6377 | Email: ssalisbury@cascadiaassociates.com

Sampled by: J. Weatherford

Site Location: OR (WA) CA AK ID ____

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 BTEX	8260 RBDM VOCs	8260 Halo VOCs	8260 Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTAL DISS. TCLP	TCLP Metals (8)	MTBE	Archive
MW-5		11/16	958	GW	5		✓	✓	✓											✓	
MW-5D		1	1029																		
MW-8			1102																		
MW-8D			1139																		
MW-9			1224																		
MW-7			1312																		
MW-10		↓	1420	↓	↓																
MW-2		11/17	804																		
MW-1		↓	910																		
MW-11		↓	954	↓	↓		↓	↓	↓											↓	

Normal Turn Around Time (TAT) = 10 Business Days

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: ____

SPECIAL INSTRUCTIONS: MTBE, Naphthalene by EPA 8260

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature:	Signature:	Signature:	Signature:
Date: 11/17	Date: 11/17	Date:	Date:
Time: 1700	Time: 17:00	Time:	Time:
Printed Name:	Printed Name: Tanna Godby	Printed Name:	Printed Name:
Company: Cascadia Assoc	Company:	Company:	Company:

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

APEX LABS — CHAIN OF CUSTODY

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

Lab # A0K0700 COC 2 of 2

Company: Cascadia Associates | Project Mgr: Stephanie Salisbury | Project Name: NuStar Vannex GWM 4Q20 | Project #: —

Address: 5820 S Kelly Ave | Phone: | Email: sbsalisbury@cascadiaassociates.com

Sampled by: J. Weatherford

Site Location: OR (WA circled) CA AK ID ___

ANALYSIS REQUEST

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 BTEX	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTAL DISS. TCLP	TCLP Metals (8)	MTBE*	Naphthalene*	Archive
MW-4		11/17	1042	GW			✓	✓	✓												✓	✓	
MW-3		↓	1124	↓			↓	↓	↓												↓	↓	
MW-6		↓	1214	↓			↓	↓	↓												↓	↓	
MW-6 Dup		↓	1214	↓			↓	↓	↓												↓	↓	
Trip Blank							H	H	H												H	H	

(Normal circled) Turn Around Time (TAT) = 10 Business Days

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: ______

SAMPLES ARE HELD FOR 30 DAYS

SPECIAL INSTRUCTIONS:
*MTBE, Naphthalene by EPA 8260
H: Hold for Project Mgr.

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: J. Weatherford Date: 11/17	Signature: [signature] Date: 11-17-20	Signature: Date:	Signature: Date:
Printed Name: Jon Weatherford Time: 1700	Printed Name: Tanna Grady Time: 17:00	Printed Name: Time:	Printed Name: Time:
Company: Cascadia Assoc.	Company: Apex	Company:	Company:

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Cascadia Associates	Project: **Nustar Vannex**	
5820 SW Kelly Ave Unit B	Project Number: **0060-001-001**	**Report ID:**
Portland, OR 97239	Project Manager: **Stephanie Salisbury**	**A0K0700 - 12 03 20 1148**

APEX LABS COOLER RECEIPT FORM

Client: Cascadia Associates Element WO#: A0K0700

Project/Project #: Nustar Vannex GWM 4020

Delivery Info:

Date/time received: 11-17-20 @ 17:00 By: TAG

Delivered by: Apex____Client X ESS____FedEx____UPS____Swift____Senvoy ____SDS____Other_____

Cooler Inspection Date/time inspected: 11-17-20 @ 17:00 By: TAG

Chain of Custody included? Yes Y No ___ Custody seals? Yes_____ No N/A

Signed/dated by client? Yes Y No ___

Signed/dated by Apex? Yes Y No ___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	5.9	5.5	5.4				
Received on ice? (Y/N)	Y	Y	Y				
Temp. blanks? (Y/N)	N	N	N				
Ice type: (Gel/Real/Other)	Real	Real	Real				
Condition:	good	good	good				

Cooler out of temp? (Y/N) Possible reason why:

If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA

Out of temperature samples form initiated? Yes/No/NA

Samples Inspection: Date/time inspected: 11-18-20 @ 16:40 By: TAG

All samples intact? Yes X No ___ Comments:

Bottle labels/COCs agree? Yes X No ___ Comments: TB# 2473

COC/container discrepancies form initiated? Yes ___ No X

Containers/volumes received appropriate for analysis? Yes X No ___ Comments:

Do VOA vials have visible headspace? Yes ___ No X NA ___

Comments

Water samples: pH checked: Yes X No___NA___ pH appropriate? Yes X No___NA____

Comments:

Additional information:

Labeled by: TAG Witness: JS Cooler Inspected by: TAG See Project Contact Form: Y

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Cascadia
Associates, LLC