

February 24, 2020

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

Subject: 2019 Groundwater Monitoring Report NuStar Vancouver Annex Facility 5420 NW Fruit Valley Road Vancouver, Washington 0060-001-005

Dear Mr. Smith:

Enclosed, please find the *2019 Groundwater Monitoring Report* that has been prepared on behalf of NuStar Terminals Services, Inc. (NuStar) by Cascadia Associates, LLC. (Cascadia). The enclosed report presents the results of four quarters of groundwater monitoring conducted in 2019 at the NuStar Vancouver Annex Facility.

If you have any questions or would like to discuss this further, please contact me at (503) 906-6577 (ext. 107) or Stephanie Bosze Salisbury (ext. 110).

Sincerely,

Amanda Spencer Principal Hydrogeologist

#### Enclosure

2019 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)
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# 2019 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 24, 2020



# 2019 Groundwater Monitoring Report NuStar Vancouver Annex Terminal 5420 NW Fruit Valley Road Vancouver, Washington

**Prepared** for:

NuStar Terminals Operations Partnership, L.P. Project No. 0060-001-005 February 7, 2020

Prepared by:

Amanda Spencer Principal, Cascadia Associates



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



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# 1.0 INTRODUCTION

This groundwater monitoring report was prepared by Cascadia Associates, LLC (Cascadia) on behalf of NuStar Terminals Services, Inc. (NuStar) for groundwater monitoring conducted in 2019 at the NuStar Terminals Operations Partnership, L.P. 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 tank farm. 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.

The additional data requested by Ecology included one year of sitewide quarterly 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. In addition, a pilot study was conducted in one of these areas in 2017 to evaluate the efficacy of injecting chemical oxidants to address the petroleum hydrocarbons (Cascadia, 2019a).

NuStar initiated quarterly monitoring at the site in the fourth quarter of 2017. This report presents the results of the quarterly monitoring program conducted in 2019.

## 1.1 SITE LOCATION, DESCRIPTION, AND HISTORY

**Location.** The Facility address is 5420 NW Fruit Valley Road, Vancouver, Washington 98660 (Latitude: N45<sup>o</sup> 39.70', Longitude: W122<sup>o</sup> 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 antistatic 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 as to whether 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, de-natured 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 OWS) 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 understanding of 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 towards 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 - 2019

A comprehensive quarterly groundwater monitoring program was conducted in 2019 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 18 through 19; May 20 through 21; August 28 through 29; and November 18 through 19, 2019. Wells MW-3 and MW-4 were not sampled during the August 2019 monitoring event due to low water conditions.

## 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 2019 are provided in Table 1. Historical groundwater elevation data collected from 2007 through 2019 are included in Appendix B. Copies of the well gauging forms are provided in Appendix C.

#### 2.1.1 SPH

SPH or sheen have not been observed in Facility wells and were not observed during 2019.

#### 2.1.2 Groundwater Elevation

Groundwater gradient is generally flat at the site with a magnitude that ranged between 0.0001 to 0.0005 in 2019. The following subsections discuss the depth to groundwater and groundwater gradients observed for each quarterly event.

#### First Quarter 2019

Depths to groundwater ranged from 16.51 to 30.04 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 10.21 to 10.19 feet above Mean Sea Level (MSL). Depths to groundwater in wells MW- 5 through MW-10, located in the western tank area, ranged from 11.41 to 19.13 feet bgs, corresponding to elevations of 10.26 to 10.34 feet above MSL.

Figure 3 provides a groundwater elevation contour map for the depth to groundwater measurements collected in February 2019 during the first quarter 2019 monitoring event. As shown on Figure 3, a groundwater high is present in the northwestern portion of the site near well



MW-8. East of well MW-8, groundwater flows to the east-southeast at an approximate gradient of 0.0003. West of well MW-8, groundwater appears to flow westerly.

#### Second Quarter 2019

Depths to groundwater ranged from 13.22 to 26.74 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 13.50 to 13.49 feet above MSL. Depths to groundwater in wells MW-5 through MW-10, located in the western tank area ranged from 7.73 to 14.76 feet bgs, corresponding to elevations of 13.94 to 13.95 feet above MSL.

Figure 4 provides a groundwater elevation contour map for the depth to groundwater measurements collected in May 2019 during the second quarter 2019 monitoring event. As shown on Figure 4, the groundwater gradient is approximately 0.0005 across the site, with a variable flow direction that generally flows to the east-southeast. Measured groundwater elevations in wells MW-9 and MW-3 were markedly different than other nearby wells (1.01 feet higher, and 0.35 foot lower, respectively). These measurements were considered anomalous based on historical conditions and not used in contouring Figure 4.

#### Third Quarter 2019

Depths to groundwater ranged from 19.04 to 32.59 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 7.68 to 7.64 feet above MSL). Depths to groundwater in wells MW-5 through MW-10, located in the western tank area ranged from 13.99 to 21.74 feet bgs, corresponding to elevations of 7.68 to 7.65 feet above MSL.

Figure 5 provides a groundwater elevation contour map for the depth to groundwater measurements collected in August 2019 during the third quarter 2019 monitoring event. As shown on Figure 5, the groundwater gradient is essentially flat, measuring approximately 0.0001 across the site. A slightly higher groundwater elevation was measured in well MW-8 than other monitoring wells, indicating a slight flow direction to the west, south, and east.

#### Fourth Quarter 2019

Depths to groundwater ranged from 18.64 to 32.09 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 8.08 to 8.14 feet above MSL. Depths to groundwater in wells MW- 5 through MW-10, located in the western tank area ranged from 13.76 to 21.28 feet bgs, corresponding to elevations of 7.91 to 8.11 feet above MSL.

Figure 6 provides a groundwater elevation contour map for the depth to groundwater measurements collected in November 2019 during the fourth quarter 2019 monitoring event. Consistent with the third quarter event, groundwater gradient was flat, measuring just 0.0001 to the west across the site and 0.0004 to the southwest between wells MW-8 and MW-7.



## 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 2019.

#### 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, 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 (with silica gel cleanup).

#### 2.2.2 Analytical Results

Analytical results for the 2019 groundwater monitoring events are summarized in Table 2. Historical analytical groundwater data collected from 2007 through 2019 are tabulated in Appendix D. Copies of the laboratory analytical reports are contained in Appendix E.

Groundwater analytical results for 2019 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)

With the exception of detections slightly above the method reporting limit of MTBE in well MW-2 and ethylbenzene and xylenes in well MW-3, BTEX, MTBE, and naphthalene concentrations were all non-detect in wells MW-1 through MW-4. Well MW-11 was installed in January 2019, and the initial sampling of the well in February 2019 indicated detectable concentrations of TPHg, TPHd, and BTEX; however, the concentrations were below MTCA Method A Cleanup Levels. Results for the second, third, and fourth quarter events indicated variable TPHg, benzene, ethylbenzene, xylenes, and/or naphthalene concentrations, with some results above MTCA Method A Cleanup Levels. MTBE concentrations were not identified above method reporting limits in well M-11 and toluene concentrations were below MTCA Method A Cleanup Levels. As shown on Figures 7 and 8, MW-11



is surrounded by wells MW-1 through MW-4, demonstrating that the area of detectable TPH and BTEX concentrations is limited in extent.

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

TPH, BTEX, MTBE, and naphthalene were not detected in wells MW-7 through MW-10, MW-5D, and MW-8D, with the exception of TPHg slightly above method reporting limits in well MW-5D. Benzene, toluene, MTBE, and total petroleum hydrocarbons in the motor oil carbon range (TPHo) were not detected in well MW-5 and ethylbenzene was not detected above MTCA Method A Cleanup Levels. Consistent with previous results, TPHg, TPHd, xylenes, and naphthalene were detected in well MW-5 at concentrations above MTCA Method A Cleanup Levels.

TPHo and MTBE were not detected above method reporting limits in well MW-6 and toluene and xylene concentrations were below MTCA Method A Cleanup Levels. TPHg, TPHd, benzene, ethylbenzene, and naphthalene were detected above MTCA Method A Cleanup Levels. However, concentrations observed in the fourth quarter 2019 event were lower than the previous three quarters, and continued monitoring results will be evaluated to assess whether this is a consistent decreasing trend in concentrations in well MW-6.

The monitoring results confirm 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 4<sup>o</sup>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.
- No compounds were detected in the trip blanks or laboratory method blanks.

The data were reviewed by Cascadia and found to be acceptable for use.



# 3.0 FUTURE WORK

Quarterly monitoring will continue in 2020. A revised feasibility study is in preparation and is scheduled to be submitted to Ecology by March 31, 2020.

# 4.0 REFERENCES

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- SECOR, 2003. Results of Phase II Environmental Site Assessment. June 6, 2003.

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)
	02/18/19	26.72			16.51		10.21
MW-1	05/20/19	26.72	14.5-24.5		13.22		13.50
10100-1	08/28/19	26.72	14.5-24.5		19.04		7.68
	11/18/19	26.72			18.64		8.08
	02/18/19	38.27			28.04		10.23
MW-2	05/20/19	38.27	20-35		24.73		13.54
10100-2	08/28/19	38.27	20-35		30.63		7.64
	11/18/19	38.27			30.16		8.11
	02/18/19	39.17			28.94		10.23
1011 2	05/20/19	39.17	245 245		26.03		13.14
MW-3	08/28/19	39.17	24.5-34.5		31.51		7.66
	11/18/19	39.17			31.06		8.11
	02/18/19	40.23			30.04		10.19
	05/20/19	40.23	20.25		26.74		13.49
MW-4	08/28/19	40.23	20-35		32.59		7.64
	11/18/19	40.23			32.09		8.14
	02/18/19	27.03			16.70		10.33
	05/20/19	27.03	10.25		13.19		13.84
MW-5	08/28/19	27.03	10-25		19.31		7.72
	11/18/19	27.03			18.92		8.11
	02/18/19	26.71			16.43		10.28
	05/20/19	26.71	25.45		12.72		13.99
MW-5D	08/28/19	26.71	35-45		19.01		7.70
	11/18/19	26.71			18.62		8.09
	02/18/19	27.33			16.99		10.34
MW-6	05/20/19	27.33	10.25		13.56		13.77
IVI W-6	08/28/19	27.33	10-25		19.66		7.67
	11/18/19	27.33			19.31		8.02
	02/18/19	21.67			11.41		10.26
	05/20/19	21.67	10.25		7.73		13.94
MW-7	08/28/19	21.67	10-25		13.99		7.68
	11/18/19	21.67			13.76		7.91
	02/18/19	27.68			17.28		10.40
	05/20/19	27.68	10.25		13.93		13.75
MW-8	08/28/19	27.68	10-25		19.94		7.74
	11/18/19	27.68			19.57		8.11

Please see notes at end of table.



#### 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)
	02/18/19	27.87			17.59		10.28
MW-8D	05/20/19	27.87	35-45		13.90		13.97
10100-80	08/28/19	27.87	35-45		20.21		7.66
	11/18/19	27.87			19.80		8.07
	02/18/19	29.39			19.13		10.26
MW-9	05/20/19	29.39	10-25		14.63		14.76
10100-5	08/28/19	29.39	10-25		21.74		7.65
	11/18/19	29.39			21.28		8.11
	02/18/19	28.71			18.42		10.29
MW-10	05/20/19	28.71	10-25		14.76		13.95
10100-10	08/28/19	28.71	10-25		21.02		7.69
	11/18/19	28.71			20.67		8.04
	02/18/19	NS			17.27		NS
MW-11	05/20/19	NS	10-25		14.32		NS
1/1/0-11	08/28/19	NS	10-23		19.55		NS
	11/18/19	NS			19.36		NS

#### Notes:

Survey elevations determined by Bluedot Group surveying, November 2017.

Reference elevation (i.e., top of casing) relative to NAVD 88, feet above mean sea level.

MSL = mean sea level

bgs = below ground surface

SPH = separate phase hydrocarbon

-- = SPH not measured/observed

NS = Not surveyed



#### 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)
	02/19/19	<0.100	<0.0762	<0.152	<0.0002	< 0.001	<0.0005	<0.00015	< 0.001	
MW-1	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
	02/19/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.00015	0.00121	
MW-2	05/20/19	<0.05	<0.0377	<0.0755	<0.0001	<0.0005	<0.00025	<0.00075	0.0031	
10100-2	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
	02/18/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.00015	< 0.001	
MW-3	05/20/19	<0.05	<0.0377	<0.0755	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	
10100-5	08/29/19									
	11/19/19	0.114	<0.0769	<0.154	<0.0002	<0.001	0.00661	0.0113	<0.001	<0.002
	02/18/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.00150	<0.001	
MW-4	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
	02/18/19	29.2	1.06 F-18	<0.151	<0.00200	<0.0100	0.187	1.06	<0.010	
	05/21/19	22	0.722	<0.0784	<0.002	<0.01	0.252	1.04	<0.010	
MW-5	08/28/19	24.8	0.963	<0.0769	<0.002	<0.01	0.239	1.1	<0.01	2.07
10100-5	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
	02/18/19	0.165	<0.0748	<0.150	<0.000200	<0.00100	<0.00050	<0.00150	<0.001	
MW-5D	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
	02/18/19	18.2	2.15 F-20	<0.151	0.249	0.0408	1.74	0.577	<0.010	
MW-6	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
	02/19/19	<0.100	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.00015	<0.001	
MW-7	05/20/19	<0.05	<0.0377	<0.0755	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	
10100 /	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
	02/18/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.00015	<0.001	
MW-8	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
	02/18/19	<0.100	<0.0755	<0.151	<0.0002	<0.001	<0.0005	<0.00015	<0.001	
MW-8D	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

Please see notes at end of table.



# Table 2Summary of Analytical Results – Monitoring WellsNuStar Terminals Operations Partnership, L.P. – Annex TerminalVancouver, 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)
	02/18/19	<0.100	<0.0748	<0.150	<0.0002	<0.001	<0.0005	<0.0015	<0.001	
MW-9	05/21/19	<0.05	<0.0374	<0.0748	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	
10100-9	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
	02/19/19	<0.100	<0.0748	<0.150	<0.0002	< 0.001	<0.0005	<0.00015	< 0.001	
MW-10	05/21/19	<0.05	<0.0377	<0.0755	<0.0001	<0.0005	<0.00025	<0.00075	<0.0005	
10100-10	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
	02/19/19	0.727	<0.0748	<0.150	0.00162	0.00176	0.083	0.0652	<0.001	
MW-11	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
	11/19/19	45.0	0.239	<0.151	0.0526	0.159	4.33	7.73	<0.02	0.414
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 with silica gel cleanup.

3. TPHho = Total petroleum hydrocarbons ion heavy oil carbon range NW-TPHdx method with silica gel cleanup.

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.

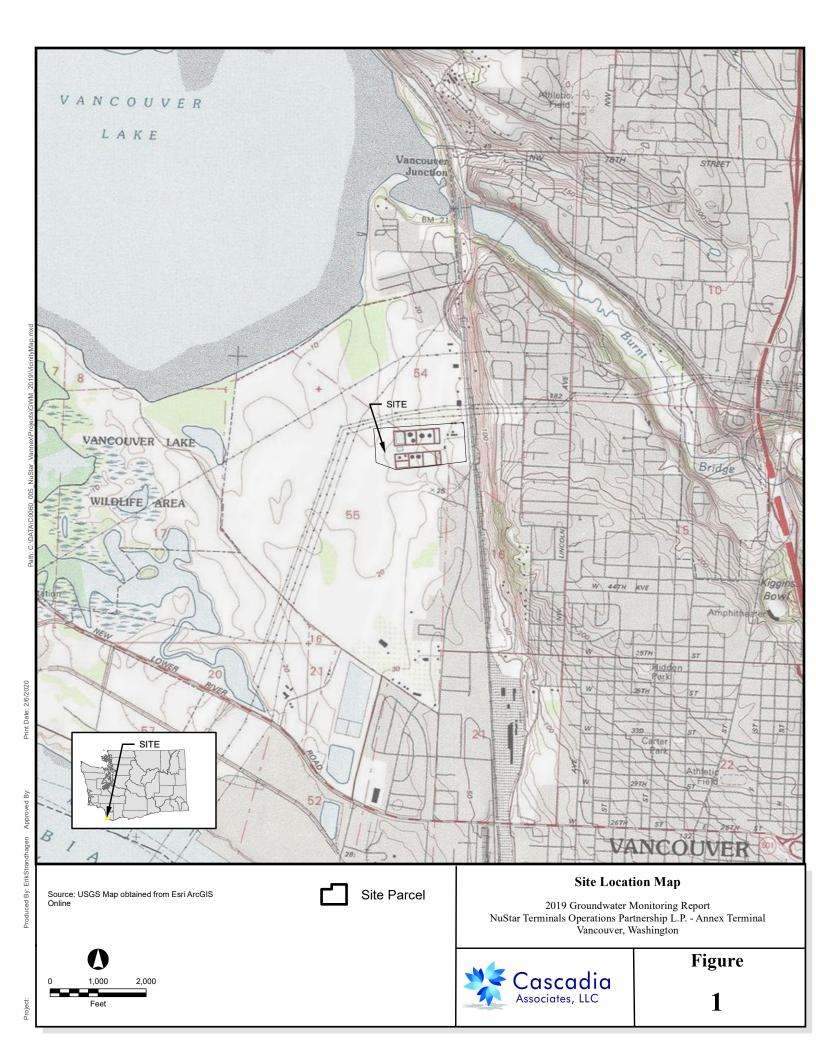
#### Quality Assurance/Quality Control Data Qualifiers

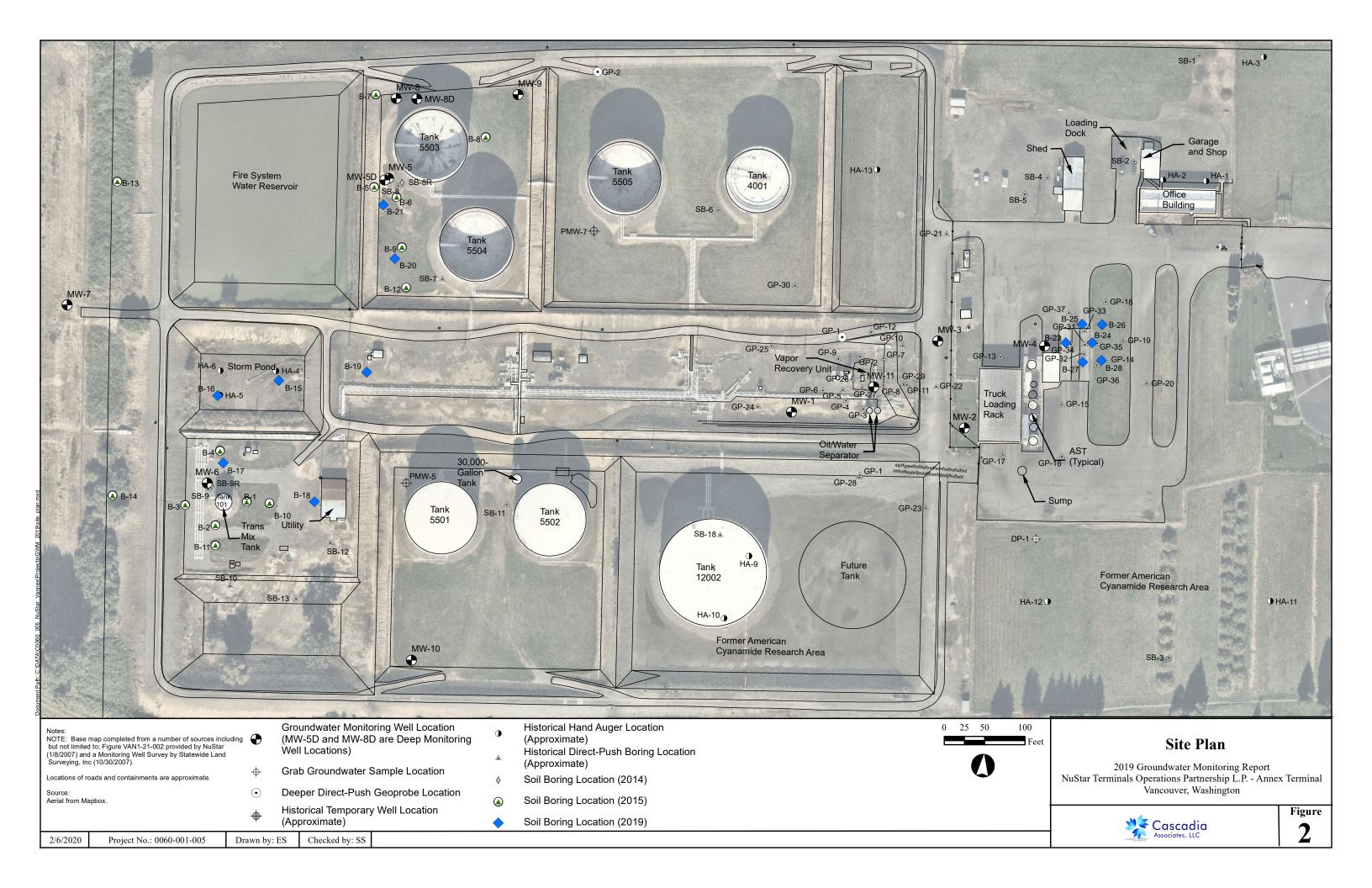
F-18 = Result for Diesel (Diesel Range Organics, C12-C24) is due to overlap from Gasoline or a Gasoline Range product.

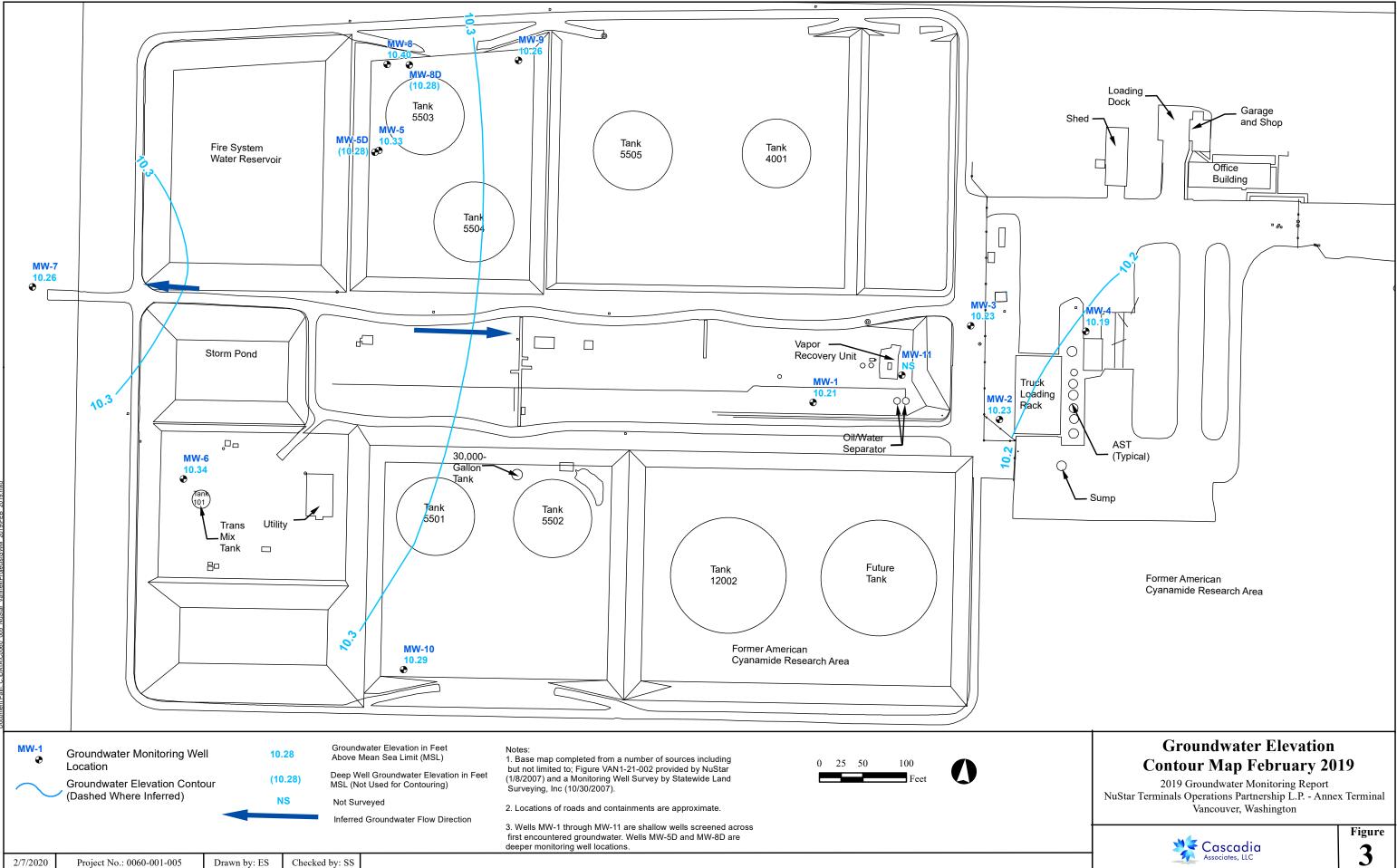
F-20 = Result for Diesel is estimated due to overlap from Gasoline Range Organics or other VOCs.

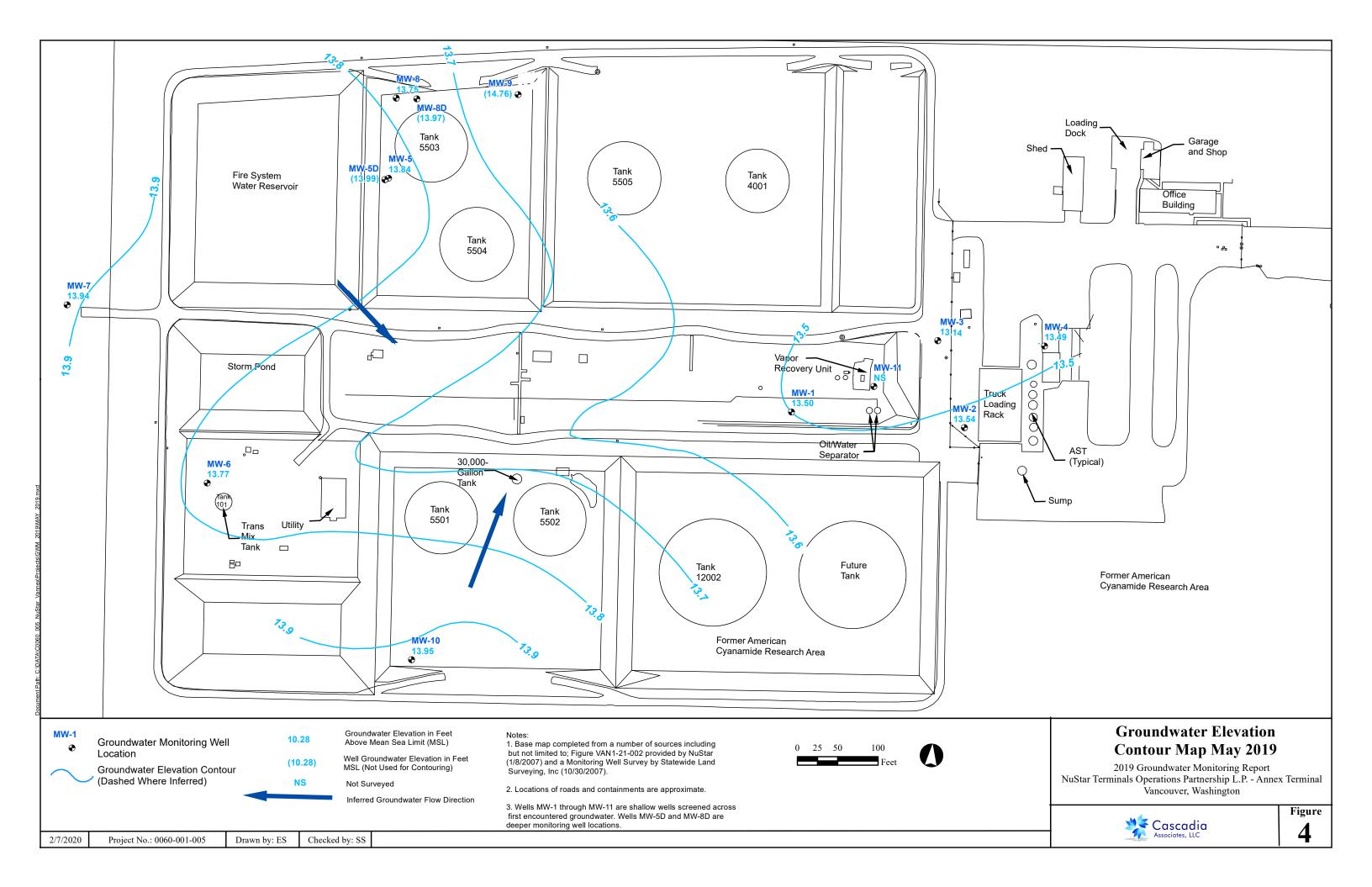


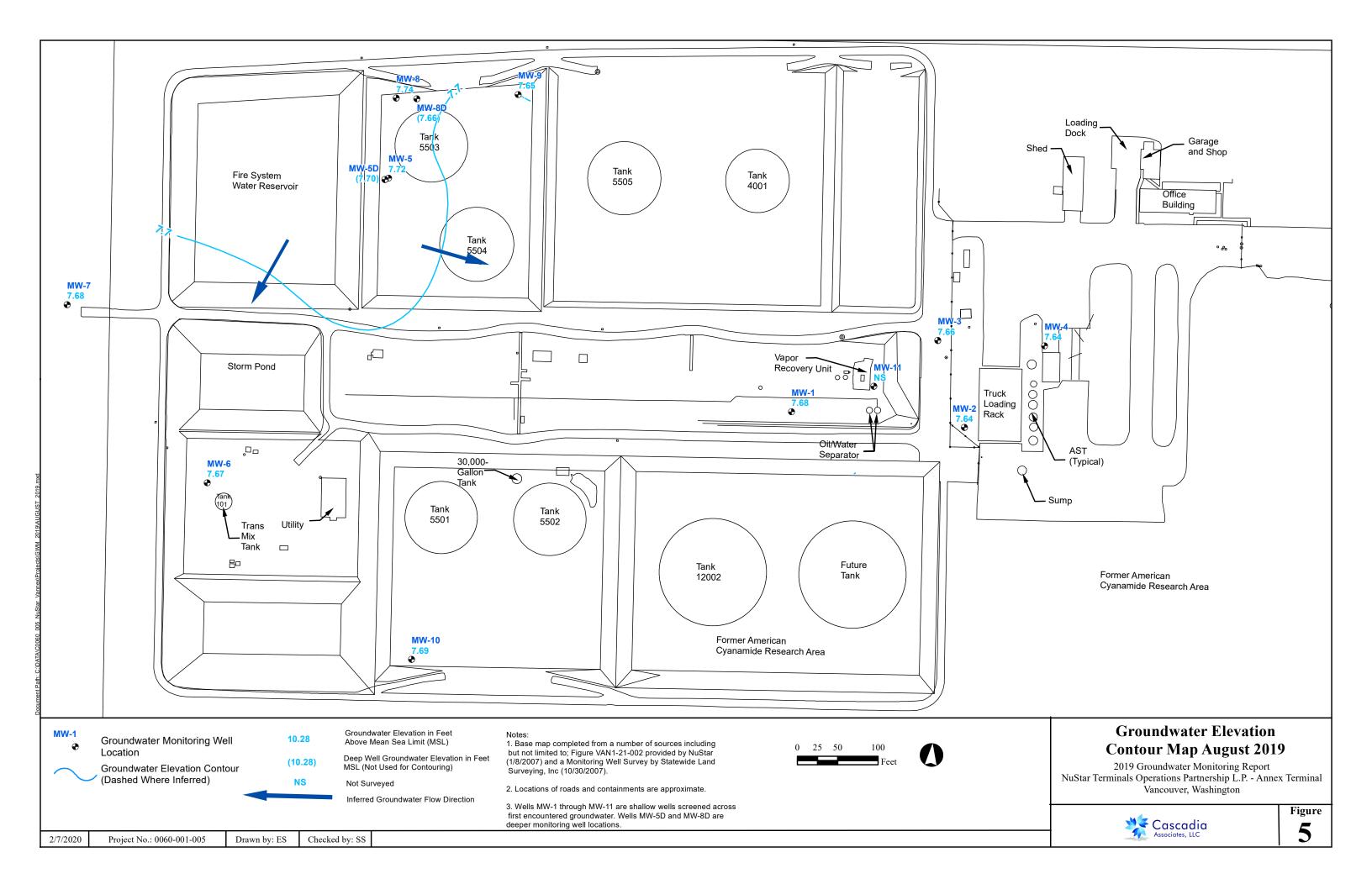
## **FIGURES**

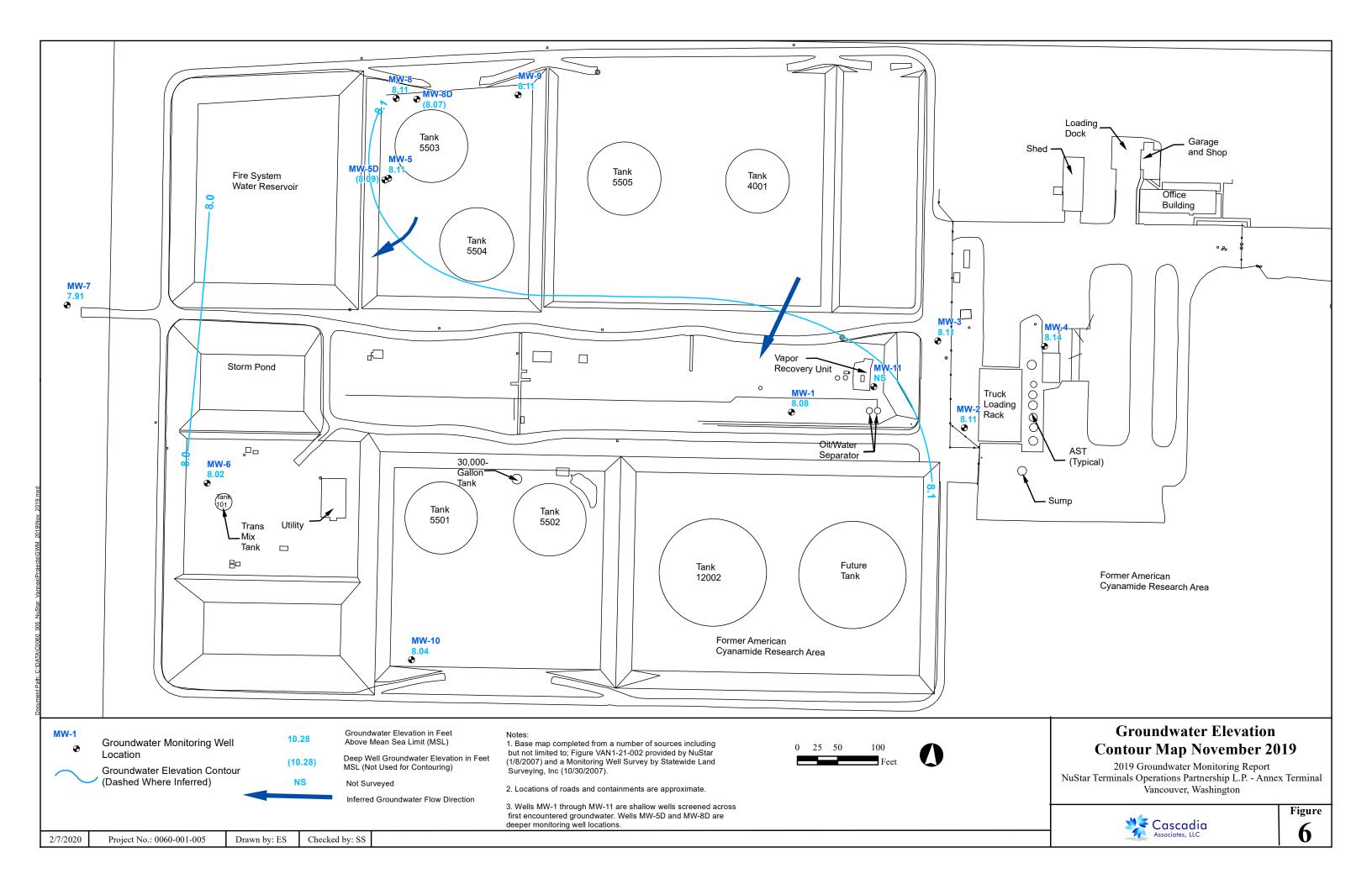


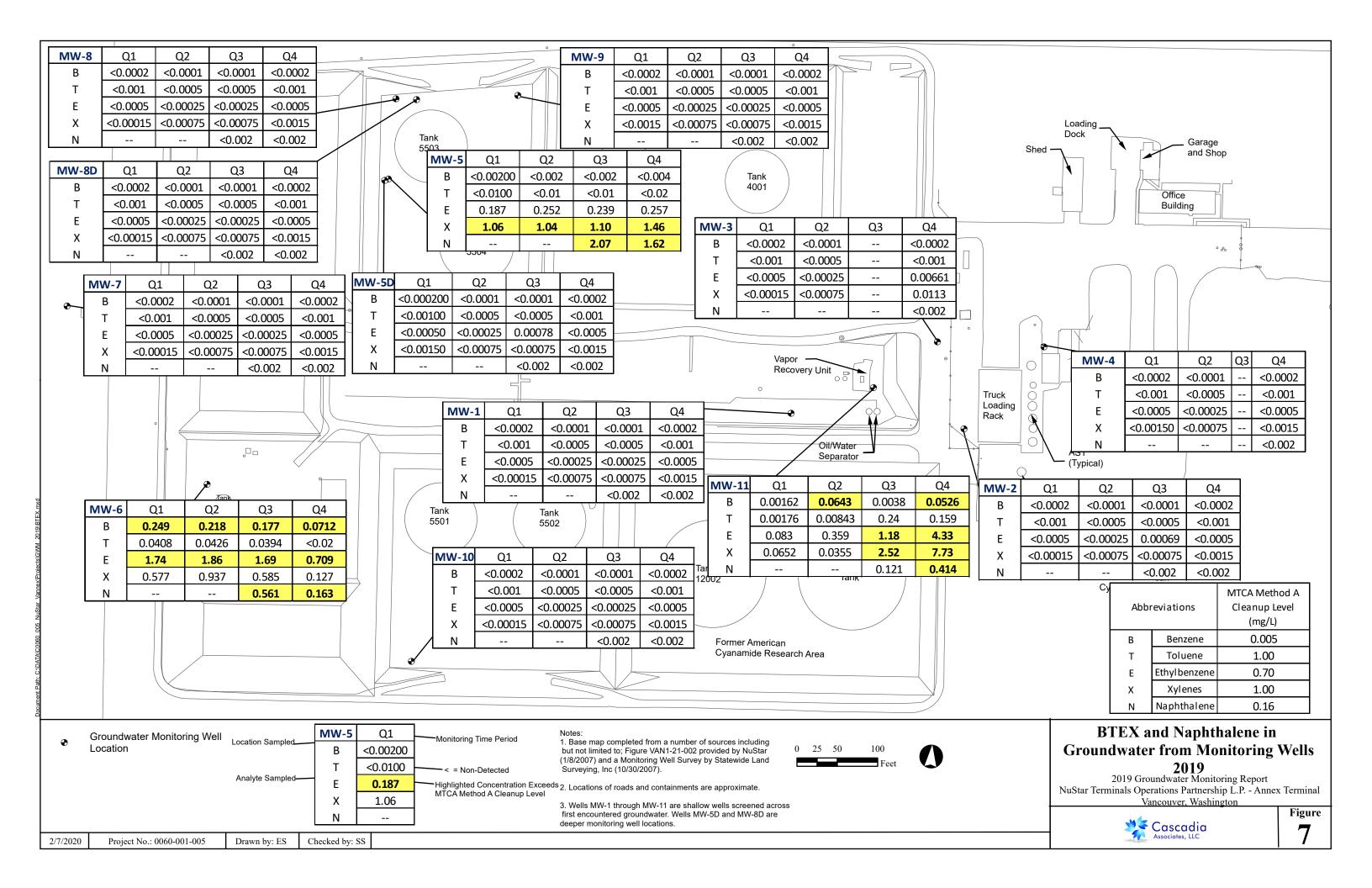


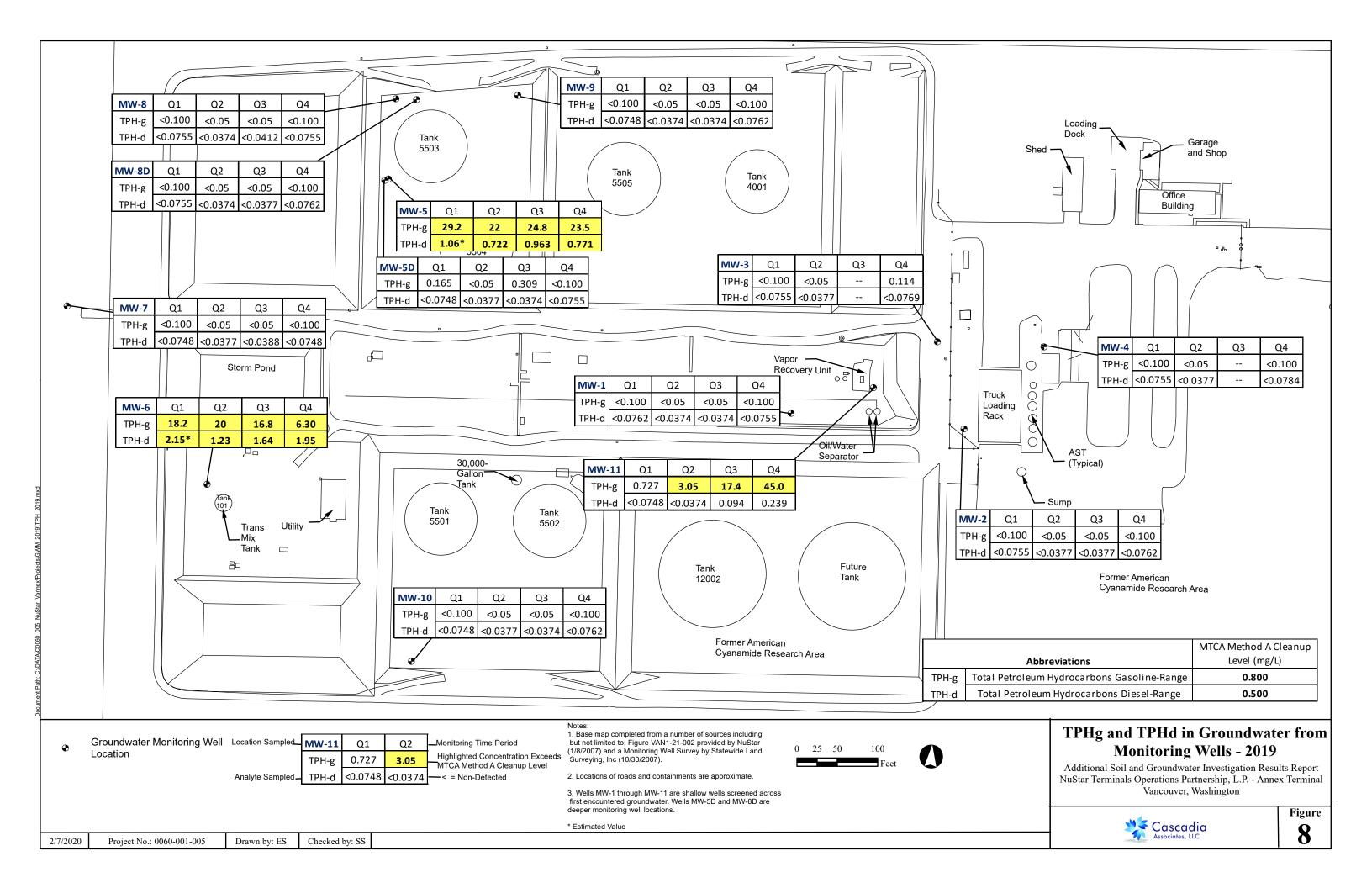












# **APPENDIX A**

CASCADIA STANDARD OPERATING PROCEDURES (SOPS)

## CASCADIA ASSOCIATES STANDARD OPERATING PROCEDURE FIELD NOTES AND DOCUMENTATION

#### 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,



## CASCADIA ASSOCIATES STANDARD OPERATING PROCEDURE FIELD NOTES AND DOCUMENTATION

- 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.



## CASCADIA ASSOCIATES STANDARD OPERATING PROCEDURE FIELD NOTES AND DOCUMENTATION

#### **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.



## CASCADIA ASSOCIATES STANDARD OPERATING PROCEDURE Low Flow Groundwater Sampling

#### 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

#### Table B-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)
	05/14/02	NS			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	14.5 - 24.5		15.25		11.41
MW-1	06/24/15	26.66	14.5 - 24.5		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
	05/14/02	NS			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	20 - 35		26.79		11.42
MW-2	06/24/15	38.21	20-33		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

Please refer to notes at end of table.



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

Well	Date of	Top of Casing	Screened Interval	Depth To SPH	Depth to	SPH Thickness	Groundwater
Number	Measurement	Elevation	(feet bgs)	(feet)	Groundwater	(feet)	Elevation
	05/14/02	(feet above MSL)			(feet)		(feet) NS
	05/14/02	NS			28.15		
	05/25/07	39.11 39.11			27.17		11.94 8.07
	08/24/07				31.04		
	11/06/07	39.11 39.11			30.36		8.75
	02/27/08				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	24.5 - 34.5		27.72		11.39
MW-3	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
	05/14/02	NS			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	aa a-		28.76		11.41
MW-4	06/24/15	40.17	20 - 35		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
	12/16/14	27.03			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			19.55		9.21
		27.03			17.82		9.21 10.64
N 4147 E	11/30/17 02/28/18	27.03	10 - 25		16.39		10.64 11.62
MW-5							
	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

Please refer to notes at end of table.



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

Number         Measurement         Levation (feet above MSL)         (feet) (feet)         (ffeet) (feet)         (ffeet) (ffeet)         (ffeet) (ffeet)         (ffeet) (ffeet)         (ffeet) (ffeet)         (ffeet) (ffeet)         (ffeet) (ffeet)         (ffeet) (ffeet)         (ffeet) (ffeet)         (ffeet) (ffeet)         (ffeet)	Well	Date of	Top of Casing	Screened Interval	Depth To SPH	Depth to	SPH Thickness	Groundwater
10/24/17         26.71          17.50          9.           MW-5D         06/30/18         26.71          15.20          11           05/29/18         26.71         35 - 45          8.37          18.           06/30/18         26.71          15.20          11          11           05/20/19         26.71          16.43          10          7          11          10          7          11          10          7          11          10          7          10          7          11         10          7          10          7          11          10          7          11          10          10          10          10          11          10          11          10          11          10	Number	Measurement	Elevation	(feet bgs)		Groundwater	(feet)	Elevation
11/30/17         26.71          16.21          10           02/28/28         26.71         35 - 45          15.20          18.           08/30/18         26.71         35 - 45          18.51          8.8           08/30/18         26.71          16.33          18.           08/28/19         26.71          16.31          18.           08/28/19         26.71          16.33          18.           08/28/19         26.71          18.62          8.9           08/28/19         27.33          16.93          17.           08/28/15         27.33          18.12          9.2           11/30/17         27.33          18.12          18.9           08/30/18         27.33          18.99          18.           08/30/18         27.33          18.99          18.           08/30/18         27.33          18.99          19.           <		10/24/17						(feet)
00/28/18         26.71          15.20          11           05/29/18         26.71         35 - 45          8.37          18.51          18.51          18.51          18.51          18.51          10.51         10.51         10.51         10.51          11.51								9.21
MW-5D         05/29/18         26.71         35.45          8.37          8.8           MW-5D         08/30/18         26.71          18.51          8.6           05/20/19         26.71          18.61          8.6         0           08/28/19         26.71          19.01          7.7         13           08/28/19         26.71          19.01          7.7         7.7           11/18/19         26.73          16.73          10.1           08/28/19         27.33          15.73          11.1           06/24/15         27.33          18.12          9.7           11/30/17         27.33          18.12          9.7           05/29/18         27.33          18.99          10.1           05/29/18         27.33          18.99          10.1           05/29/18         27.33          13.56          13.5           05/29/19         27.33          <								10.50
MW-5D         08/30/18         2.6.7.1         -54.5          18.51          18.51          18.51          18.51          10.33           02/18/19         2.6.7.1          16.43          10.03         0.03								11.51
Multiple         02/18/19         26.71          16.43          10           05/20/19         26.71          12.72          13           05/20/19         26.71          12.72          13           11/15/19         26.71          18.62          8.87           03/25/15         27.33          16.33          10           03/5/15         27.33          19.70          77           10/4/17         27.33          18.12          9.0           11/30/17         27.33          15.77          11           05/29/18         27.33          16.99          16.99           05/20/19         27.33          16.99          10           05/20/19         27.33          13.966          17.9           05/20/19         27.33          19.31          18.9           02/18/19         27.67          13.266          17.9				35 - 45				18.34
Mean         05/20/19         26.71          12.72          13.3           08/28/19         26.71          18.62          88.0           11/18/19         26.71          18.62          88.0           03/25/15         27.33          16.93          11           06/24/15         27.33          19.70          77           10/24/17         27.33          19.70          77           10/24/17         27.33          19.70          77           10/24/17         27.33          19.70          19.70           05/29/18         27.33          15.77          10.1           05/20/19         27.33          15.77          10.1           05/20/19         27.33          19.66          77           11/18/19         27.33          19.66          77           11/18/19         27.87          11.12          88           08/30/18 <td< td=""><td>MW-5D</td><td></td><td></td><td></td><td></td><td></td><td></td><td>8.20</td></td<>	MW-5D							8.20
08/28/19         26.71          19.01          7.           11/18/19         26.71          18.62          8.6           03/25/15         27.33          15.73          10           03/25/15         27.33          19.34          10           06/24/15         27.33          19.74          19.74            11/30/17         27.33          19.70          10            06/24/17         27.33          18.71          10          10           06/25/918         27.33          15.77          11          10          10         0          10         0          10         0          10         0         0         0          10         0          10         0          10         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0								10.28
11/18/1926.7118.628.412/16/1427.3316.931003/25/1527.3315.7317.709/15/1527.3319.3477.709/15/1527.3318.1290.310/24/1727.3318.1290.302/28/1827.3316.7111.105/29/1827.3316.9916.905/20/1927.3316.9910.005/20/1927.3315.7710.005/20/1927.3315.9910.005/20/1927.3319.3110.005/20/1921.6719.3110.02/28/01821.6710-2513.2608/30/1821.6710-2513.2608/28/1921.6713.9910.005/20/1921.6713.397.711/18/1921.6713.997.711/18/1921.6713.997.711/18/1921.6713.997.711/18/1921.6713.917.711/18/1921.6713.917.711/18/1921.6713.917.7 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>13.99</td>								13.99
Image         Image <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>7.70</td></th<>								7.70
03/25/15         27.33          15.73          11.           06/24/15         27.33          19.34          7.           09/15/15         27.33          18.12          9.           10/24/17         27.33          18.12          9.           11/30/17         27.33          18.12          9.           05/29/18         27.33          18.77          10.           05/29/18         27.33          18.99          8.           06/30/18         27.33          18.99          8.           05/20/19         27.33          13.56          13.           05/20/19         27.33          13.56          13.           05/20/19         21.67          11.11          10.           2/28/2018         21.67         10 - 25          13.26          13.7           05/20/19         21.67         10 - 25          13.26          7.           05		11/18/19						8.09
06/24/15         27.33          19.34          7.2           99/15/15         27.33          19.70          7.2           10/24/17         27.33          19.70          9.7           11/30/17         27.33          16.71          10.7           02/28/18         27.33          16.71          10.7           05/29/18         27.33          16.99          10.7           05/20/19         27.33          16.99          10.0           05/20/19         27.33          13.56          13.7           08/80/18         21.67          19.31          8.8           08/80/18         21.67          13.26          11.1           5/29/2018         21.67          13.76          13.7           08/80/18         21.67          13.76          7.7           11/18/19         21.67          13.76          7.7           08/80/18         21.67		12/16/14	27.33			16.93		10.40
09/15/15         27.33          19.70          7.7           10/24/17         27.33          18.12          0.0           02/28/18         27.33         10 - 25          16.71          0.0           02/28/18         27.33          15.77          0.0           02/28/18         27.33          18.99          0.0           05/20/19         27.33          18.99          0.0           05/20/19         27.33          19.66          0.0           05/20/19         27.33          19.66          0.0           05/20/19         27.33          19.66          0.0           05/20/19         27.33          19.66          0.0           11/18/19         27.67          13.56          10.0           5/29/2018         21.67          11.12          10.0           05/20/19         21.67          13.26          13.26		03/25/15	27.33			15.73		11.60
10/24/17         27.33          18.12          9.2           11/30/17         27.33         10 - 25          16.71          10           02/28/18         27.33          16.71          11           03/30/18         27.33          18.99          18.9           03/30/18         27.33          18.99          18.9           03/30/18         27.33          19.95          10.9           05/20/19         27.33          13.56          13.3           05/20/19         27.33          19.966          7.4           11/18/19         27.33          19.66          7.4           11/18/19         27.67          19.66          7.4           11/18/19         21.67          11.12          10.1           5/29/2018         21.67          13.26          13.3           08/30/18         21.67          13.14          10.1		06/24/15	27.33			19.34		7.99
MW-6         11/30/17         27.33         10 - 25          16.71          10           02/28/18         27.33          15.77          11           05/29/18         27.33          9.03          18.89           08/30/18         27.33          16.99          10           05/20/19         27.33          13.56          13           08/30/18         27.33          19.61          10           05/20/19         27.33          19.31          10           08/30/18         21.67          19.31          10           2/28/2018         21.67          13.26          11           5/29/2018         21.67          13.26          8.9           08/30/18         21.67         10 - 25          13.39          13.30           08/28/19         21.67          13.76          7.7         13.30           08/28/19         21.67          13.39		09/15/15	27.33			19.70		7.63
MW-6         02/28/18         27.33         10-25          15.77          11.           05/29/18         27.33          9.03          18.99          18.9           08/30/18         27.33          18.99          18.99          18.9           02/18/19         27.33          18.99          18.9           05/20/19         27.33          13.56          13.           08/28/19         27.33          19.66          7.           11/18/19         27.33          19.31          8.           08/28/19         21.67          11.12          10.0           2/28/2018         21.67          13.26          13.3           08/30/18         21.67          13.26          7.           11/30/2017         27.68          13.76          7.           11/30/2017         27.68          16.01          10.0           2/28/2018         27.68		10/24/17	27.33			18.12		9.21
MW-6         02/28/18         27.33          15.77          11           05/29/18         27.33          9.03          18.99          18.99           08/30/18         27.33          16.99          16.99          10           05/20/19         27.33          13.56          13.3           08/32/19         27.33          19.66          7.7           11/18/19         27.33          19.31          8.9           08/28/19         27.33          19.31          8.9           11/30/2017         21.67          11.12          10.0           5/29/2018         21.67          13.26          8.9           08/30/18         21.67          13.76          7.7           02/18/19         21.67          13.76          7.7           11/18/19         21.67          13.76          7.7           11/18/19         21.67		11/30/17	27.33	10 25		16.71		10.62
08/30/18         27.33          18.99          8.8           02/18/19         27.33          16.99          10.0           05/20/19         27.33          13.56          13.7           08/28/19         27.33          19.66          13.7           11/18/19         27.33          19.61          18.9           11/18/19         27.33          19.61          18.7           2/28/2018         21.67          11.12          11.1           5/29/2018         21.67         10 - 25          13.26          18.8           08/30/18         21.67         10 - 25          13.26          13.3           08/28/19         21.67          13.76          13.7         13.7           08/28/19         21.67          13.76          11.1           11/18/19         21.67          13.76          11.1           5/29/2018         27.68          13.93         <	MW-6	02/28/18	27.33	10 - 25		15.77		11.56
02/18/19         27.33          16.99          10           05/20/19         27.33          13.56          13.           08/28/19         27.33          19.66          7.           11/18/19         27.33          19.66          7.           11/18/19         27.33          19.66          7.           11/18/19         27.33          19.31          8.           2/28/2018         21.67          10.19          11.           5/29/2018         21.67         10 - 25          13.26          8.           08/30/18         21.67         10 - 25          13.26          8.           08/28/19         21.67          13.99          7.         7.           11/18/19         21.67          13.76          13.76         7.           11/18/19         21.67          13.76          13.76         7.           11/18/19         21.67          <		05/29/18	27.33			9.03		18.30
MW-80         05/20/19         27.33          13.56          13.56           08/28/19         27.33          19.66          7.4           11/18/19         27.33          19.31          8.6           11/18/19         27.33          11.12          10.0           2/28/2018         21.67          10.19          11.12           5/29/2018         21.67          13.26          8.7           08/30/18         21.67         10 - 25          11.41          10.0           05/20/19         21.67          13.39          7.7         13.3           08/28/19         21.67          13.76          7.7           11/18/19         21.67          13.76          7.7           11/18/19         21.67          13.76          7.7           11/18/19         21.67          13.76          13.76           08/28/19         21.67          13.76		08/30/18	27.33			18.99		8.34
08/28/19         27.33          19.66          7.4           11/18/19         27.33          19.31          8.4           11/30/2017         21.67          11.12          10.0           2/28/2018         21.67          10.19          11.12           5/29/2018         21.67          3.4          18.8           08/30/18         21.67          13.26          8.8           02/18/19         21.67          13.26          8.8           05/20/19         21.67          13.39          10.0           05/20/19         21.67          13.76          7.7           11/18/19         21.67          13.76          7.7           08/28/19         21.67          13.76          10.0           11/18/19         21.67          16.01          11.1           5/29/2018         27.68          16.01          10.0           05/20/19 </td <td></td> <td>02/18/19</td> <td>27.33</td> <td></td> <td></td> <td>16.99</td> <td></td> <td>10.34</td>		02/18/19	27.33			16.99		10.34
11/18/19         27.33          19.31          8.4           11/30/2017         21.67		05/20/19	27.33			13.56		13.77
11/30/2017         21.67          11.12          10           2/28/2018         21.67          10.19          11           5/29/2018         21.67          3.4          18           08/30/18         21.67         10 - 25          13.26          8.           02/18/19         21.67          11.41          10           05/20/19         21.67          7.3          13.3           08/28/19         21.67          13.99          7.           11/30/2017         27.68          13.76          10           2/28/2017         27.68          9.31          11           5/29/2018         27.68         10 - 25          19.32          8.           08/30/18         27.68         10 - 25          19.31          18           08/28/19         27.68         10 - 25          19.33          13.           08/28/19         27.68         10 - 25          19.57		08/28/19	27.33			19.66		7.67
1/2/28/2018         21.67          10.19          11.           5/29/2018         21.67          3.4          18.           08/30/18         21.67         10 - 25          13.26          8.           02/18/19         21.67          13.26          8.           05/20/19         21.67          11.41          10.0           05/20/19         21.67          13.99          7.           08/28/19         21.67          13.99          7.           11/18/19         21.67          13.99          7.           11/30/2017         27.68          16.91          10.0           2/28/2017         27.68          19.22          8.           05/20/19         27.68          19.94          10.0           05/20/19         27.68          19.94          10.0           05/20/19         27.68          19.94          10.0           05/20/19		11/18/19	27.33			19.31		8.02
5/29/2018         21.67          3.4          18           08/30/18         21.67         10 - 25          13.26          8.4           02/18/19         21.67          11.41          10           05/20/19         21.67          11.41          13           08/28/19         21.67          13.99          7.4           08/28/19         21.67          13.99          7.4           11/18/19         21.67          13.76          7.4           11/18/19         21.67          16.91          11.4           5/29/2018         27.68          16.01          11.4           5/29/2018         27.68         10 - 25          19.22          18.8           08/30/18         27.68         10 - 25          19.22          18.9           05/20/19         27.68          13.93          13.9           08/82/19         27.68          19.94        <		11/30/2017	21.67			11.12		10.55
MW-7         08/30/18         21.67         10 · 25          13.26          8.           02/18/19         21.67          11.41          10           05/20/19         21.67          7.73          13.3           08/28/19         21.67          13.99          7.7           11/18/19         21.67          13.76          7.7           11/18/19         21.67          13.76          7.7           11/18/19         21.67          13.76          7.7           11/18/19         21.67          13.76          7.7           2/28/2017         27.68          16.01          11.1           5/29/2018         27.68         10 - 25          19.22          8.7           08/30/18         27.68         10 - 25          19.94          7.7           05/20/19         27.68          19.94          7.7           11/18/19         27.68          19.94		2/28/2018	21.67			10.19		11.48
MW-7         02/18/19         21.67         11.41          10.0           05/20/19         21.67          7.73          13.9           08/28/19         21.67          13.99          7.7           11/18/19         21.67          13.76          7.7           11/18/19         21.67          13.76          7.7           11/30/2017         27.68          16.91          10.0           2/28/2017         27.68          9.31          18.8           08/30/18         27.68         10 - 25          19.22          8.4           05/20/19         27.68          13.93          13.3           08/30/18         27.68          19.22          8.4           05/20/19         27.68          19.94          10.0           05/20/19         27.68          19.57          10.0           11/30/2017         27.87          19.53          10.0           2/28/2018		5/29/2018	21.67			3.4		18.27
MW-8         02/18/19         21.67          11.41          10.           05/20/19         21.67          7.73          13.           08/28/19         21.67          13.99          7.           11/18/19         21.67          13.76          7.           11/18/19         21.67          13.76          7.           2/28/2017         27.68          16.01          10.           5/29/2018         27.68          19.22          8.           08/30/18         27.68         10 - 25          19.22          8.           02/18/19         27.68         10 - 25          19.22          8.           02/18/19         27.68         10 - 25          19.22          8.           05/20/19         27.68          19.57         13.3          13.3           08/28/19         27.68          19.57          8.           11/18/19         27.68          19.57		08/30/18	21.67	10 - 25		13.26		8.41
08/28/19         21.67          13.99          7.4           11/18/19         21.67          13.76          7.4           11/30/2017         27.68          16.91          10           2/28/2017         27.68          16.01          11           5/29/2018         27.68          9.31          18           08/30/18         27.68         10 - 25          19.22          8.           08/28/19         27.68         10 - 25          19.24          10           05/20/19         27.68         10 - 25          19.94          13.3           08/28/19         27.68          13.93          13.3           08/28/19         27.68          19.94          7.5           11/30/2017         27.87          17.36          10           2/28/2018         27.87         35 - 45          19.41          8.5           MW-8D         08/30/18         27.87         35 - 45	MW-7	02/18/19	21.67			11.41		10.26
11/18/19         21.67          13.76          7.4           11/30/2017         27.68          16.91          10           2/28/2017         27.68          16.01          11           5/29/2018         27.68          9.31          18           08/30/18         27.68          19.22          8.4           08/30/18         27.68          19.22          8.4           05/20/19         27.68          19.22          8.4           05/20/19         27.68          19.94          10.4           08/28/19         27.68          19.94          7.4           08/28/19         27.68          19.94          7.4           11/30/2017         27.87          17.36          10.4           2/28/2018         27.87         35 - 45          16.35          11.4           5/29/2018         27.87         35 - 45          19.41          8.4		05/20/19	21.67			7.73		13.94
Image: Market		08/28/19	21.67			13.99		7.68
12/28/2017         27.68          16.01          11.           5/29/2018         27.68          9.31          18.           08/30/18         27.68         10 - 25          19.22          8.           02/18/19         27.68         10 - 25          19.22          8.           05/20/19         27.68          13.93          10.           05/20/19         27.68          19.94          13.3           08/28/19         27.68          19.94          7.           11/18/19         27.68          19.94          8.           08/28/19         27.68          19.94          7.           11/18/19         27.68          19.94          8.           2/28/2018         27.87          16.35          10.           2/28/2018         27.87         35 - 45          19.41          8.           08/30/18         27.87         35 - 45          19.41 </td <td></td> <td>11/18/19</td> <td>21.67</td> <td></td> <td></td> <td>13.76</td> <td></td> <td>7.91</td>		11/18/19	21.67			13.76		7.91
MW-8         5/29/2018         27.68         10 - 25          9.31          18           08/30/18         27.68         10 - 25          19.22          8.4           02/18/19         27.68          19.22          10.0           05/20/19         27.68          13.93          13.3           08/28/19         27.68          19.94          7.7           11/18/19         27.68          19.94          8.4           08/28/19         27.68          19.94          7.7           11/18/19         27.68          19.57          8.4           2/28/2018         27.87          19.57          10.0           5/29/2018         27.87         35 - 45          19.41          8.4           08/30/18         27.87         35 - 45          19.41          8.4           02/18/19         27.87         35 - 45          19.41          8.4           05/20/19         27.87 <td< td=""><td></td><td>11/30/2017</td><td>27.68</td><td></td><td></td><td>16.91</td><td></td><td>10.77</td></td<>		11/30/2017	27.68			16.91		10.77
MW-8         5/29/2018         27.68         10 - 25          9.31          18           08/30/18         27.68         10 - 25          19.22          8.4           02/18/19         27.68          19.22          10.0           05/20/19         27.68          13.93          13.3           08/28/19         27.68          19.94          7.7           11/18/19         27.68          19.94          8.4           08/28/19         27.68          19.94          7.7           11/18/19         27.68          19.57          8.4           2/28/2018         27.87          19.57          10.0           5/29/2018         27.87         35 - 45          19.41          8.4           08/30/18         27.87         35 - 45          19.41          8.4           02/18/19         27.87         35 - 45          19.41          8.4           05/20/19         27.87 <td< td=""><td></td><td>2/28/2017</td><td>27.68</td><td></td><td></td><td>16.01</td><td></td><td>11.67</td></td<>		2/28/2017	27.68			16.01		11.67
MW-8         02/18/19         27.68          17.28          10           05/20/19         27.68          13.93          15.91          10.91          10.91          10.91          10.91          10.91          10.91          10.91          10.91          10.91          10.91          10.91          10.91          10.91          10.91          10.91		5/29/2018	27.68			9.31		18.37
MW-8D         02/18/19         27.68          17.28          110           05/20/19         27.68          13.93          13.93          13.93          13.93          13.93          13.93          13.93          13.93          13.93          13.93          13.93          13.93          13.93          13.93          13.93          13.93          13.93          13.93          13.93          7.7          19.57          8.4          19.57          8.4          10.9          10.9          10.9          10.9          10.9          10.9          10.9          10.9          10.9          10.9          10.9          10.9          10.9          10.9          10.9          10.9          10.9		08/30/18	27.68	10 - 25		19.22		8.46
08/28/19         27.68          19.94          7.7           11/18/19         27.68          19.57          8.7           11/30/2017         27.87          17.36          10.0           2/28/2018         27.87          16.35          11.1           5/29/2018         27.87          9.53          18.7           08/30/18         27.87         35 - 45          19.41          8.7           02/18/19         27.87         35 - 45          19.41          8.7           05/20/19         27.87         35 - 45          19.41          8.7           05/20/19         27.87         35 - 45          13.9          10.0	MW-8	02/18/19	27.68			17.28		10.40
08/28/19         27.68          19.94          7.7           11/18/19         27.68          19.57          8.7           11/30/2017         27.87          17.36          10.0           2/28/2018         27.87          16.35          11.1           5/29/2018         27.87          9.53          18.7           08/30/18         27.87         35 - 45          19.41          8.7           02/18/19         27.87         35 - 45          19.41          8.7           05/20/19         27.87         35 - 45          19.41          8.7           05/20/19         27.87         35 - 45          13.9          10.0		05/20/19	27.68			13.93		13.75
11/18/19         27.68          19.57          8.           11/30/2017         27.87          17.36          10.           2/28/2018         27.87          16.35          11.           5/29/2018         27.87          9.53          18.           08/30/18         27.87         35 - 45          19.41          8.           02/18/19         27.87         35 - 45          19.41          8.           05/20/19         27.87         35 - 45          19.41          8.           05/20/19         27.87         35 - 45          17.59          10.								7.74
2/28/2018         27.87          16.35          11.           5/29/2018         27.87          9.53          18.           08/30/18         27.87         35 - 45          19.41          8.           02/18/19         27.87          17.59          10.           05/20/19         27.87          13.9          13.		11/18/19	27.68			19.57		8.11
5/29/2018         27.87          9.53          18           08/30/18         27.87         35 - 45          19.41          8.           02/18/19         27.87         35 - 45          17.59          10.           05/20/19         27.87          13.9          13.9		11/30/2017	27.87			17.36		10.51
MW-8D         08/30/18         27.87         35 - 45          19.41          8.           02/18/19         27.87          17.59          10.           05/20/19         27.87          13.9          13.9		2/28/2018	27.87			16.35		11.52
MW-8D         08/30/18         27.87         35 - 45          19.41          8.4           02/18/19         27.87          17.59          10.0           05/20/19         27.87          13.9          13.9		5/29/2018	27.87			9.53		18.34
MW-8D         02/18/19         27.87          17.59          10.           05/20/19         27.87          13.9          13.		08/30/18		35 - 45				8.46
05/20/19 27.87 13.9 13.	MW-8D							10.28
								13.97
		08/28/19	27.87			20.21		7.66
								8.07

Please refer to notes at end of table.



## Table B-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)
	11/30/2017	29.39			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	10 - 25		21.04		8.35
MW-9	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
	11/30/2017	28.71			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	10 - 25		20.3		8.41
MW-10	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
	02/18/19	NS			17.27		NS
	05/20/19	NS	10 - 25		14.32		NS
MW-11	08/28/19	NS	10 - 25		19.55		NS
	11/18/19	NS			19.36		NS

#### Notes:

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.



<sup>1.</sup> Survey elevations determined by Bluedot Group surveying, November 2017.

## **APPENDIX C**

# FIELD GAUGING AND SAMPLING FORMS

Vannex GWN Project: Nustar Client: Sampler: IN

Date: 2/18/19 Permit:

Product Well ID: Time: DTP: DTW: Notes: Thickness: 758 18.42 MW-10 MW - 6 0808 16.99 -0809 MW-7 11.41 MW-5D 0813 6.43 --MW-5 0814 16.70 MW-8 0817 28 MW-80 0818 7.59 \_\_\_\_ -NW-9 0820 19.13 -MW-02 0827 28.04 6832 30.04 Mow -4 0835 28.94 Mw-3 -0837 nw-11 17.27 0840 16.51 nhw-1 \_ -

				Well ID:	MW	-(0		Job Number:		
N/Z	Casc	adia		Client:	Nust	-aR		Date:	2/18	(19
	Associate	uulu		Project:		'X Gluk	1	Sampler:	LW	
	Associate	es, LLC		Weather:	OVE	cast,	30%	Time In/Out:	0850	10925
			0	21	WELL					
		Flush-mount/	Shick-up		Well Diamete	er:	24	Depth to Free	Product:	-
Monument Ty	pe:	Other:			Well Depth:		-	Free Product	Thickness:	-
Monument Co	ndition:		A		Depth to Wat	er:	18.01	Water Colum	n Length:	_
Well Cap Lock		Yes (No)			Screened Inte		10.01	Purge Volume		~
Comments:	Flesent.				Screencering			r uige volume		
Purge Volume	= (Water He	ight) X (Multin	lier) X (# Casir	volumes)						
Water height			1-inch well =		2-inch = 0.16	2	4-inch = 0.65	3	1 gal = 3.785 li	ters
Water neight	indiciplicity (B	ui).	1 1101 1101		PURGIN				U.	
Purge Method	l:	24			Pump Intake	Depth:		ms	-	
Sampling Met	hod:	1	F		Tubing Mater	rial & Type:	ID	PI	NEW	/ DEDICATED
	Volume	Cumulative								
Time	Purged	Volume	DTW	Purge Rate	рН	Temp	Cond	DO	ORP	Clarity/Colo
TITIC	(liters)	Purged	(btc)	(L/min)	P. 1	(°C)	(µS/cm)	(ppm)	(mV)	Other Remar
		(liters)			+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	1
			15 01							
0857			18.01	0.2	6.48	11.55	743	10.05	-24.7	Clea
0900			18.22	1	6.51	11.85	749	5.34	- 76.0	1
0903			18.35		6.51	12.12	751	3.64	-44.6	
			18.48					2.95	.44.5	
0906					6.51	12.11	751			d d
1909			18.59		6.51	11.85	747	2.61	-46.9	
0912			18.722	4	651	11.82	746	2.58	-47.7	$\checkmark$
0										
			1.1.1							
			- 14							
		L	I		PURGIN	IG DATA				
Sample ID:		MW	- (0	Sampling Flo	ow Rate:	0.3		Analytical La		Apr
Sample Time:			910	Final Depth		18	. 81	Did Well Dew		NS
No. of Contain	ners/Type	Prese	rvative	Analysis/Me	thod	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
BV	YONL	t	121	J	OCC	N				
			+21	-	PLI	N				
24				-	FILT					
					1					
		1				NAL COMMEN	TS			
			× 41.	N		INAL CUIVIIVIEN	13			
										· · · · · · · · · · · · · · · · · · ·

MA	less in the			Well ID:	mw-	1		Job Number:	21.001	
	Case	cadia		Client:	1 Al	istak	1	Date:	2/81	[9
2	Associat	es, LLC		Project: Weather:	Brere		WN DOF	Sampler: Time In/Out:	0930/	1000
		0		weather.	WELL				10950/	1008
		Flush-mount/	Stick-up		Well Diamete	er:	211	Depth to Free	Product:	
Monument T	ype:	Other:	Λ		Well Depth:		-	Free Product	Thickness:	
Monument C	ondition:	8	Vd	<i>,</i>	Depth to Wa	ter:	16.48	Water Colum	n Length:	
Well Cap Loc	k Present: (	Yes No	·····.		Screened Int	erval:		Purge Volume	:	-
Comments:			A				A			
Purge Volum	e = (Water He	eight) X (Multip								
Water height	multipliers (g	gal):	1-inch well =	0.041	2-inch = 0.16		4-inch = 0.65	3	1 gal = 3.785 lit	ers
Purge Metho	d.		PP		PURGIN Pump Intake	G DATA	1	15		
Sampling Me			LF		Tubing Mate			DPE	NEW	/ DEDICATED
		Cumulative						I E		,
Time	Volume Purged (liters)	Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remark
		(interoy			+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
0937			16148	0.2	7.28	11.57	294	17.6 (	-59.6	e lear
1940			16.51	1	7.5	12.80	294	3.57	-70.)	
943			(6,50		7.05		307	3.02	-30.7	
					6.99	12.68	010	2.57		
0946 0949 0952			16.49					1	-20.9	<u> </u>
			16.48		6.99	12.56		2.20	-18.6	· · · · ·
			16.47	L	6.98	12.53	376	2.08	-17.9	*
	- and -									
Sample ID:		14		Complin - Fl	PURGIN	G DATA	7	Analistadiat	aratar ::	N H SOIL
Sample ID: Sample Time:	:	Inn -	50	Sampling Flov Final Depth to		10.4		Analytical Lab Did Well Dewa		- TY TX
No. of Contai		Preser		Analysis/Met		Field Filtered		MS/MSD	Duplicate ID	123
ZVI	your	471		1/	015	N	-			
5	110		. ]		TOH	N				
		1 pro	(			1.4				1.7
_	<u> </u>									
				1. 1.						
				NO	TES/ADDITIO	NAL COMMEN	IS			-
		de la								
	22									

				WELL	MONITORIN	G DATA SHE	ET				
				Well ID:	mw.	5		Job Number:			
1	Case	adia		Client:	NUL	tak		Date:	2/18	119	
	Associate			Project:	Van	nex c		Sampler:	IW		
and an and the				Weather:	aver		30	Time In/Out:	1000	0/1025	
			(au)		WELL I						
nument T	ype:	Flush-mount/	Stick-up		Well Diamete	r:	24	Depth to Free			
		Other:			Well Depth:			Free Product T		~	
nument C		The No	- + -		Depth to Wat		17.al	Water Column			
	k Present:	Tes No			Screened Inte	rval:	-	Purge Volume:			
nments:		· 1 · ) · / / · / · · · · ·	1: \\\//!! C :	N/ 1 N	r - 1		1				
	e = (Water He multipliers (g	ight) X (Multip	1-inch well =	and the second	2-inch = 0.162	,	4-inch = 0.65	2	1 gal = 3.785 li	tors	
ter neight	multipliers (g	,al):	I-inch weil =	0.041	PURGING		4-11101 - 0.03	5	1 Bai - 2.102 II		
ge Metho	d:	20	)		Pump Intake [		MS	Sec. Sec. 4	-		
npling Me			LF		Tubing Mater		LDI	>E	NEW	/ DEDICATED	
	Volume	Cumulative									
Time	Purged (liters)	Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pН	Temp (°C)	Cond ( <b>µS/cm)</b>	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks	
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV		
1000			17.94	0.2	6.78	12.78	424	3.44	-20.7	Clear	
			18.48	1	675	13.34	436	2.26	-35.6	1	
1003			19.74			1 .	444		-51.(		
000	,			-	6.74	1.3.63		(.90			
009			20.04		6.74	13.55	444	1.92	-55.1	- 4	
								-			
										, 4	
					1.12						
				Takik.							
1											
				*							
				-							
					PURGIN	G DATA					
nple ID:		min	1-5	Sampling Flo	w Rate:	0.		Analytical Labo		Avex	
nple Time			1010	Final Depth t		20.0		Did Well Dewa		No	
	ners/Type	Prese	rvative	Analysis/Me	thod	Field Filtered	Filter Size	MS/MSD	Duplicate ID		
5	× youl	tte	2	V	200	2					
21	KIC	1	21	-	TAT	N					
							6				
							-				
10	_						-c				
				NC	DTES/ADDITION	AL COMINENT	3				
1	-	-					_				
die hi	The second	1	1.0		-			1	- 85.		

						NG DATA SHI	EET			
MA		Tie State		Well ID:	Mw			Job Number:		
	Case	adia		Client:	Nus			Date:	21.8	· · · · · · · · · · · · · · · · · · ·
2	Associate	es, LLC		Project:	4	-	wM	Sampler:	Lu	)
				Weather:	Overo	DATA	20° F	Time In/Out:	1230	1110
		Flushmount	/Stick-up		Well Diamet		2"	Depth to Free	Product:	
Aonument T	ype:		Stick-up		Well Depth:		l	Free Product		
Assument C		Other:	1		· · · · · · · · · · · · · · · · · · ·		2 - 1			
Monument C		20	Dod		Depth to Wa		30.01	Water Columr		
Vell Cap Loci	(Present:	Yag No	4		Screened Int	erval:	~	Purge Volume	:	
Comments:	a = ()Mator Ho	ight) V (Multin	lior\ V (# Casir	(a) (alumas)		r			-	
	multipliers (g		olier) X (# Casir 1-inch well =		2-inch = 0.16	2	4-inch = 0.65	2	1 gal = 3.785 lit	orc
vater neight	munipilers (g	di).	1-Inch wen -	0.041	PURGIN		4-inch = 0.65	5	1 gal = 5.765 III	.ers
urge Metho	d:	F	P		Pump Intake		1	NS		
ampling Met	hod:		LF		Tubing Mate		11	SPE	NEW	/ DEDICATED
	Volume	Cumulative								
Time	Purged	Volume	DTW	Purge Rate	pН	Temp	Cond	DO	ORP	Clarity/Color
	(liters)	Purged (liters)	(btc)	(L/min)		(°C)	(µS/cm)	(ppm)	(mV)	Other Remarks
		(			+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1046			30.or	. 6.2	6.44	12.08				Clear
					6.32	12.67	166	11.52	66.7	LITAK
1049			30.02				167	10.30	79.1	
1052			30.02	2	6.23	13.((	168	10.22	102.9	
1055			30.02		6.21	13.15	168	9.57	108.9	V
1058			30.02	V	6.20	13.31	168	141	118.2	• /
1101			3003		6.19	13.35	167	6.80	1230	
1104			3003		6.19	13.38	167	6.40	124.4	
1107			30.04	•	6.19	13.36	167	6.21	125.1	V
										<u>.</u> .
	26						2.1.1		h	
					PURGIN	r				~
ample ID:				Sampling Flov		0.	2	Analytical Labo		APRX
ample Time: o. of Contair		Prese	<u>.</u>	Final Depth to Analysis/Met		30.0 Field Filtered		Did Well Dewa MS/MSD	ater: Duplicate ID	NO
	leis/Type	riesel 1 /							Duplicate ID	
CX	IC		21	(	H	N				
SX	Your	H H	151	VC	S	M		a second a definition of the second		· · · · · · · · · · · · · · · · · · ·
				NO						
1				NO	ILS/AUDIIIO	NAL COMMENT	3			the second s
	the fragment framework	an an a subscription of the subscription of the								
						1. 31				
						12				

				Well ID:	Mw.	IG DATA SHE		Job Number:			
VIZ	Casc	adia		Client:	NV	ISTAR		Date:	2.118	19	
	Associate	uuiu		Project:	J.	currex Gwi		Sampler:	L	in	
	Associate	S, LLC		Weather:	oven	SAL I	36°F	Time In/Out:	11201	1150	
		<u> </u>			WELL	DATĂ		1			
Ionument Ty	/ne:	Flushemount/	Stick-up		Well Diamete	er:	211	Depth to Free	Product:		
	/F = .	Other:			Well Depth:		-	Free Product	Thickness:	-	
1onument C	ondition:	Q	Dod		Depth to Wat	er:	19.20	Water Colum	n Length:		
/ell Cap Lock	Present:	Yes No	)		Screened Inte	erval:	_	Purge Volume	:	-	
omments:											
		ight) X (Multipl			, ,						
/ater height	multipliers (ga	al):	1-inch well =	0.041	2-inch = 0.162	the second s	4-inch = 0.65	3	1 gal = 3.785 li	ters	
urge Metho	4.	DP	,		PURGING Pump Intake I		1	15			
ampling Met			LF	-	Tubing Mater		10	07	NEW	/ DEDICATED	
		Cumulative						r c		,	
Time	Volume Purged (liters)	Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µ <b>S/cm)</b>	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks	
		(11013)			+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV		
1124			19.20	0.2	6.28	12.67	109	11.01	137.0	Cleur	
· /				0.2				1.			
1127			19.18		6.29	12.43	90	10.17	1378		
1130			19,19		6.28	13.17	87	9.98	141.4	P	
1133			19.19		6.28	13.23	85	9.71	142.1		
1736		X	19.18		6.28	13:30	86	9.61	144.1		
in the second					DUDCIN	CDATA					
ample ID:		m	w-4	Sampling Flow	PURGIN	O.Z		Analytical Lab	oratory:	Anei	
imple Tb.				Final Depth to		19.	20	Did Well Dewi		KY 2X	
o. of Contair		Preser		Analysis/Met		Field Filtered		MS/MSD	Duplicate ID		
34	. YOAL	H	U	5 1 /	)(1	P					
24	10	ŀ	+21	T	344	N					
								· · · · · · · · · · · · · · · · · · ·			
				NC		AL COMMENT				*	
				NO	TLS/ADDITION		15				

					_		IG DATA SH				
	Section 1	A STAN		Well ID	):	Mh	1-8D		Job Number:		
A A	Casc	adia		Client:		NVII	TAR		Date:	2/18/	19
	Associate	es, LLC		Project		Vonn		wM	Sampler:	LW	
- management		A		Weath	er: .	WELL	cost,	30°F	Time In/Out:	1150	1222
		Fluse-mount/	Stick up			Well Diamete		211	Depth to Free	Draduate	
/lonument Ty	pe:		заск-ир			+	1.	- 6	Free Product		
	1	Other:	- t			Well Depth:					
Nonument Co		000	1001		-	Depth to Wat		17.79	Water Columr		-
Vell Cap Lock	Present:	A ROAD				Screened Inte	erval:	~	Purge Volume		
comments:											
		ight) X (Multip			nes)	2 in the 0.101		A inch O CE	2	1 . 1 - 2 705 14	
Vater height i	nultipliers (g	ai):	1-inch well =	0.041		2-inch = 0.162 PURGIN		4-inch = 0.65	3	1 gal = 3.785 lit	ers
urge Method	:	00	)			Pump Intake I		M	<		
ampling Met		1.1	I.F			Tubing Mater		LD		NEW	/ DEDICATED
	Volume	Cumulative								*	00000
Time	Purged (liters)	Volume Purged (liters)	DTW (btc)	Purge (L/m		pН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
						+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	•
1157			17.79	0.	2	6.94	12.00	94	3.27	5023	clear
1200			17.77			2.15	11.54	92	(41	105.0	1
						7.21		-	1.57		
1203			17.78	$\vdash$		1	11.68			1078	
1206			17.79	4		7.32	11.82	- 93	9.08	96.3	
	-			- 1							
											······································
						PURGIN	G DATA				. <u></u> .
ample ID:		mw.	-90	Sampli	ng Flo	w Rate:	0.	2	Analytical Lab	oratory:	Aper
ample Time:			210			o Water:	17.7	9	Did Well Dew		No
lo. of Contain	ers/Type	Preser		Analysi	is/Met	thod	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3×4	onl	H	15		VI	265	7				
2 1/	14	11	71	-	七	24	N				
				*							
Sec.			1				-				
		í		1	NC	DTES/ADDITION	AL COMMEN	TS			
2.5.5											

		1000-0405 01-05-05-		Well ID:		NG DATA SHI		Job Number:		
-	0	1.		Client:	Nu			Date:	2/18	119
	Case	adia		Project:			wy	Sampler:	LALA	
	Associat	es, LLC		Weather:	aver	Cinet -	(WA)	Time In/Out:	1220	(1300
				weather.	WELL			Time iny out.	112201 1300	
		Flush-mount	/Stick-up		Well Diamete		24	Depth to Free	Product:	
Monument Ty	/pe:	Other:	Stick up		Well Depth:		C	Free Product		
	1	ouner.					10 50			~
Monument Co			1 vad		Depth to Wa		17.89	Water Colum		_
Well Cap Lock	Present:	Yes No	0		Screened Inte	erval:	<b>^</b>	Purge Volume	e:	
Comments:										
		eight) X (Multip								
Water height	multipliers (g	gal):	1-inch well =	0.041	2-inch = 0.16		4-inch = 0.65	3	1 gal = 3.785 li	iters
Durge Marti	4.	-	2		PURGIN			the		
Purge Method		P	1		Pump Intake					
Sampling Met	nou.	Cumulative	LF		Tubing Mater	пагостуре:	-u	Dr.E	(NEW	/ DEDICATED
Time	Volume Purged (liters)	Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond ( <b>µS/cm)</b>	DO (ppm)	ORP (mV)	Clarity/Colc Other Remai
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	•47-20 mV	
1224			17.89	0.3	6.06	12.49	70	6.44	106.5	clfak
1717			19.80		4			100		UTUN.
1611			11.0		6.00	12.55	70	6.19	1(9.5	
1230			20.90	J	5.97		70	7.26	137.1	
1233	*		21.40	0.15	5.97	12.30	70	747	139.7	
1236			22.51	0.1	5.99	12.28	78	7.47	139.(	
			-				5			a na a ta a ta ana ana a
		L			PURGIN	G DATA				
Sample ID:		MIA	1-8	Sampling Flo	and the second se	0,	1	Analytical Lab	oratory:	Mar
Sample Time:		12		Final Depth t		22.	19	Did Well Dewa		No
No. of Contain	ers/Type	Preser	vative	Analysis/Met	hod	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
2×	11	H	21	ا جرنے	>1	N				
7.1.	12.1	<u>├</u>			0 (	. 1				
<u> </u>	INC	t	TC	$- \mathbf{V}$	UC	PP-				
				=						
				NC	DIES/ADDITION	NAL COMMENT	5			
2										

				WELL	MONITORIN	G DATA SHI	EET			
	Section 2	1987 - 19 P		Well ID:	MW	1-3		Job Number:		
A A	Case	adia		Client:	NNS-			Date:	2/8/1	19
-	Associate	es, LLC		Project:			wm	Sampler:	ilw	1.055
	and a second			Weather:	DJerc			Time In/Out:	315	1355
			101		WELL I		A			
/onument Ty	pe:	Flosh mount,	Stick-up		Well Diamete	r:	24	Depth to Free		
		Other:	1		Well Depth:			Free Product	Thickness:	
Monument Co	ondition: 🔶		20	1.00	Depth to Wat	er:	291.55	Water Columr	n Length:	
Vell Cap Lock	Present:	Yes <table-cell></table-cell>			Screened Inte	rval:		Purge Volume	:	
Comments:										
		ight) X (Multip	lier) X (# Casir	ig Volumes)						
Vater height	multipliers (g	al):	1-inch well =	0.041	2-inch = 0.162		4-inch = 0.65	3	1 gal = 3.785 lit	ters
			7		PURGING					
urge Method		P			Pump Intake [			m	NEW	
ampling Met		Cumulative	LE		Tubing Materi	ar & Type:		1 (c	ALE VAL	/ DEDICATED
	Volume	Volume	DTW	Purge Rate		Temp	Cond	DO	ORP	Clarity/Color
Time	Purged (liters)	Purged	(btc)	(L/min)	рН	(°C)	(µS/cm)	(ppm)	(mV)	Other Remarks
	(inters)	(liters)								
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1323			29.65	0.2	6.25	13.57	(90	6.71	126.1	Clear
1326			29.91	0.2	6.29	13.65	191	6.04	59.5	,
1329			29.91	6.15	6.28	13.77	186	4.15	53.7	
				0.15		13.78		2.83		
1332			29.91	0.13	6.27		184	1	55.0	/
133)			29.91		6.27	13.77	182	2.98	57.5	
1378			29.91		6.26	13.78	180	189	59.4	
		1 m				_				
	· · ·									
			•	-						
		4	-		PURGING					
ample ID:		mw.	-3	Sampling Flo		0.15		Analytical Lab		HPex
ample Time:		130		Final Depth t		29.9	Cites Cine	Did Well Dewa		NO
lo. of Contair				Analysis/Met	nod		Filter Size	MS/MSD	Duplicate ID	
28	1C Pul	He	21		.1-1	N				(
340	pul		RI	L	locs	N	-			
			·····							
				,						
				NC	TES/ADDITION	IAL COMMENT	ſS			
										1.00

	La		A	Well ID:	mw	- 7		Job Number:		
MA	Case	adia		Client:	Nusta		1	Date:	2/19	119
	Case	adia		Project:		4 Gul	pt -	Sampler:	ĹW	
	Associate	es, LLC		Weather:	OVERCA	4	>°F	Time In/Out:	730/	810
1 143		~	2		WELL					
		Flush-mount/	/Stick-up	X	Well Diamete	er:	24	Depth to Free	Product:	
Monument Ty	ype:	Other:			Well Depth:			Free Product		
Monument Co	andition:		1		Depth to Wat	or:	11.51	Water Column		-
			602							
Well Cap Lock	(Present:	Yes No			Screened Inte	ervai:	<u>^</u>	Purge Volume		
Comments:	- /\ <b>A</b> /atam	iaht) V (Multin	lier) V /# Cosir		T					
Water height		eight) X (Multip	1-inch well =	and the second	2-inch = 0.16	2	4-inch = 0.65	2	1 gal = 3.785 li	tors
water neight	multipliers (	391):	1-Inch well =	0.041	PURGIN		4-inch = 0.65	3	1 gai = 3.785 li	lers
Purge Metho	d:	P	0		Pump Intake		/	ns		
Sampling Met			F		Tubing Mater			PL	NEW	/ DEDICATED
1 0		Cumulative			0			1-6		,
Time	Volume Purged	Volume	DTW	Purge Rate	nU	Temp	Cond	DO	ORP	Clarity/Colo
Time	(liters)	Purged	(btc)	(L/min)	рН	(°C)	(µS/cm)	(ppm)	(mV)	Other Remai
	(incroj	(liters)			Sec. 1					
					+/-0.1	+/-0.5 <b>°C</b>	+/-5%	+/-0.5 ppm	+/-20 mV	
747			11.5	0.2	6.60	12.71	505	5.62	98.4	CLAR
750			1154	1	6.55	13.22	513	2.64	49.1	1
			1150		1 ~1	13.44			28.4	
753			11.58		6.54		516	2.30	,	
756			11.62		6.54	13.46	1	1.34	24.2	¥
759			11.64		6.54	12.47	516	1.30	22.7	(
802			11.68		6.54	12.48	515	1.22	22.4	
002			11.40		6.17	19.48	217	1. 60	00-	
0- m.										
			1		PURGIN					1
Sample ID:			<u>v-7</u>	Sampling Flo			.2	Analytical Lab		Aprx
Sample Time:			00	Final Depth t		Field Filtered		Did Well Dew		NO
No. of Contain			rvative	Analysis/Met		riela rittered	Filter Size	MS/MSD	Duplicate ID	
	Idal		HZI	V V	5	N,				
2×		H	21	T	PH	N	-			
									I	
								1.		
		1		INC	DTES/ADDITIO	NAL COMMENT	rs		I	
			_							
	the second s	and the second se		and the second se				and the second sec	and the second se	

-	las alen	Sector State		Well ID:	MN			Job Number:		
	Casc	adia		Client:	Nusi	The second s		Date:	2/19	119
2	Associate	s, LLC		Project: Weather:	Vann			Sampler: Time In/Out:	1.822	alerice
Contraction of the second				weather.	WELLI		0	Time myOut.	Dra	18200
		Flush-mount/	Stick-up		Well Diamete		٤"	Depth to Free	Product:	
Aonument Ty	/pe:	Other:	1		Well Depth:		-	Free Product 1	hickness:	-
Monument Co	ondition:	an	X		Depth to Wat	er:	18.39	Water Column	Length:	
Vell Cap Lock	Present:	YERK			Screened Inte	rval:	-	Purge Volume	:	-
Comments:										
			lier) X (# Casin						2.1.	
Vater height	multipliers (ga	al):	1-inch well = (	).041	2-inch = 0.162		4-inch = 0.65	3	1 gal = 3.785 l	iters
urge Method	d:	ŀ	20		Pump Intake I			M		
Sampling Met			TF	10.00	Tubing Mater		LE	WE	NEW	/ DEDICATED
	Volume	Cumulative				3				
Time	Purged	Volume Purged	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
	(liters)	(liters)	(500)				(po) (iii)	(5511)	(1117)	
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
2825			18.37	0.15	6.51	12.47	110	10.24	33.7	clear
0828		4	18.35	1	6.37	12.27	85	9.44	65.4	8
831			18.36		6.32	12.32	79	9.10	81.7	
834			18.36		6.28	12.50	77	878	100.6	d
837			1123(	1	124	17.68	72	8.75	106.9	1
	1000	N	18.36		6.28		74	PIA	107.9	
840			18.30	NV.	0.28	12.66	74	0-07	10/9	
NN 72 4										
			12.							
							,			
	off i									
							1.00			
			A Distance		PURGING	G DATA			30	
ample ID:		MV		Sampling Flov		0,	15	Analytical Labo		APIX
ample Time: No. of Contair		0		Final Depth to		IS.	<b>3</b> Filter Size	Did Well Dewa		NO
NO. OF CONTAIN	ers/Type	Preser	vative	Analysis/Met		Field Filtered	Filter Size	MS/MSD	Duplicate ID	
<u></u>	TUM	11	IICA	- Fr	M	N			and the second	
2	XIC	- H	C(	5-1-1-	IPH					
							<b></b>			
E.										
				NO	TES/ADDITION	IAL COMMENT	S			

	Same in	112		Well ID:	MU	v-11		Job Number:		
	Casc	adia		Client:		ytar		Date:	2/19	19
	Associate	es, LLC		Project:		hntx	GwM	Sampler:	in	00/
and the second second		-		Weather:	Rai	JATA	-	Time In/Out:	910	935
		Flush-mount/	Stick-up		Well Diamete		2"	Depth to Free	Product	~
Monument Ty	/pe:	Other:			Well Depth:		-	Free Product		
Monument Co	andition:	otilet.	0.1		Depth to Wa	tor	17.20	Water Colum	The second second	~
Well Cap Lock	/	Yes No	Ded		Screened Inte		17.29	Purge Volume		
Comments:	i resent.	<u>FC3 110</u>			Screened ind	erval.	-	Fulge volume		
	e = (Water He	ight) X (Multip	lier) X (# Casir	ng Volumes)						
Water height	multipliers (g	al):	1-inch well ≐	0.041	2-inch = 0.16	2	4-inch = 0.65	53	1 gal = 3.785 l	iters
					PURGIN					
Purge Method		- FP			Pump Intake		N	1S		
Sampling Met	hod:	Cumulative	LF		Tubing Mate	rial & Type: T	L	DPE	NEW	)/ DEDICATED
There	Volume	Volume	DTW	Purge Rate		Temp	Cond	DO	ORP	Clarity/Co
Time	Purged (liters)	Purged	(btc)	(L/min)	pH	(°C)	(µS/cm)	(ppm)	(mV)	Other Rem
	(	(liters)			+/-0.1	10.5.90	150	105	100.00	
9.2			17 26	6.10		+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
917			17.35			13.47	186	4.50	48.5	ele
920			17.36		6.51	14.10	179	1.44	38.7	
923			17.36		6.51	14.11	179	1.36	37.1	
926			17.36	N'	6.50	14.13	179	1.26	35.2	V
			65 B			1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		· · · · · · · · · · · · · · · · · · ·		
1	•									
2										
1.1	20. 20				PURGIN	G DATA				
Sample ID:		Mu		Sampling Flo		0.15		Analytical Lab		AP.
Sample Time:			30	Final Depth		17.36	370	Did Well Dewa	V	16
No. of Contair	ners/Type	Preser	vative	Analysis/Me	1	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
LX1	6	, P	ru -	TY		N.		I		
3)	CYDAL	HC	1		VOCS	N				
						1				
						2				
	1.1	1. 1. 1	- ME - M							
	-			N	OTES/ADDITIO	NAL COMMENT	rs			

		1		Well ID:	Mu	1-1		Job Number:	1	
NZ	Case	adia		Client:	Nust			Date:	2/19	
	Associat	Luuia		Project:		ex Ge	M	Sampler:	211	
- the star	Associat	es, LLC		Weather:	Pari	n, 46°		Time In/Out:	940	11010
						DATA		Time my out.	-	11010
		Flush-moun	t/Stick-up		Well Diamete	er:	Zu	Depth to Free	Product:	
Monument T	ype:	Other:			Well Depth:			Free Product		
Monument C	ondition:		0		Depth to Wa	ter:	16.43	Water Colum		
Well Cap Loc	Present:	Yes No	good		Screened Inte		10.95	Purge Volume		$\vdash$
Comments:					Screened ind			Pulge volume		
Purge Volume	e = (Water He	eight) X (Multi	plier) X (# Casi	ng Volumes)	T					
Water height			1-inch well =		2-inch = 0.16	2	4-inch = 0.65	3	1 gal = 3.785	litors
				0.011	PURGIN		4-11101 - 0.03	5	1 gai - 5.765	illers
Purge Metho	d:		PP		Pump Intake	Depth:	M			
Sampling Met	thod:		LF		Tubing Mater		1	DPE	NEW	/ DEDICATED
	Volume	Cumulative								
Time	Purged	Volume	DTW	Purge Rate	рН	Temp	Cond	DO	ORP	Clarity/Co
	(liters)	Purged (liters)	(btc)	(L/min)		(°C)	(µS/cm)	(ppm)	(mV)	Other Rem
		(incers)			+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
943			16.44	DIC				+/-0.5 ppm	1	
			1	0.15		13.68	2	188	8	cear
946			16.45		6.53		4	141	141-4-1	
949			16.45		6.44	14		0,70	86	
952			16.48		28	1 95	234	1.31.5.5	88.6	
955			1 1		/	7	233	10 × 1	-	1
958			16.45		V		· · · ·	0.61	89.7	
150			164	V	6.31	13.94	233	56	90.9	V
										1
		L			BUE SU	DAT				
Sample ID:			10 0 1	Sampling Flou	PURGING		0,15	Appletical		1.00
Sample Time:		yv\	wit	Sampling Flov Final Depth to				Analytical Labo		APRX NO
No. of Contain	ers/Type	Preser	vative	Analysis/Meth		Field Filtered		Did Well Dewa MS/MSD	ter: Duplicate ID	100
21	Yon	F	71		/// /	k	THE JILE		Suplicate ID	NOT THE REAL PROPERTY AND ADDRESS OF
77	in	1	101	V	4					
2X	1.1	He	1	1	plt	IV	Constant and the second se	and shere the case of the second second		
		2								
			1.1.2							
				NOT	ES/ADDITION	AL COMMENT	S			

					-	IG DATA SHI	EET			
n.L		200 . S		Well ID:		v-2		Job Number:	,	
	Casc	adia		Client:	Nust			Date:	2/19/	19
	Associate	es, LLC		Project:		Nrex C	IWM	Sampler:	La	/
- Andrew State		~		Weather:	Rain	140		Time In/Out:	1020/	1110
		Flush-mount	Stickup		Well Diamete		2"	Depth to Free	Product	
Monument Ty	pe:		Suck-up			:1.				
		Other:	1		Well Depth:		27	Free Product		-
Monument Co		jo.	7		Depth to Wat		27.94	Water Columr		
Well Cap Lock	Present:	Yes No			Screened Inte	erval:	-	Purge Volume	:	~
Comments:	0.0.0	·							_	
Water height r		ight) X (Multip	1-inch well =		2-inch = 0.16	2	4-inch = 0.65	3	1 gal = 3.785 li	tors
water neight i	nutipliers (g	ai).	1-IIICII Well –	0.041	PURGIN		4-11101 - 0.05		1 gai - 3.763 li	
Purge Method	:		PP		Pump Intake			MS		
Sampling Meth	hod:		LF		Tubing Mater	the second second second	4	>PE	NEW,	/ DEDICATED
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remark
					+/-0.1	+/-0.5 ° <b>C</b>	+/-5%	+/-0.5 ppm	+/-20 mV	
1027			27.94	0.15	6.11	13.85	182	5.46	119.1	clea
1030	· · ·	-	27.99	1	6.09	13.89	183	4.09	127.6	1
1033			28.00		6.07	13.9	185	3.53		
				1 /		13.94	107	1.92	125.7	
1036			28.00		6.06		101			
1039			25.01	<b>V</b>	6.01	13.94	189	1.69	127.6	
1642			28.01		6.05	13.98	192	1.14	130.1	
1245			28.01		6.04	13.99	193	1.09	131.7	/
1048			28.01		6.04	13.99	192	1.01	132.7	V
1070			20.01						1000	
						· · · · · · · · · · · · · · · · · · ·				
										9
		1			I PURGIN	G DATA				
Sample ID:		M	W-2	Sampling Flo		0.	15	Analytical Lab	oratory:	Anex
Sample Time:			MD	Final Depth t		28	.01	Did Well Dew		ND
No. of Contain			rvative	Analysis/Met	hod	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
7.X	lL		HCI	2	PH	N	-			
21	40-1	L	M		065	N	-			
71	1- INL	F	101	V		,				
				and the series	N. 1					,
1										
				NC	TES/ADDITIO	NAL COMMEN	TS			
						1				
		-	-							

Vannex GWM Nustar LN Project: Client:

Date: 2/18/19 Permit:

L	-0				
Well ID:	Time:	DTP:	DTW:	Product Thickness:	Notes:
MW-10	758	_	18.42	-	
MW - 6	0808		16.99	-	
MW-7		-	11.41	_	
MW-5D	0813	-	6,43	. (	
MW-5		_	16.70		
MW-8	0817		17.28		
MW-8D			17.59	1	
MW-9	0820	~	19.13		D
MW-02	0827		28.04	-	
March -4	6832	$\sim$	30.04	~	
Mw-3	0835	_	28.94		
MW-11	0837	-	17.27		
ihw-1	0840		16.51	1	
Phi -					
				- Samuel	
		-			

Sampler:

	1.6.1	1.1.1		WELL	MONITORIN	IG DATA SHE	EET			
4				Well ID:	mu	) - (0		Job Number:	1	
13	Case	adia		Client:	NuSto	N Va	nner	Date:	5/20	1
	Associate	uulu		Project:	Van			Sampler:	144	VINW
	Associate	es, LLC		Weather:	Overca	st		Time In/Out:	10 2	5-1050
		(			WELL	DATA				
	1.1.1	Flush-mount	Stick-up		Well Diamete	er:	2"	Depth to Free	Product:	-
Monument Ty	ype:	Other:			Well Depth:		-	Free Product T	hickness:	-
Monument Co	ondition:	Good			Depth to Wa	er:	1499	Water Column	Length:	~
Well Cap Lock		Yes No			Screened Inte		1111	Purge Volume		
Comments:	Triesent.	Tes NO			Screened into			i urge volume		
		ight) X (Multip	lior) V (# Casi						1 20.00	
	multipliers (g		1-inch well =		2-inch = 0.16	2	4-inch = 0.65	3	1 gal = 3.785 li	iters
water neight	Inducipaters (g	ai).	T-IIICII Weil -	0.041	PURGIN		14-inch = 0.05	5	1 gai - 5.705 i	
Purge Metho	d:	P	0		Pump Intake	1000-0000	T	ms	0	
Sampling Met			LC		Tubing Mate		10	PE	NEW	/ DEDICATED
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1003	2tm		14.32	0.2	6.28	13.1	668	6.6	243.6	Clear
Innl.	all	1	1465	- 1	1. 32	137	661	11	7220	-
1000			19.63		1 01	10 0	401		1000	-
1010			14.14	2	6.36	13.2	450	0.57	160.5	K
1013	16		14.96	TORAL ST.	6.30	13.5	640	0.40	94.6	1
1016	2012		14.46		4.35	BU	1.39	0.37	79.5	
	15.58		1.14		1.20	17 1	638	0 20	117	
1019			1100	V'	6.30	15.9		0.54	64.3	
1022			14.90		6.39	13.5	627	0,32	53.0	4
	1. A. S.		. ,	*				1000		
			-	1 Street		1				
			1							
	. Sec				and the state					
			1000							
				1		G DATA	1	1		A
Sample ID:		INW	-06	Sampling Flo			M	Analytical Lab		Agex
Sample Time:		102	5	Final Depth t		191	11	Did Well Dewa		N
No. of Contai	ners/Type	Prese	rvative	Analysis/Met		Field Filtered	Filter Size	MS/MSD	Duplicate ID	
JX	.40	H	l	NO	C	N.				
ZX	IL	110	1	T	214	N				
	1.14 (1.1.11)									
		- · ·						1		
							1.0			S
				NC	DTES/ADDITIO	NAL COMMEN	TS			
			1.14							
	1999									
	~								2.00	

						G DATA SHE	EEI			
MA		1.1		Well ID:	mw -		1	Job Number:		
744	Case	es, LLC		Client:		R Va	nnex	Date:	5/20/19	
-	Associat	es. IIC		Project:	Gwn			Sampler:	LWIS	
- Aller	7.5300101			Weather:		cast		Time In/Out:	10701	1130
					WELL					
Monument Ty	pe:	Flush-mount/	Stick-up		Well Diamete	r:	24	Depth to Free		
	PC.	Other:			Well Depth:			Free Product	Thickness:	
Monument Co	ondition:	Gri	ed		Depth to Wate	er:		Water Colum	n Length:	-
Well Cap Lock	Present:	Yes No	Nen	1	Screened Inte	rval:	-	Purge Volume	:	
Comments:				5.0 2.4			27.00			
Purge Volume	= (Water He	eight) X (Multip	lier) X (# Casir	ng Volumes)		The second				
Water height i	multipliers (g	gal):	1-inch well =	0.041	2-inch = 0.162		4-inch = 0.65	3	1 gal = 3.785 li	ters
					PURGING					
Purge Method		P	P		Pump Intake [			ns	-	
Sampling Met	hod:		LF		Tubing Mater	al & Type:	LI.	PPC_	NEW	/ DEDICATED
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Col Other Rema
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	an a
1107			26.05	0,25	6.70	14.5	161.4	3.22	56.5	cie
1110			26.06	07	650	14.5	159.3	6.78	697	i
1112			26.07	I	1 11	14.1	158.7	0.55	71. 2	
1113		. 9	11.2		6.41	11.4			200	
1116			ROT		6.36	14.5	1627	0,43	80.8	
1119				V		- 3ª	A to a			¥
								100.248.05		
								18 8 Star		
					- 18 C					
										•
					PURGING	G DATA	1			
Sample ID:		mu	v-3	Sampling Flo	w Rate:	0.	2	Analytical Lab	oratory:	AP
Sample Time:		11	20	Final Depth t		26	.07	Did Well Dew		
No. of Contair	ners/Type	Prese	rvative	Analysis/Met	hod	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
21	(40		171	107	S	· ••••				
iv	11		1471	TPF	F					
	14		1101					•		
										13 - N
			· .							
				NC	TES/ADDITION	AL COMMEN	TS			
					3					

Cascadia Associates, LLC e: Fluth-mount/Stick-up Other: dition: resent: Ves No (Water Height) X (Multiplier) X (# C ultipliers (gal): 1-inch we volume Purged (liters) Cumulative Volume Purged (liters) DTW	Well ID: Client: Project: Weather: Casing Volumes) ell = 0.041	WELL Well Diameter Well Depth: Depth to Wat Screened Inter 2-inch = 0.16	tan v n rcast DATA er: ter:	2" 2" Ho.71	Job Number: Date: Sampler: Time In/Out: Depth to Free Free Product T Water Column	Thickness:	1.1215
Associates, LLC e: Fluth-mount/Stick-up Other: dition: resent: Ves No (Water Height) X (Multiplier) X (# C ultipliers (gal): 1-inch we od: Volume Purged Volume Purged (liters) Purged (btc)	Project: Weather: Casing Volumes)	(16) A WELL Well Diameter Well Depth: Depth to Wat Screened Inter 2-inch = 0.16	DATA er:	2"	Sampler: Time In/Out: Depth to Free Free Product T Water Column	Product:	1/215
Associates, LLC e: Fluth-mount/Stick-up Other: dition: resent: Ves No (Water Height) X (Multiplier) X (# C ultipliers (gal): 1-inch we od: Volume Purged Volume Purged (liters) Purged (btc)	Weather:	Well Diameter Well Diameter Well Depth: Depth to Wat Screened Inter 2-inch = 0.165	DATA er: ter:	~	Time In/Out: Depth to Free Free Product T Water Column	Product: Thickness:	1/215
e: Fluxe-mount/Stick-up Other: dition: resent: Ves No (Water Height) X (Multiplier) X (# C ultipliers (gal): 1-inch we od: Cumulative Purged Volume DTW Purged (btc)	Casing Volumes)	Well Diameter Well Diameter Well Depth: Depth to Wat Screened Inter 2-inch = 0.165	DATA er: ter:	~	Depth to Free Free Product T Water Column	Product: Thickness:	11215
e: Other: dition: resent: (Water Height) X (Multiplier) X (# C ultipliers (gal): 1-inch we Dd: Volume Purged (liters) Purged (btc)	and the second sec	WELL Well Diameter Well Depth: Depth to Wat Screened Inter 2-inch = 0.16	DATA er: ter:	~	Free Product T Water Column	Thickness:	
e: Other: dition: resent: (Water Height) X (Multiplier) X (# C ultipliers (gal): 1-inch we Dd: Volume Purged (liters) Purged (btc)	and the second sec	Well Depth: Depth to Wat Screened Inte 2-inch = 0.16	ter:	~	Free Product T Water Column	Thickness:	
e: Other: dition: resent: (Water Height) X (Multiplier) X (# C ultipliers (gal): 1-inch we Dd: Volume Purged (liters) Purged (btc)	and the second sec	Depth to Wat Screened Inte 2-inch = 0.16			Free Product T Water Column	Thickness:	
dition: resent: (Yes) No (Water Height) X (Multiplier) X (# C ultipliers (gal): 1-inch we od: 7/ Volume Cumulative Purged Volume DTW Purged (liters) Volume (btc)	and the second sec	Depth to Wat Screened Inte 2-inch = 0.16		26.71	Water Column		
resent: (Yes) No (Water Height) X (Multiplier) X (# C ultipliers (gal): 1-inch we od: Volume Purged (liters) Purged (btc)	and the second se	Screened Inte		26.71		Length:	
(Water Height) X (Multiplier) X (# C       ultipliers (gal):     1-inch we       od:     7       volume     Cumulative       Purged     Volume       (liters)     Purged	and the second se	2-inch = 0.16	erval:		Dung - 17-1		
ultipliers (gal): 1-inch we Dd: 7 Volume Cumulative Purged Volume DTW (liters) Purged (btc)	and the second se				Purge Volume	:	
ultipliers (gal): 1-inch we Dd: 7 Volume Cumulative Purged Volume DTW (liters) Purged (btc)	and the second se						
od: Volume Purged (liters) Volume Purged Volume Purged (btc)	ell = 0.041						
od: Volume Purged (liters) Cumulative Volume DTW Purged (btc)		PURGIN	2	4-inch = 0.65	3	1 gal = 3.785 li	iters
od: Volume Purged (liters) Cumulative Volume DTW Purged (btc)		1 ONOIN	G DATA				
Volume Purged (liters) Cumulative Volume Purged (btc)		Pump Intake	Depth:	N	r S		
Volume Purged (liters) Cumulative Volume Purged (btc)	e	Tubing Mater		LDA	P	NEW	/ DEDICATED
Purged Volume DTW (liters) Purged (btc)							
(liters) Purged (btc)	Purge Rate		Temp	Cond	DO	ORP	Clarity/Cold
(liters)	(L/min)	рН	(°C)	(µS/cm)	(ppm)	(mV)	Other Rema
(110010)							
		+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
21.2	2 0.2	6.24	16.2	1333	6.44	123.3	l
01-				1Ca.		99.7	1
26.7	4	6.40	14.2	131.4	6.39		
		6.10	13.2	13.6	6.10-	114.7	
		1006	177	15111	5.65	1192	
			1 2 1	1) 4.	5,00	111.2	
Y	₩.	6.00	13,1	154.0	5.47	123.4	
		6.00	132	1539	45	1244	L
		10-0 N	1 9.0	177,1	1-	/ -/.E	
						· · ·	
	6						
		DUDCIN	C DATA		<u> </u>		L
h 1 11			G DATA	2			<i>A</i>
			0		1		- Re
and the second se				-			.00
s/Type Preservative	Analysis/Met	thod	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
L HON	1	[F+1					
ID Ity		665					
10 1101	V						
					,		
	NC		VAL COMMENT	TS .	L		
			L L CONTRIENT	-			
			1. E. S.				
	Mh-4 //200 rs/Type Preservative L HCA /D HTA	And Y Sampling Flo Trs/Type Preservative Analysis/Me L ID ID ID ID ID ID ID ID ID ID	Image: State of the state	Image: State of the state	Image: Sampling Flow Rate:       0       7       153.4         Image: PURGING DATA       Image: Sampling Flow Rate:       0       7         Image: Sampling Flow Rate:       0       7       2         Image: Sampling Flow Rate:       0       7       2         Image: Sampling Flow Rate:       0       7       7         Image: Sampling Flow Rate:       0       7       7         Image: Sampling Flow Rate:       0       7       7	Image: Strain of the strain	Image: State of the state

				Well I	-	mw	IG DATA SHE		Job Number:		
NE	Case	adia		Client:			vanne	X	Date:	5/2011	9
	Associate			Projec	:t:	GWI		13	Sampler:	LW	1
-	Associate	35, LLC		Weath	ner:	Grera	ast		Time In/Out:	12201	1250
State of the		$\cap$				WELL					
Monument Ty	/ne:	Flush-hount/	'Stick-up			Well Diamete	r:	24	Depth to Free	Product:	
inonument r	, pc.	Other:				Well Depth:		~	Free Product	Thickness:	~
Monument Co	ondition:	200	1			Depth to Wat	er:	24.66	Water Colum	n Length:	
Well Cap Lock	Present:	es No			$\mathcal{T}_{\mathcal{T}}}}}}}}}}$	Screened Inte	erval:		Purge Volume	e:	-
Comments:			line in								
Purge Volume	e = (Water He	ight) X (Multip	lier) X (# Casir	ng Volu	mes)						
Water height	multipliers (g	al):	1-inch well =	0.041		2-inch = 0.162		4-inch = 0.65	3	1 gal = 3.785 lit	ers
			50			PURGIN			1 (		
Purge Metho Sampling Met		ii	11			Pump Intake Tubing Mater			DPT DPT	NEVO	
sampling we		Cumulative	LL	T		Tubing Mater	lai & Type:		T	NEVO	/ DEDICATED
Time	Volume Purged '(liters)	Volume Purged (liters)	DTW (btc)	1	e Rate min)	рН	Temp (°C)	Cond ( <b>µS/cm)</b>	DO (ppm)	ORP (mV)	Clarity/Colo Other Remar
		(incers)				+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1726			24.66		5.1	5.94	14.2	157.1	452	142.9	Clear
1779					F		141		DVI		lear
1661			24.68	-	<u> </u>	5.82		189.3	0.86	146.4	
1232			2469			5.80	14.1	(89.4	0.54	140.1	
1235			24.70	20		5.78	14.1	188.0	0.43	149.4	
1238				19							
10.00				,	$\overline{V}$				44 - 14		
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		ļ									
											1.12.11
								1			
								+			
		· · · ·	<u> </u>	<b> </b>							
			Consector.								
						PURGIN			T		A La Gas
Sample ID: Sample Time		mu	-			ow Rate: to Water:	0.2	72	Analytical Lab Did Well Dew		TIPCA
No. of Contai			rvative	-	sis/Me		Field Filtered		MS/MSD	Duplicate ID	NU
	XIL	1			TF	>11	licia interea			Dupiloute in	
2:1			21	+	1	+1	-				
34	Jonl	He	1		10	5					
1					1						
						1	- Alter				
			1.1								
								-		11	
					NI		 NAL COMMEN <sup>-</sup>				424
						JIES/ADDITIO	NAL COMINIEN	15			
										S	1
							i an i			~	1
L											1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

4	- 1			Well ID:	MW	-7		Job Number:		
MA	C	a dia		Client:	Nustan		wet	Date:	5/201	19
	Casc	aala		Project:	GW			Sampler:	Line	
71	Associate	es, LLC		Weather:			lain	Time In/Out:	1300/	1330
				weather.	WELL		CAIN	Time myout.	13001	152-
		Flush-mount/	Stick up		Well Diamete		24	Depth to Free	Producti	
Aonument Ty	pe:		Suck-up	_		1.				
	1	Other:			Well Depth:			Free Product	Thickness:	**************************************
Monument Co	ndition:	8	609		Depth to Wat	er:	7.94	Water Colum	n Length:	5
Well Cap Lock	Present:	Yes No			Screened Inte	erval:	(	Purge Volume		_
Comments:	1 14 34				1.1.1.1					Contrast 1
urge Volume	= (Water He	ight) X (Multip	lier) X (# Casir	ng Volumes)		10 C	Sec. 2			and the second
Vater height r			1-inch well =		2-inch = 0.162	2	4-inch = 0.65	3	1 gal = 3.785 li	ters
		/			PURGIN				1-0-	
urge Method			PP		Pump Intake	Depth:		MS	$\bigcirc$	
ampling Meth		1.32	10		Tubing Mater	-	1.1	DPE	-NEW	/ DEDICATED
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remark
		(incers)			+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1200			20.	6 A				1		. 1
1309			7.94	0.2	6.38	13.4	436.9	1	126.7	cleer
1312			7.98		6.41	13.3	436.2	0.95	124.4	1
1315			8.01		6.43	13.4	435.4		1222	
			0 (		1 . 7		1	0.40		
1318			8.04		6.43	13.3	434.6		121,0	
1321			X.07	V	6.43	13.3	434.3	0.37	120.8	J.
										A CONTRACTOR
										Service and the
-										
		1.1.2								
									· · · · · ·	
					PURGIN	G DATA				
ample ID:		mw	-7	Sampling Flo			127	Analytical Lab	oratory.	AREV
ample Time:			20	Final Depth t		. 8.	11	Did Well Dew		ACO
lo. of Contain	ers/Type		rvative	Analysis/Met		Field Filtered	Filter Size	MS/MSD	Duplicate ID	10 0
		1	Le i			neiu mitereu	i liter Size			
28	.10	t	TU_	-14	+1					
24	youl	It	71		OLS					
					- #					
									1	
							, TC			
				NC	DTES/ADDITION	NAL COMMEN	15			
				101-13						

A. Bar					MONITORIN	G DATA SHI	EET			
MA	1			Well ID:	hu	J - 11		Job Number:	1	1
24	Case	adia		Client:	Nusta	v Va	nnex	Date:	1.1/	115/21
21	Associate	es, LLC		Project:	GWM	1		Sampler:	Jul	LW
				Weather:	P+ ()	ady		Time In/Out:	041	OBC
1.5					WELL					
Monument Ty	vpe:	Flush-mount/	Stick-up		Well Diamete	r:	-l	Depth to Free		
1.1.1.2		Other:	and the second second		Well Depth:		-	Free Product	Thickness:	
Monument Co	ondition:	Good	20 - A.M.		Depth to Wat	er:	13.09	Water Colum	n Length:	
Well Cap Lock	Present:	Yes No			Screened Inte	rval:	~	Purge Volume	2:	
Comments:	Newh	Lel Co	P							
urge Volume	= (Water He	ight) X (Multip	lier) X (# Casir	ng Volumes)		6.2	1.24			
Vater height	multipliers (g	al):	1-inch well =	0.041	2-inch = 0.162	2	4-inch = 0.65	3	1 gal = 3.785 l	iters
					PURGIN	G DATA	<u> </u>			
Purge Methoo			PP		Pump Intake I	Depth:	Mid	Suren		
ampling Met	hod:	FP	Low	Flow	Tubing Mater	ial & Type:	LDP	E	NEW	/ DEDICATED
	Volume	Cumulative								
Time	Purged	Volume	DTW (hts)	Purge Rate	pН	Temp	Cond	DO	ORP	Clarity/Color
	(liters)	Purged (liters)	(btc)	(L/min)	A	(°C)	(µS/cm)	(ppm)	(mV)	Other Remarks
		(incers)			+/-0.1	+/-0.5 °C	· +/-5%	+/-0.5 ppm	+/-20 mV	
1.11			INKG	0.2	1.12	11 [1]			1920	
1.11			1309	0.2	4.72	14.0	192.0		101	- clea
1:30					6.48	14.6	197.6	0.53	193.5	1
7:33					6.37	14.0	192 5	641	1985	
131				1	1.19	110	197 1	0.35	100 5	
100				V	U.VI	1910	1164	0.00	100,2	V
1:31					10,27	14.0	191.5	0.52	174.8	
1				1.1						
			-	in the						
								7072	1	
								1		
1.5				,						
										· · · · ·
					PURGINO	G DATA		I	1	
ample ID:		Mu	1-1	Sampling Flo		0.21	1 Inchi	Analytical Lab	oratory	Anor
ample Time:	1.1	0140		Final Depth to			g frank	Did Well Dew		Aller
lo. of Contair		Preser	vative	Analysis/Met		Field Filtered	Filter Size	MS/MSD	Duplicate ID	
17	40	ILA	0	100		N				· · ·
JX	1 1	T	AL	VUC	6				2	
Lx	12	HU	L	TY	T	N	-			
									SAL MARK	
					1					
				NO	TES/ADDITION	IAL COMMENT	rs			
							(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)			

*	Case	cadia es, LLC		Well Clier Proje Wea
		6		wea
		Flush-mount	Stick-up	
Monument T	ype:	Other:		
		Other.	7	-
Monument C		10	202	
Well Cap Loci	k Present:	Yes No		
Comments:				
Purge Volume	e = (Water He	eight) X (Multip	lier) X (# Cas	sing Vol
Water height	multipliers (g	gal):	1-inch well	= 0.041
Purge Metho		PP,		
Sampling Me	thod:		zw7/c	m
	Volume	Cumulative Volume		Der
Time	Purged	Volume Purged	DTW (htc)	Pur
1000	(liters)	(liters)	(btc)	(L,
		(incers)		
Manz			14.28	
$\frac{100}{200}$			14.00	0:
0806				1
0829				
an in		· · · · · · · · · · · · · · · · · · ·		
UDIL				
0815				
ARIZ			V	
0010				
				_
		3.22		
Sample ID:		Mh)-1	1	Samp
Sample Time:		0815	)	Final
No. of Contain	ners/Type	Prese	rvative	Analy
3.1	100	1)A	0	A
A	10	- HC	<u>k</u>	
200	L	4	L	<
· · · · ·				
-				
		1		_
				_

X	Cascadia Associates, LLC							
					WELL	DATA		
Monument Ty	/pe:	Flust-mount/	Stick-up		Well Diameter: Well Depth:			
	-	Other:	,	and the second second				
Monument Co	ondition:	98	bod		Depth to Water:			
Well Cap Lock	Present:	Yes No			Screened Inte	erval:		
Comments:					T			
		eight) X (Multip			2: - 0.10			
Water height	multipliers (g	gal):	1-inch well =	0.041	2-inch = 0.162 PURGIN			
Purge Method	d.	T	DP		Pump Intake			
Sampling Met		20175	IF	res a	Tubing Mater			
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)		
		(110010)			+/-0.1	+/-0.5		
0910			1481	0.25	8.20	121		
70.2			11/51	Urmr	211-	14.		
0712			14.01		1.40	12.		
0916		26.210	14.81		6.94	12.		
0419		4	14.01		6.75	12		
10122			14.81		6.46	12.8		
0120					1,42	inx		
0921			14.01		1 27	16-0		
0428			14.01		6134	14		
0.931			1481		6.27	12.8		
0934			14.81		6.22	(2		
		-						
		1.1						
					PURGIN	G DATA		
Sample ID:		MW	-10	Sampling Flo		,		
Sample Time:		09	30	Final Depth		1		
No. of Contai	ners/Type	Prese	rvative	Analysis/Me	thod	Field Filt		
50	40	ITC	1	V	IOCS	N		
ZX	11	P	TC1	1	24	N		
				N	OTES/ADDITIO	INAL COM		

		Section 1		Well ID:	mw	-SN		Job Number:		
MA	C			Client:		K Van	md X	Date: 5/21/19		
	Lasc	adia		Project:		ik Van	111	Sampler:		$()\omega$
2	Associat	es, LLC						· · · · · · · · · · · · · · · · · · ·	0840	
and the second		0		Weather:	Sur WELL			Time In/Out:	040	10910
			/C+:-!		1		24	Dauth ta Fran	Daviduati	
onument Ty	pe:	Flush-mount/	/ Stick-up		Well Diamete	er:	24	Depth to Free Product:		
Other:		1.		Well Depth:			Free Product	Thickness:		
lonument Co	ondition:	hco	102 - V	nissing	Depth to Wa	ter:	12.68	Water Colum	n Length:	- /.
/ell Cap Lock	Present:	Yes Ato	1	tab 8	Screened Inte	erval:		Purge Volume	5:	- /
omments:				1-0						
	= (Water He	eight) X (Multip	lier) X (# Casir	volumes)	T	[				
1000.00	multipliers (g	the second s	1-inch well =		2-inch = 0.16	2	4-inch = 0.65	2	1 gal = 3.785 lit	ers
deer neight i	indicipiicits (g	5017.	I men wen	0.041	PURGIN		4 Inch = 0.05	5	11 gal - 5.765 m	
Irge Method	:		PP		Pump Intake	and the second se	m	5	1.0	
mpling Met		1 1 1	16		Tubing Mater		100	T	NEW	/ DEDICATED
		Cumulative						Construction		
Time	Volume Purged (liters)	Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (° <b>C)</b>	Cond ( <b>µS/cm)</b>	DO (ppm)	ORP (mV)	Clarity/Color Other Remark
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1844			12.68	0.2	6.89	14.0	246.0	3.78	515	cleab
6			1	1				the second secon		- CICUD
6847			12.69		7.00	13.9	249.5	3.96	44.	
1850			12.69		6.94	13.9	255.4	2.93	49.5	1
2/3		-	12/4		- W		259.6	2.09	51.3	4/
83/			12.69		6.93	13.9		2007		
) 856		- 4	12.69		6.91	13.9	265.1	1.61	53.3	
0859			12.69		6.91	13.9	266.5	1.59	53.3	at a
-271			1001	¥	Q . L !					
				, ,					<u>                                     </u>	
								4.1. · · · · ·	1	
									1	
									++	•
					PURGIN	G DATA		I		
mple ID:		in	N=5D	Sampling Flo		C	). 2	Analytical Lab	oratory:	Apex
mple Time:		0855		Final Depth t		12.0		Did Well Dew		NO
o, of Contain	ers/Type		rvative	Analysis/Met		Field Filtered	-	MS/MSD	Duplicate ID	
2 1/ /	D	11030	11-1	1/1	1/5				- apricate iD	
SXY	U		ITCI	VU	e,					
/ }	$\langle \rangle$	l r	101		1PH	<				
	,		·		1001					
								1. 1. Car		
				NC	TES/ADDITIO	NAL COMMEN	13			
					in the state					
							12			100 - 10 - 10 - 10 - 10 - 10 - 10 - 10
							No.			The Carl
		÷ _								

		1		WELL	MONITORI	NG DATA SHI	EET			
				Well ID:	MW.	- 5		Job Number:		-
34	Case	es, LLC		Client:	NIST	an Va	nnex	Date:	5/20	19
1	Associat			Project:		un		Sampler:		110
- marking	Associat	es, LLC		Weather:				Time In/Out:	6900/	0925
					WELL	DATA			10	
Manunant	1	Flush mount/	/Stick-up		Well Diamet	er:	2 <sup>n</sup> Depth to Free Product:			
Monument Ty	pe:	Other:			Well Depth:			Free Product	Thickness:	-
Monument Co	ndition:		1		Depth to Wa	tori	1211			
		0 0	b oc				15117	Water Columr		
Well Cap Lock	Present:	Yes No			Screened Int	erval:	-	Purge Volume	:	-
Comments:										
		eight) X (Multip								
Water height	multipliers (g	;al):	1-inch well =	0.041	2-inch = 0.16		4-inch = 0.65	3	1 gal = 3.785	iters
Duran Maral		1	~ ^		-	IG DATA				
Purge Method			PP		Pump Intake			MS		
Sampling Met	hod:		U		Tubing Mate	rial & Type:	60	PE	NEW	/ DEDICATED
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond ( <b>µS/cm)</b>	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
0906			13.11	076	6.80	14.0	356.0	7 19	69.2	char
000 4	·····		12 00	61	1.71		70111	0.11	67.0	aller
0901			12. 57	1/	6.72	14.0	3241	0.5,4	55.1	
092			14.05		6.7	13.9	352.1	0.42	45.9	
					PURGIN	G DATA				
ample ID:		M	1-5	Sampling Flov		0.25	2/min	Analytical Labo	oratory:	And
ample Time:		09	20	Final Depth to			IS DI	Did Well Dewa		nper l
No. of Contain	ers/Type	Preser	vative	Analysis/Met		Field Filtered	Filter Size	MS/MSD	Duplicate ID	10.0
ΛX	11	H	1	1	1011	1				
DI	· · ·	110	1	(	PH	N				
37	Yorl	H	21	1/	065	N	-			
					*					
									-	
										1
				NO	TES/ADDITIO	NAL COMMENT	S			
		-	-							
Contraction of				1 4 1						

÷.

				WELL	MONITORIN	G DATA SHE	ET			
				Well ID:	NAW	-P17	1	Job Number:		1
MA	Casc	adia		Client:	Nu.	Harv		Date:	5/7	1/15
	Casc	aala		Project:	GWN			Sampler:	LWD	W
T	Associate	s, LLC		Weather:	Sur			Time In/Out:	093	0-955
100		~			WELL I	DATA	10			
	E	Flush-mount/	tick-up		Well Diamete	r:	2	Depth to Free	Product:	
onument Ty	pe:	other:			Well Depth:		-	Free Product T	hickness:	-
	list	1			Depth to Wat	er:	13.25	Water Column	Length:	~
onument Co		1900U	The Car		Screened Inte			Purge Volume		_
ell Cap Lock	Present: /	Yes No	1		Screened Inte	IVal.		Turge volume	·	
omments:	A.	CIP								
		ight) X (Multipl	ier) X (# Casin	g Volumes)			4-inch = 0.65	2	1 gal = 3.785 lit	ers
ater height	multipliers (g	al):	1-inch well =	0.041	2-inch = 0.162 PURGIN		4-111011 - 0.05	5	1 gdi 5.705 iii	
		RG			Pump Intake		1	18	0	
urge Metho		11		1			10	DE	NEW	/ DEDICATED
mpling Met	thod:	Lon	s Flor		Tubing Mater	lai & Type.	CP	f		
	Volume	Cumulative Volume	DTW	Purge Rate	1. I.	Temp	Cond	DO	ORP	Clarity/Color
Time	Purged	Purged	(btc)	(L/min)	рН	(°C)	(µS/cm)	(ppm)	(mV)	Other Remarks
	(liters)	(liters)		(, ,						
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	1
1022			13.25	0.2	709	177	R73	4.17.	19,9	clear
100			1200	1	T.C.C.	62	BILL	3 105	29.2	1-1-2
136			15.85		6.99	IL.T_		10.9	CIL	
1939			13.05		6.78	12.7	86.7	3.64	43.1	
naun			1		6.86	12.7	86.3	3-77	47.6	-11
0772						115	015	3.63	40.8	
0945			Y		6.93	12.1	06.1			6
0948			V	St	6.96	127	87.4	3.53	40.4	0L
0.11										
Sec. Sec.										
	1.23								-	
			N .			÷			1	
								Sector 1		
							and the second second			
A COL										
									-	
					PLIRGI	NG DATA				
		M	CD	Sampling Fl		0.7	1 / 100 110	Analytical La	boratory:	ADex
Sample ID:		mw.	140	Final Depth		13				ACD
Sample Tim	the second se		ervative	Analysis/Me		Field Filtered		MS/MSD	Duplicate ID	
No. of Conta	ainers/Type	1 I N		Anarysis/ M					7	
07	c 210	H	<u> </u>	V	JU_					
2-	LIL	H	27	T	PH	<u> </u>				
6 )										
										· · · · · · · · · · · · · · · · · · ·
		_		N	OTES/ADDITI	ONAL COMME	NTS			
	_									
2			A	1. 8						
		14 C								

-4.2

				WELL	MONITORIN	IG DATA SHI	EET		1. 1. 50	
				Well ID:	MW.	-8		Job Number:	1	
102	Case	adia		Client:	Nust	an Va.	INX	Date:	5/2	1/1.9
				Project:	GINM			Sampler:	t j	win
	Associat	es, LLC		Weather:	Sun		11111	Time In/Out:	1005	- 1030
14	0	/	)		WELL	DATA				
	,	Elush-mount	Stick-up		Well Diamete	er:	1	Depth to Free	Product:	~
Monument Ty	vpe:	Other:	· ·		Well Depth:			Free Product 1	~	
	-	10-1					10 70			
Monument Co	ondition:	Good	to an		Depth to Wat	er:	13.1	Water Columr	Length:	
Well Cap Lock	Present:	Yes No	2		Screened Inte	erval:	-	Purge Volume	:	~
Comments:	100	Contraction of the	12						325	
Purge Volume	= (Water He	eight) X (Multip	lier) X (# Casir	ng Volumes)						
Water height	multipliers (g	gal):	1-inch well =	0.041	2-inch = 0.16	2	4-inch = 0.65	3	1 gal = 3.785 li	ters
	the second	and the last			PURGIN	G DATA		1	1 1 1 1 1	
Purge Method	d: 16	PP			Pump Intake	Depth:	M	2	5	
Sampling Met		15			Tubing Mater		LBP	8	NEW	/ DEDICATED
		Cumulative								
<b>T</b>	Volume	Volume	DTW	Purge Rate		Temp	Cond	DO	ORP	Clarity/Color
Time	Purged	Purged	(btc)	(L/min)	рН	(°C)	(µS/cm)	(ppm)	(mV)	Other Remarks
	(liters)	(liters)	1.53							
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1001			13.78	0.2	6.99	12.3	68.9	3.92	81.8	Clear
0			10.90		20.0					cue
1004				6.61	and the second	12.3	68,4	3,52	104.2	
1007			14.52	0.2	6.31	12.2	67.5	3.54	115.0	•
			14.70	1	6 1	10 0	110	3.57	1202	
1010			19.40		Q . 1	16.6	1 1 1		165.1	
1013					6.04	12.2	67.6	3.70	125.8	N
1015			14.75		5 99	12.2	65.7	3.71	1774	
013			11.17		10.10	1	10.1		10.1	
010					2.75	12.2	106-1	3.71	130.8	
								-		
12										
							- 1 K -			
						1.1				
					· ·					
	1									
		110		14						
	1 10		100 - 0-0		PURGIN	G DATA			- 2-1	
Sample ID:		M	W-8	Sampling Flo				Analytical Labo	oratory:	DOCK
Sample Time:	1.15		020	Final Depth t		14.7	-5	Did Well Dewa		N.
No. of Contair			rvative	Analysis/Met	and the second sec		Filter Size	MS/MSD	Duplicate ID	
	1013/ Type	110301	A Q		nou	neid nitered	Tinter Size	1013/10130	Duplicate 1D	
24	40	H	<u>u</u>	NC		N,				
2×	1L	14	U		PH	·N	-			
		60	1			10 1 N 10 1				
			A.77 1-0							
		and the	1			-				
			1							
				3						
									4.	
				NC	TES/ADDITION	NAL COMMEN	TS			
Sec. 15	1.									
					-					
				41 S. S.						

	Sec. 1 ( 198			WELL	MONITORIN	G DATA SHE	EET				
		and the second		Well ID:	MIN-	٩ .		Job Number:	1		
13	Case	adia		Client:	Nu 4	tar Na	mex	Date:	5/21	115	
	Cusc	adia es, LLC		Project:	GW	N		Sampler:	JULY		
	Associate	es, LLC	-	Weather:	Fun			Time In/Out: 1035 - 1.100			
	C	$\neq$			WELL	DATA		1521-17	1.00		
		Flush-mount/	Stick-up		Well Diamete	r:	2	Depth to Free	Product:	-	
Monument Ty	/pe:	Other:			Well Depth:		~	Free Product T	hickness:	-	
Monument Co	andition			7 7 7 7	Depth to Wat	or:	15 5	Water Column			
		Good					19.57				
Well Cap Lock	Present:	Mas No			Screened Inte	ervai:	~	Purge Volume			
Comments:	() A ( )	· 1 · 1 · 1 · 1 · · ·	1: 1. 1. 1. 1. C								
		ight) X (Multip	1					2	4 1 9 795 1		
Water height	multipliers (g	al):	1-inch well =	0.041	2-inch = 0.162 PURGIN	the second se	4-inch = 0.65	3	1 gal = 3.785 li	iters	
Purge Metho	4.	D C	9		Pump Intake	100 M (100 M (10	1	15			
Sampling Met		r i	TE		Tubing Mater		CDP	FI I	NEW	/ DEDICATED	
Sampling Met	.nou.	Cumulative	4	1		lat or type.			INLVV	1) DEDICATED	
	Volume	Volume	DTW	Purge Rate		Temp	Cond	DO	ORP	Clarity/Color	
Time	Purged	Purged	(btc)	(L/min)	рН	(°C)	(µS/cm)	(ppm)	(mV)	Other Remarks	
12131224	(liters)	(liters)									
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm 🧃	+/-20 mV	<u> </u>	
1038			15.52	0.2	6.12	13.5	82.5	4.17	127.4	clear	
1011			1	1		12 11	82.1			1	
1041					6.09	Det		4.18	130.2		
1044			V	d	6.06	13.4	82.4	4.06	133.j		
				V.						N	
			· · · · ·								
	-										
							100				
							1.6.1				
	-0		-								
					1 . A						
					PURGIN	G DATA					
Sample ID:		MW.	-9	Sampling Flo		0.2	~	Analytical Labo	oratory:	boex	
Sample Time:		1050	5	Final Depth t		15.5		Did Well Dewa		NO	
No. of Contain			rvative	Analysis/Met		Field Filtered		MS/MSD	Duplicate ID	11-	
2	ND		0 0		$\mathbf{x}$						
X	70	4	<u>u</u>								
1th	IL	H	U_	T	YHY	Z	-			-	
		. (									
				NC	TES/ADDITION	AL COMMEN	TS				
			2								
							1				
		- 1									

Project: Vannex GWM Client: NGStae Sampler: LW/JW

Date: 5/20/19 Permit:

Product Well ID: Time: DTP: DTW: Notes: Thickness: mw-6 0755 13.56 MW-7 0803 MW-8D 0806 3.90 MW-5D 0808 2.7 2 Missing 50 MW-508 \_ 501 9 14 MW-8 0X \_\_\_\_ Ś 3. 9 3 bolt Missing MN-9 9 -2 0% MW -4 MW-2  $\overline{}$ 0832 10 MW-3 26.03 - $\sim$ 3) MW-11 0842 -14 -A. 0850 ~ 13.22 MW-10 0854 14.76 / \_

				18-	
Project: Va Client: N Sampler: A	nnex u Ster	GWM			Date: 8/28/19 Permit:
Well ID:	Time:	DTP:	DTW:	Product Thickness:	Notes:
MW-4	0715	-	32.59		
MW-2	0720	-	30.63		bolt missing
MW-3	0727	-	31.51		/
162-11	0741	_	19.55		kolor kut no cuttine
NW-1	0746	-	19.04		
MW-le	0757	-1	19.66		
MW. 10	0812		21.02	-	
MW-7	0829	-	13.99		
MW-5T	0850		19.01		
MW-5	0855		19.31		
MW-8	0901		19.94		
NJ-8D	0906	-	20.21		
NW-9	0911	د	21.74		No bolty
	• •				
	£				
					5. C
			· · ·		



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Job No. 🔔	DAILY FIELD REPORT	
Report By: JW		
Date of Work: 328/19 Project Name and Address		
	Client/Owner:	Page 1 of
GWM - Nannex	Nu Star Nannex	
	Project Manager:	Weather Sun - Hot
	55	Jun Hov
Description of Work: GWM		
Field Staff: UL		
Report: JW onsite 0645		·
HASP - Traffic, PPE. Heat.	- Thegular shall / hydrationbr.	eale. Every 30 mln
at least when 90°+. Ft	- Regular shaele / hydrodionbr. emp 910@ 1330, begin extra bree	ls]
0700 vecive permit, 07	15 begin gaging	-
0915 Begin sampling		
1730 - MILLE description	2. 3x attempt to ameliovate.	~1300 call 53,-17
Wait, sample MW-8D, con	aloto W/1-80 1400	
AW 1 ST 100 The The ID	1) in the second of the first	e
Fres Approx 's gas (1)	W in lower garage ( 2 bucket	\$ ]
Je sign aut, offsite	, <u>[]</u>	
Site Status:		
Drum Inventory (Quantity, Media, Location On-Site):		
Time of Arrival On-Site: 0645	Total Mileage:	
Time of Departure from Site: 1515		
Attachments:	1	



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Job No.	DAILY FIELD REPORT	
W/O No.		
Date of Work: 8/29 Project Name and Address	Client/Owner:	Page ) of
	Nustar	rage of
GWM-Vannex	Project Manager:	Weather
	55	Rain Sun 8
Description of Work: GWM		1
Field Staff: SW		
Report: JW onsite 0645		4.4
HASP - traffic, IDW han	dling [PPE, Seal drum, S	ficker
0700 veceive permit (#9	314	
0715 Begin sampling, MW-	4 pump won't draw. Call	59, charle
if FEI has bladder pump - no	Discuss 355 determine	I that sample
wouldn't represent GW could	itions if obtainable.	
1250 MW-3 same as MW-	4. (1)	
1330 mw-2 able to dota	in sample. N. difficult to	get flows. Some
a b b las	·	0
1415 - News drum of sticker 1430 ~ JW sign out & Sticker	(15 gal.). Dispose approx 1	11 gal. IDW
1430 ~ IW sign out & SR	site	0
,,,		
	· · · ·	
Site Status:		
	- M.	
Drum Inventory: 1 press 15 gal		
Sr. Tech Hours: prep: job: travel:	Total Mileage	
Sr. Tech Hours: prep: job: travel:	aruck Car	
Report By: AN Copy	y Given To:	

				WELL	MONITORIN	IG DATA SHE	EET	494.4		
	in the second			Well ID:	Mw-	1		Job Number:	5	
MA	Case	adia		Client:	Nus	tar		Date:	8/28	3
-	Associat			Project:	Vanne		13919	Sampler:	10	
-	Associat	es, LLC		Weather:	Sun	-1		Time In/Out:	5-000	
					WELL	DATA				1003
Monument T.	(00)	Flush-mount	Stick-up		Well Diamete	er:	Z	Depth to Free	Product:	· · · · · · · · · · · · · · · · · · ·
Monument T <sub>i</sub>	ype.	Other:	0		Well Depth:			Free Product	Thickness:	
Monument Co	ondition:	Spor	L		Depth to Wa	ter:	21.74	Water Colum	n Length:	•
Well Cap Lock		Yes No	)		Screened Inte		ant	Purge Volume		
Comments:	Cricsent.		/					L'urge voluille		
	a – (Water He	eight) X (Multip	lier) X (# Casir		1					·····
Vater height			1-inch well =		2-inch = 0.16	2	4-inch = 0.65	3	1 gal = 3.785 li	ters
		' <i>!</i> '			PURGIN		L' inch - 0.05		1-0- 0.7001	
Purge Metho	d:	PI	· · · · · · · · · · · · · · · · · · ·		Pump Intake		#5			
Sampling Met		LA	6		Tubing Mater		LDPE	5	NEW	DEDICATED
		Cumulative				71-1				
Time	Volume Purged (liters)	Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Тетр (°С)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1917			21.75	11	6. 4/5	15.17	156.1	1271	69.0	-
DILL			61011	0.2		17.18		16.11	1 1	clear
U43D					6.01	14.74	95	11.13	16,4	1
0933				4	6.00	14.64	94	10.45	189.2	
D136	$\sim$		21.76	0.2	6.04	14/2	95	10,41	95.6	V
0610			1177	1	6.06	14.55	94	10.37	96.6	
~ 121					le ve					
						-				
					PURGIN	IG DATA				
Sample ID:		MW	- 9	Sampling Flo	w Rate:	0.2	Analytical Lak		ooratory:	Apex
Sample Time	:	094	0	Final Depth t	to Water:	21.5	tit-	Did Well Dew	ater:	No
No. of Contai	ners/Type	Prese	rvative	Analysis/Me	thod	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
IX	L	HO	0	TF	2A					
1	1)	110	<u>í</u>		24	-				_
-JX	1-	+ TU	L		7					
3x	40	HC	l		UC	- 1000-000-000-000-000-000-000-000-000-0				
				NC	JIES/ADDITIO	NAL COMMEN	15			
	5							•		

4				Well ID:	Mul-c	1		Job Number:	-	-
NX	Care			Client:	NUSL	w		Date:	812	D.
	Case	aala		Project:		Given 30	219	Sampler:		1a)
-V-	Associat	es, LLC		Weather:	Sun	900	*	Time In/Out:	1020	105
		~ /	)		WELL	the second se		Time in out.	1000	
		Flush mount	Stick-up		Well Diamete		2°	Depth to Free	Product:	-
lonument Ty	ype:					-1 -	U			
		Other:	<u>^</u>		Well Depth:			Free Product		
Ionument C	ondition:	spod	<u> </u>		Depth to Wat	ter:	19.41	Water Colum	n Length:	
Vell Cap Lock	k Present: 🧳	Yes No			Screened Inte	erval:	-	Purge Volume	5:	~
omments:			· · · · · · · · · · · · · · · · · · ·							
urge Volume	e = (Water He	eight) X (Multip	olier) X (# Casir	g Volumes)						
	multipliers (g		1-inch well =		2-inch = 0.16	2	4-inch = 0.65	53	1 gal = 3.785	iters
			2	anto a composito de la composito	PURGIN	G DATA				
urge Metho	d:	PF			Pump Intake	Depth:	HC.			1.1.1.1
ampling Met		İF			Tubing Mater		LOP	E	NEW	DEDICATED
		Cumulative						<b>.</b>		
Time	Volume	Volume	DTW	Purge Rate	54	Temp	Cond	DO	ORP	Clarity/Color
Time	Purged (liters)	Purged	(btc)	(L/min)	рН	(°C)	(µS/cm)	(ppm)	(mV)	Other Remark
	(liters)	(liters)	a shakira							
			A particular		+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	<b>B</b>
1026			19.21	.2	6.52	15,49	451	10.20	89.1	dear
1029			RAI		L C		462	2.97	1 VIII	1
the second se			19.91	. 15	6.59	15.58		1	75.1	
032			20.25		6.64	15.63	463	1.95	74,9	-
035	J.		20,63	i	4.620	15,65	464	1.81	74.7	1
into							1 1 1		mo	
1030			20,85		1e.6 t	15,69	468	1:67	72.8	9
										7
										7
		-								1
							x			· · ·
			2						-	
						ļ				
								10 A		
								1		
		+			+					
						-				
		1	Aw		PURGIN	IG DATA	1	1	L	Λ
ample ID:		MA	and the second se	Sampling Flo				Analytical La	boratory:	LOIK
ample Time	:	107		Final Depth t		22.1	26	Did Well Dev	and the second se	TN:
lo. of Contai			rvative	Analysis/Me		Field Filtered		MS/MSD	Duplicate ID	
21	1	11	A ()	and the second se	>14			1		-
100	L	H	<u>u</u>							
3x 4	D	H	Cl							
2.	11	11	NI		PH				MW-5	2.0
AXI	1-	11							1.1.1	NOV-
3×4	40	40	l	NO	9C				MW-5	Jup
10.19.0000000		V							1.1.	a
						-	-			1
	The second s			L					1	
				NC	DTES/ADDITIO	NAL COMMEN	TS			
									-	1
		contraction and and the second								

				Well ID:	MONITORIN			Job Number:	6	~
MAC		1.		Client:	1.00-	1 .		Date:	g/-	70
		adia		Project:	Nur	ferd internal	2019	Sampler:		-And
7 As	sociate	s, LLC		Weather:	Vanne	4 GWM 92°	26/1	Time In/Out:	1110 -	1750
	~	1-		weather.	WELL	DATA		Thine my out.	1 111-	1000
	-(1	Flush mount/	tick-up		Well Diamete	the second s	7~	Depth to Free	Product:	
Monument Type:	V	Other:			Well Depth:		K	Free Product		
Monument Condit					Depth to Wat		19 19	Water Colum		~
		good	\				19.18			
Well Cap Lock Pres	sent:	No			Screened Inte	erval:		Purge Volume		
Comments:	Votor Hair	-h+) V (Multin	lies V /# Cosi			1				
Purge Volume = (V Water height mult			1-inch well =		2-inch = 0.16	2	4-inch = 0.65	2	1 gal = 3.785 li	tors
water neight muit	ipiiers (ga	1).	1-inch weil =	0.041	PURGIN		4-1001 = 0.05	5	1 gai - 2.763 li	lers
Purge Method:		P	P		Pump Intake	anne an	19		-	
Sampling Method:		L	F		Tubing Mater		LAP	É	NEW	/ DEDICATED
		Cumulative		[						
	olume urged	Volume	DTW	Purge Rate	pН	Temp	Cond	DO	ORP	Clarity/Co
	iters)	Purged	(btc)	(L/min)	P	(°C)	(µS/cm)	(ppm)	(mV)	Other Rem
		(liters)		Carl Contra	+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
11/2	 	Anna an	16 10	.2	1021	18.41	Dile	1	67.2	110.
1167			19,18	24	4.21	14	14)	10.52		Lleen
1124					6.15	6.00	410	9.25	106.7	
1130			4	V V	6.95	15.05	408	8.40	110.1	
1133		î.	19.20	.2	6.97	15.76	410	7.98	108.6	
1130			1	4 0	6.98	15.65	418	7.77		
			4		1 0 .					
1139				1	6,97	15.56	426	7.64	106.7	4
<i></i>			<i></i>		5					
					a presidente de la compañía de la co	$p \in S_{n}$	1.1			
		1								
									-	
							-			-
1.1										2
				2	PURGIN	IG DATA	I	1	1	
Sample ID:	I	MW-	51)	Sampling Flor	and the state of t	0.2	-	Analytical Lab	oratory:	ADEX
Sample Time:		1130		Final Depth t	and the second sec	19.1		Did Well Dew	and the second se	ALA
No. of Containers/	Туре		vative	Analysis/Met		Field Filtered		MS/MSD	Duplicate ID	1.1.1
7×1	2	171	90	T	PH					
21	10		NO.	1						
UX		-1	e	V	OC					
			1							
			×							
				NC		NAL COMMEN	 TS			
				NC		TAL CONTRICT	13			
1		0								

	1. C.	and the second		WELL	MONITORIN	IG DATA SHE	EET			
				Well ID:	MW-	B		Job Number:		
1	Case	adia	×	Client:	Nus	tan		Date:	8/2	Ð
	Associate			Project:	Vanner	GWM 3	3919	Sampler:	I	AW
-	Associate	es, llc		Weather:	Sun	95	~ /	Time In/Out:	205	14
			)		WELL	DATA	14			
Manuar	(	Flush-mount/	Stick up		Well Diamete	er:	2	Depth to Free	Producti	
Monument Ty	/pe:	Other:	A		Well Depth:		-	Free Rroduce 1	hickness:	
Monument Co	andition:	cipo.	d		Depth to Wat	er'	21112		Length	
							61.91			
Well Cap Lock	01	Yes No			Screened Inte	erval:		Purge Volume		
Comments:		0(+3								
		ight) X (Multip					1			
Water height	multipliers (g	al):	1-inch well =	0.041	2-inch = 0.16		4-iach = 0.65	3	1 gel = 3.785 j	ters Juni
					PURGIN	and the second se			a second and	
Purge Metho			PP		Pump Intake		MC			)
Sampling Met	thod:		LF		Tubing Mater	rial & Type	LDP	E		1
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Tem (°C)	Cond (µS/cm)	• DO (pipim)	ORP (mV)	Clarity/Color . Other Remains
		123.553			+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1717,			11.47	1.25	1. 41	14 91	137	34	87	dear
1015			61110		0.11	41 01	BL	11/1	- Vel	- Checky
1217			21.0	1.1	6.49	14.21	Dle	144	91.2	
1218			12.14		6.27	14.32	77	3.49	86,	rt
1221			12 3		621	11/11	78	3,54	84.0	V,
			00.00	1	Q. C1	1901		the second diversity of the second diteration diversity of the second diversity of the second diversit		
224			12 41	1.12	6.24	14.47	78	3.61	82.9	choudy
										_
										17.
									,	
				ļ						
					PURGIN	IG DATA			1	4
Sample ID:		Min)-	8	Sampling Flo	w Rate:	D.		Anelytical Let	oratory:	APex
Sample Time	: An	-+330	5 1226	Final Depth 1	to Water:	23.1	5	Did Well Dev	ater:	VS
No. of Contai	ners/Type		rvative	Analysis/Me	thod	Field Filtered	Filter Size	MS/MSD	Duplicate ID	1-
3×2	$\mathbf{D}$	1/0	0	110						
2	11	HU	X							
LX	16	HC HC	l	71	'A					
					1					
						1				
			4	N	OTES/ADDITIO	NAL COMMEN	ITS			
1.1.1	00.0	and and and		The second s	pliky		DTW			
PULL	dering	etering	awrit		0		VIN	1	RI	N D.A
	Alech	ang J	to Li	L'élan F		Sampli	ng de	vaterec	l. Calle	e TWI
	Resu	X	apply		1350	DTh	12.	36		
						A	LU,	y		
	FUIMA	1021.	52 1	sell di	water	+ sedi	imenta	13		
	R	A 4.	an alara	i st 1	105		1			
	rigu	WINC JUN	100000		105					

				WELL	MONITORIN	IG DATA SHE	EET			
4				Well ID:	MW-	BD		Job Number:	1	
NZ	Casc	adia		Client:	Nust	av		Date:	8/2	8
	Associate	uuiu	1.1	Project:	Vannex	GWM 3	Q19	Sampler:	1	And
	Associate	IS, LLC		Weather:		35		Time In/Out:	1315	21400
					WELL					
	P	Flush-mount/	Stick-up		Well Diamete	r:	2	Depth to Free	Product:	
Monument Ty	ype:	Other:			Well Depth:			Free Product 1	Thickness:	-
Monument Co	ondition:	900	d		Depth to Wat	er:	20.45	Water Columr	Length:	<u> </u>
Well Cap Lock		Yes No	5/01/		Screened Inte		~	Purge Volume		-
Comments:										
	a – (Watar Hai	ight) V (Multin	lier) X (# Casin	a Volumos)	T					
	multipliers (g		1-inch well =	and the second sec	2-inch = 0.16	2	4-inch = 0.65	3	1 gal = 3.785 l	iters
water neight	multipliers (g	ai):	T-IUCH WEII -	0.041	PURGIN		4-111011 - 0.05	5	T Bai - 2.702 I	
Purge Metho	d:		00		Pump Intake		-145	1041 - <b>14-1</b> 10 - 147 - 10-1 - 142 - 24		
Sampling Met			F		Tubing Mater			PE	NEW	/ DEDICATED
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
			And the state	-	+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1311			20.45	,25	7.02	15,42	104	6.35	130.6	clean
2001			(1	101	1.00	0	104	1 73		
1369			20.46		6.85	13.01	109	0.11	140.0	
1327			20,4%	1	10.74	14,96	105	6.76	133.1	
1221)			1	,25	6.79	14,89	105	6.01	179 4	Y
1000			1	101	Well 1	11:01	100		1013	
										100
					-					
										-
	L			1	PURGIN		1	1		10.02
Sample ID:	والمراجع والمتعاد المراجع ومروا الم	MW	-27	Sampling Flo		1 20	5	Analytical Lab	poratory:	11.00 M
Sample Time		122	~~	Final Depth t		75	210	Did Well Dew		A
No. of Contai		Prese	rvative	Analysis/Me		Field Filtered		MS/MSD	Duplicate ID	
1	1			1	1	- teta r inter eu				
ZX	16	HL	re		OH					
Bx	40	A(	l		0C	-				
1. 10.										-
			1							
	· · · · · · · · · · · · · · · · · · ·								-	
				_						
		1		N	OTES/ADDITIO	NAL COMMEN	ITS			
									*	
	the second									
	- George							×		

4	and the second bar			Well ID:	MW-	IG DATA SHE		Job Number:	T	
NE	Case	adia	-	Client:	Nus	ar		Date:	8/28	······
	Associate			Project:	Vannex	GWM	3919	Sampler:	42	
and the	73300101	53, LLC	Contraction of the American Street	Weather:	Sun		/	Time In/Out:	1420 -	1510
		P	<b>N</b>		WELL		- 0(			
Monument Ty	/pe:	Flush-mount/	Stick-up		Well Diamete	er:	Zn	Depth to Free		~~~~
		Other:	0		Well Depth:		~	Free Product T		,
Monument Co		apr 1	×		Depth to Wa	ter:	14.39			$\sim$
Well Cap Lock	Present:	Yes UNO			Screened Inte	erval:	~	Purge Volume	:	
Comments:					1					
		ight) X (Multip	T						1 1 0 705 1	
Water height	multipliers (g	(al):	1-inch well =	0.041	2-inch = 0.16 PURGIN		4-inch = 0.65	3	1 gal = 3.785 lit	ers
Purge Metho	d:		20		Pump Intake		MS			
Sampling Me			- F		Tubing Mate		LOPT	5	NEW	/ DEDICATED
	Volume	Cumulative								
Time	Purged (liters)	Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Col Other Rema
		(			+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1430		T	14.39	•2	653	16.41	552	1.83	103.8	clear
11/23			ſ		1. 53	16.32	556	.56	93.9	1
1905			11/115		1 20	11 01	517	. 50		<u> </u>
1454			14.45		6.50	16,21	567	,40		
1439			14.50	¥	6.61	15.95	567	.40	90.2	, de
										T.
								-		Ser.
		1								
							- Ar			
	Υ.			P	DUDCIA	IG DATA				
Sample ID:		MW	- 7	Sampling Flo		.2	-	Analytical Lab	oratory:	Apen
Sample Time	:	INC		Final Depth t	and the second se	14.		Did Well Dew	and the second se	No
No. of Contai	iners/Type		rvative	Analysis/Me	thod	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
ZX	LL	HO	l	17	24					
0	40	HC		Vo						
		110	~		-					
	1									
				NO	DTES/ADDITIC	NAL COMMEN	TS			

	and the second day			Well ID:	Mu - C	l.		Job Number:	-	
MA	~	1.						Date:		29/15
2 A	Case	cadia es, LLC		Client:	Nusta		3010		0/2	-7/1)
21	Associat	es, LLC		Project:	Vanne	y GWM		Sampler:	14	0000
and the second se				Weather:	WELL	DATA		Time In/Out:	0715	- 0830
Monument		Flush-mount/	tick-up		Well Diamete	er:	2	Depth to Free	e Product:	
Monument Ty	pe:	Other:	A		Well Depth:		35	Free Product	Thickness:	
Monument Co	ondition:	Cracke	S		Depth to Wa	ter:	32.45	Water Colum	n Length:	
Well Cap Lock	Present:	Yes No			Screened Int	erval:	-	Purge Volum	e:	
Comments:										
		eight) X (Multip	lier) X (# Casi	ing Volumes)						
Water height i	multipliers (g	gal):	1-inch well =	= 0.041	2-inch = 0.16		4-inch = 0.65	3	1 gal = 3.785 li	ters
D					T .	G DATA				
Purge Method					Pump Intake			19 1	1	1.050101750
Sampling Met	noa:	Cumulative			Tubing Mate	rial & Type:			NEW	/ DEDICATED
Time	Volume Purged (liters)	Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Colo Other Remar
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
^	1 Jox	Deta								
- No U	Neur	-								
1-										
					1					
										1.
		,								
				-						
	1.1.1.1					¢				
				-			-			
										0.000
					and the second se	IG DATA		[		
Sample ID:				Sampling Flor				Analytical Lat		
Sample Time: No. of Contain	ers/Type	Preser	vative	Final Depth to Analysis/Met		Field Filtered	Filter Size	MS/MSD	Duplicate ID	
to. or contail	I I	riesel	Valive			n iela riiterea	1 11121 3120		Dupicate ID	
	- l	)								
Not	any									
140 0	V									
						1				1
				NC		L NAL COMMEN				
1 1	. 1		. \ \	Α		- and the second se	- 1 1	11.		
Unabl	1 top	mp-	1	er colu				Ke		
Sectim	ent +	airpor	dets.	not Gl	2 cand	1 trons	, 0			فعيماعات
8x es	Hemo	45. Li.	el unt	draw	stead	ly in	ater			
,			- Mul			)				
						-				

			13	WELL	MONITORIN	G DATA SHE	ET		and the second	
4				Well ID:	MW-	1		Job Number:		
36	Case	adia		Client:	Nusta	W		Date:	4	3/29
	Casc	uulu		Project:	Vanne	x Gerin	3419	Sampler:	Aa	1
- Alexandre	Associate	es, LLC		Weather:	It va	rv		Time In/Out:	0845	-940
					WELL	DATA				
	(	Flush-mount	stick-up		Well Diamete	r:	2	Depth to Free	Product:	
Monument Ty	/pe:	Other:	٨		Well Depth:		-	Free Product	Thickness:	-
Monument Co	ondition:	900	d	- Mr.L	Depth to Wat	er:	18.96	Water Colum		
Well Cap Lock		Tes No	<u> </u>		Screened Inte			Purge Volume		
Comments:										
	e = (Water He	ight) X (Multip	lier) X (# Casir	volumes)	1			1.1.2		
Water height			1-inch well =		2-inch = 0.162	)	4-inch = 0.65	3	1 gal = 3.785 li	ters
water neight	indicipiiers (B	ai).	I men wen -	0.041	PURGIN	and the second	4-Incii = 0.05		1 Bal - 3.703 I	
Purge Methoo	d:	P	P		Pump Intake	and the second se	X	AS		
Sampling Met	- Internet and the second	F	21		Tubing Mater		LDPE	5	NEW	DEDICATED
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
		(incers)		14.5.5.6.5.7.5	+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
CIE			10 61	100	a substantia a subst		1.11	214		.0
712			18.96	0.2	5.89	15.55	1044	7.11	137.1	clear
918			18.97		5.70	15.39	1045	4.23	133.7	
921			1		5.78	15.33	1045	4.43	132.0	
224					5.82	15.14	1039	4.61	130.1	
269				V	0.00	13.17	1031	1001	130,1	
				ļ			2			
									Section.	
1										
farmers.										10 m
								1		
									1,	
										-
										1144
		L			PURGIN	G DATA				
Sample ID:		Mh)-	1	Sampling Flo	the second s	0.	2	Analytical Lat	oratory:	Apex
Sample Time:	:	092.	1	Final Depth t			94	Did Well Dew		TN
No. of Contai	ners/Type	Prese	rvative	Analysis/Me			Filter Size	MS/MSD	Duplicate ID	
2.	11,	H	00	1	2H					
2 1	10	1	NO	10						
JX 4	3×40 HUL V									
									- 1 V	
				NC	JIES/ADDITIO	NAL COMMEN	15			
							-			
				E.						
L										

				WELL	MONITORIN	IG DATA SHE	ET			
4				Well ID:	MW-	- 11		Job Number:		
NX	Casc	adia		Client:	NUS	tan		Date:	3/	29
	Associate	uuiu		Project:		+ GWM	3019	Sampler:	1	10
	Associule	S, LLC		Weather:	Class	n		Time In/Out:	945	1040
					WELL	DATA				
Monument	(no) (	Flush-mount	Stick-up		Well Diamete	er:	2"			
Monument Ty	ipe:	Other:			Well Depth:		-	Free Product T	hickness:	and the second second
Monument Co	ondition:	good	1		Depth to Wat	er:	20.17	Water Column	Length:	
Well Cap Lock	Present	Yes No	1		Screened Inte			Purge Volume		~
Comments:					Screened mite	.1 vai.		i dige voluine	•	
	- (Water He	ight) X (Multip	lior) X (# Casir	(semulation of						
Water height	and the second		1-inch well =		2-inch = 0.16	, ,	4-inch = 0.65	2	1 gal	
water neight	multipliers (g	ai).	T-IIICH Weil -	0.041	PURGIN	and the second	4-11011 - 0.05	5	T Bai	
Purge Metho	d:	0	0 ,		Pump Intake	and the second	-MA-C	<u>.</u>		
Sampling Met		- 11	0h		Tubing Mater	the second se	1 DPE		NEW	DEDICATED
Time	Volume Purged	Cumulative Volume	DTW	Purge Rate	pН	Temp	Cond	DO	ORP	Clarity/Color
	(liters)	Purged (liters)	(btc)	(L/min)		(°C)	(µS/cm)	(ppm)	(mV)	
		(			+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm		
1002			20.17	0.25	10,23	16.01	389	1, 4/5	107.6	char
1005			20.18	15	6.41	15.50	309	the UN	110.6	1
1008			20.10	15	1. 11	15.50	280	2.39	103.9	
			AV IG		4.41	13,56			0.0	
1011			20.19		6.45	15.44	283	2.48	99.2	*
1014			<u>k</u>		6.50	15.34	301	2.16	93.t	
1017			20.2		6.52	15.35	311	2.21	90.6	
1020			20.2	V V	6.55	15,37	314	2.25		4
										1
			l		PURGIN	G DATA				
Sample ID:		ML)-	-11	Sampling Flo		Contraction of the second s	5	Analytical Lab	oratory:	APRX
Sample Time:		101	21	Final Depth t		21	0.2	Did Well Dew		N
No. of Contain	and the second se		rvative	Analysis/Met		Field Filtered		MS/MSD	Duplicate ID	
2.	11.	H	12	TI	>H		Ī			
2.	10	11	$\tilde{\boldsymbol{\rho}}$							
OX	10	HC				-				
-										
				L						
			- Aller and a state of the second	NC	DIES/ADDITIO	NAL COMMEN	15			
			· · · · · · · · · · · · · · · · · · ·							
										<u>.</u>
		-		-						<i>Y</i>

	and the second strength	netter			1	IG DATA SHE			1	
MA				Well ID:	Mu	T		Job Number:		The second
24	Case	adia		Client:	Nr 5t		2010	Date:	5/	27
21	Associate	es, LLC		Project:		GWM	XQ (7	Sampler:	40	5
				Weather:	DVer WELL			Time In/Out:	10	55-1
	- for	Flush-mount	/Stick-up		Well Diamete	and the second se	Z.	Depth to Free	Product:	
Monument Ty	pe:	Other:			Well Depth:			Free Product		-
Monument Co	adition	A			Depth to Wa	han	20.11	Water Colum		
		crood					20.44			
Well Cap Lock	Present:	Yes No	)		Screened Inte	erval:		Purge Volume	2:	
Comments:	- //Matar Ha	ight) V /Multig	lier) V /# Coci		T	1				
Purge Volume Water height	and a second	and the second s	1-inch well =	And an	2-inch = 0.16	2	4-inch = 0.65	2	1 gal = 3.785 li	tors
water neight	multipliers (g	(d1).	I-men wen -	0.041	PURGIN		4-11101 - 0.65	5	1 gai - 5.765 ii	lers
Purge Method	1:	0	20		Pump Intake	the second s	M	5		
Sampling Met		1 P	11-		Tubing Mate	the second s	LDF	E	NEW	DEDICA
	Volume	Cumulative	-							
Time	Purged	Volume	DTW	Purge Rate	рН	Temp	Cond	DO	ORP	Clarity
	(liters)	Purged	(btc)	(L/min)	P.1.	(°C)	(µS/cm)	(ppm)	(mV)	Other R
		(liters)			+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
ilail	and a statement of		ADIL	1		16.09	220	4.83		. (
1104	4		00.9	.2	6.31	10.01	TIL		60.7	cla
107			10.71		6.45	12:33	837	2.25	44.7	
1110			20.83		6.47	15,65	839	2.00	39.4	
113			21.03	1	6.49	15,58	844	192	33.4	
1112			01100			1.11.5-	011	1.17	55.1	
									10.0	
			1. Sec. 1.						1	
		7								-
Contraction of the	1.5	+								
	144		•							
		<i>u</i>								
										*
					1					
		1			1				7	
		1			PURGIN	IG DATA		L	1	
Sample ID:		M	2-6	Sampling Flo	and the second second second	T		Analytical Lat	poratory:	Aos
Sample Time:		111	2	Final Depth t		21	32	Did Well Dew		K
No. of Contair		Prese	rvative	Analysis/Met		Field Filtered	A Alexandream	MS/MSD	Duplicate ID	
2x	11	HC			×₩	-	L			
0	In				11		<u> </u>			
SX	40	HC	L	Vo	C		1			
				,					1	
			I							
				ALC NC		NAL COMMEN			1	
L				NC		INAL CONTINIEN	1.3	3		

Weilling         Weilling         Mill A - 10         Date Manufact           Weilling         Marker Marker         State					WELL	MONITORIN	IG DATA SHE	EET			
Associates, LLC         Utgen.         Utgen. <t< td=""><td></td><td></td><td></td><td></td><td>Well ID:</td><td>Mu</td><td>1-10</td><td></td><td>Job Number:</td><td>T</td><td></td></t<>					Well ID:	Mu	1-10		Job Number:	T	
Associates, LLC         Utgen.         Utgen. <t< td=""><td>WZ.</td><td>Case</td><td>ndia</td><td></td><td>Client:</td><td>Nust</td><td></td><td></td><td>Date:</td><td>8/2</td><td>5</td></t<>	WZ.	Case	ndia		Client:	Nust			Date:	8/2	5
Weather:         Weather:         Time Influx:         If S         12245           Weather:         Weather:         2         Depth to free Product its column length:         -           Wanument Condition:         Go 0         Depth to Water:         20.92         Yes Column length:         -           Weather:         Yes         Screened Interval.         -         Purge Volume:         -         -           Water Register:         Yes         Screened Interval.         -         Purge Volume:         -         -           Water Register:         Yes         Screened Interval.         -         Purge Volume:         -         -           Water Register:         Yes         Differer         Purge Intake Depth:         -         -         -         -           Water Register:         Volume         Purge Rate         P         Temp (Column Register:         -	-	Associate			Project:	Vannex	GusM .	3019	Sampler:	4	m
Monument Type:         Plush-mound block-up         Well Dameter:         2         Depth to Free Product:           Worumant Condition:         Go 0         Depth Water:         Z0.92         Water Column length:		Associate			Weather:	Sun	C .		Time In/Out:	115	1245
Monument Type:         UnitsHindung/Lic-up         Well unitset:         2         Upper to Mere Product Thickness:           Worument Condition:         900         Depth:         —         Free Product Thickness:           Well Cap Lock Present:         Yes         Screened Interval:         —         Purge Volume:           Purge Volume :         —         Screened Interval:         —         Purge Volume:         —           Purge Volume :         —         Purge Volume:         —         —         Purge Volume:         —           Purge Method:         …         Purged Interval:         …         Purge Volume:         …         …           Time         Volume:         DTW         Purge Rate         Purged Raterial & Type         LISP (CmV)         …         …           12D 4			0			WELL	DATA				
Well Depth:	Manunant	(	Flush-mount/	tick-up		Well Diamete	er:	2	Depth to Free	Product:	
Wonument Condition:         Yes         Depth to Water:         Z0.92         Water Column Length:         Purge Volume:           Comments:	wonument i	ype:	Other:			Well Depth:		-	Free Product T	hickness:	
Well Cap Lock Present:       Yes       Screened Interval:       Purge Volume:         Comments:       Purge Volume:       Purge Volume:       Purge Volume:         Water height multipliers (gal):       1-inch well = 0.041       Purge Method:       Purge Method:         Time       Purge Method:       Purge Method:       Purge Method:       Maren Inste Depth:         Time       Volume       Ormulative       Purge Method:       Maren Inste Depth:       Maren Inste Depth:         Time       Volume       Ormulative       PUrge Rate       pH       Temp       Cond       ORP         12.0.6       2.0.712       .2       0.4.97       18.127       43.6       10.711       10.6       Clear         12.0.6       2.0.712       .2       0.4.97       18.127       43.6       10.711       10.6       Clear         12.0.4       2.0.92       1       0.5.75       10.6.41       2.2.0       7.7.4       47.2.0         12.12       1       .2       0.39       16.116       14.9       8.45       516.1       112.1         12.14       1       4       6.3.5       17.5       8.19       75.3       12.4         12.12       1       1       6.3.8	Monument Co	andition	9,050 d				er.	20 91	Water Colum	length:	~
Comments:								20.16			-
Parge Volume = (Water Height) X (Multiplier) X (# Casing Volumes) Water height multipliers (ga): Time Volume Time Volume V		(Present:	Yes NO			Screened Inte	ervai:		Purge volume		
Water height multipliers (gal):       1-inch well = 0.041       2-inch = 0.162       4-inch         Purge Method:       PURGING DATA       PURGING DATA       PURGING DATA         Time       Volume (iters)       Purge Hatto (iters)		()				1					
PUREING DATA           Purp Intake Depth:         #5           Sampling Method:         Cumulative Purged (Iters)         Purge Rate (Um)         Purge R	and the second se	the second s	and the second se					Les 1			
Purge Method:         Purge Intake Depth:	Water height	multipliers (g	al):	1-inch well =	0.041			4-inch			
Sampling Method:       Unit with the purged (liters)       Unit with the purge of (liters)       Unit with the purge of (liters)       Tubing Material & Type       L St PE       (NEW)         Time       Volume       DTW       Purge Rate (l/min)       pH       Temp ('C)       Cond (l/s/cm)       ORP (mV)         Purged (liters)       Unit of (l/min)       pH       Temp ('C)       Cond (l/s/cm)       ORP (mV)         1/2.06       2.0.97       .2       4.6.97       18.72       -136       10.6       -10.6         1/2.04       2.0.97       .4       6.57       116.64       22.0       7.74       4/2.0         1/2.04       .2       .92       .4       6.57       116.64       22.0       7.74       4/2.0         1/2.1       .2       .2       .2       .2       1.6       .2       1.6       .4       7.5       .1         1/2.1       .2       .9       .2 </td <td>Durgo Matha</td> <td>d.</td> <td>0</td> <td>0</td> <td></td> <td></td> <td>and the second /td> <td>11</td> <td>6</td> <td></td> <td></td>	Durgo Matha	d.	0	0			and the second	11	6		
Time         Volume Purged (iters)         Cumulative Purged (iters)         D DTW Purge Rate (iters)         PH         Temp (C)         Cond (is/cm)         ORP (mV)           12.06         20.912         .2         4.69         78.22         436         10.771         10.6         Cean           12.06         20.912         .2         4.69         78.22         436         10.771         10.6         Cean           12.04         20.92         4         6.57         116.64         72.0         7.74         4/2.0           12.05         31.05         6.227         1/4.92         114         8.45         576.         1           12.15         31.05         6.28         15.55         11.5         8.19         75.3         1           12.24         4         6.3         15.56         11.2         8.19         75.3         1           12.24         1         4         6.3         15.61         110         8.01         76.9           12.24         10.92         15         6.20         15.61         10         8.01         76.9           12.24         Final Depth to Water:         20.92         Did Well Dewater:         N         N         <			- r	Y_				77		CNEW	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	sampling ivie	inoa:	Curturi	L.		lubing Mater	rial & Type	LDF		NEW	2
j206       20.92       1       6.69       18.22       436       10.71       10.6       Clear         i209       20.92       4       6.53       16.64       220       7.76       4/2.0         j212       1       .2       6.39       16.16       149       8.45       56.1         j212       1       .2       6.39       16.16       149       8.45       56.1         j215       20.92       .15       6.28       15.51       115       8.18       68.7         j215       20.92       .15       6.28       15.51       115       8.19       75.3         j221       1       .15       6.28       15.61       110       8.01       76.9         j221       10.92       .15       6.36       15.61       110       8.01       76.9         j221       20.92       .15       6.10       76.9       9       9         j221       20.92       .15       6.10       76.9       9         j224       Final Depth to Water:       20.92       Did Well Dewater:       No         sample Time:       122.4       Final Depth to Water:       20.92       Did Well Dewater:       N	Time	Purged	Volume Purged			рН		1	DQ. (apm)	1 1	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						1	+/-0.5 °C		+/-0.5 ppm	1-10-mil	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	1206			20.92	.2	6.69	1812	436	1071	10.6	clean
$\begin{array}{c c c c c c c c c c c c c c c c c c c $							1				Concert.
PU15       Image: Standard	1201			10.72	1	6.5	10.64				
PURGING DATA         Sample ID:       MW-IO       Sampling Flow Rate:       / 15       Analytical Laboratory:       Apax         Sample ID:       122.4       Final Depth to Water:       20,92       15       Model       Pilder Filter Size       MS/MSD       Duplicate ID         2x / 1 /L       HCL       T PLK       —       … <t< td=""><td>1212</td><td></td><td></td><td></td><td>.2</td><td>6.39</td><td>16.16</td><td>149</td><td></td><td>56.1</td><td></td></t<>	1212				.2	6.39	16.16	149		56.1	
1218       20.92       .15       6.28       15.5       115       8.14       73.1         1221       1       1       6.3       15.56       112       8.19       75.3          1224       20.92       .15       6.36       15.61       110       8.01       76.9          1224       20.92       .15       6.36       15.61       110       8.01       76.9          1224       20.92       .15       6.736       15.61       110       8.01       76.9          1224       20.92       .15       6.15.61       110       8.01       76.9          1224                 1225                  1225                  PURGING DATA                  <	115	r - 19			3.15	6.27	14.92	116	8.1B	687	
1221       1				20 60		6.28	15 61	112	9110	the second se	
1224       20.92,15       (e.3(e) 15.(e) 100       8.0)       7(e,9)         Image: Second	1210			Will	.15			113			
$\frac{1}{2 \times 1 L} \qquad HCL \qquad TPH \qquad I = 1 \qquad I = I = I = I = I = I = I = I = I = I$	1221				6	6.31	15.56	112	8,19	75,3	
$\frac{1}{2 \times 1 L} \qquad HCL \qquad TPH \qquad I = 1 \qquad I = I = I = I = I = I = I = I = I = I$	12.7.0			20.92	,15	60 360	15/1	110	801	710.9	V
Sample ID:       MW-10       Sampling Flow Rate:       15       Analytical Laboratory:       Apax         Sample Time:       1224       Final Depth to Water:       20,92       Did Well Dewater:       N         No. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         Z × 1L       HCL       TPH	1001		1	00.15		4.04	12.00	110	10.01	10,1	
Sample ID:       MW-10       Sampling Flow Rate:       15       Analytical Laboratory:       Apax         Sample Time:       1224       Final Depth to Water:       20,92       Did Well Dewater:       N         No. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         Z × 1L       HCL       TPH											
Sample ID:       MW-10       Sampling Flow Rate:       15       Analytical Laboratory:       Apax         Sample Time:       1224       Final Depth to Water:       20,92       Did Well Dewater:       N         No. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         Z × 1L       HCL       TPH											
Sample ID:       MW-10       Sampling Flow Rate:       15       Analytical Laboratory:       Apax         Sample Time:       1224       Final Depth to Water:       20,92       Did Well Dewater:       N         No. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         Z × 1L       HCL       TPH				1, 1 2, 1							
Sample ID:       MW-10       Sampling Flow Rate:       15       Analytical Laboratory:       Apax         Sample Time:       1224       Final Depth to Water:       20,92       Did Well Dewater:       N         No. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         Z × 1L       HCL       TPH									1.4		
Sample ID:       MW-10       Sampling Flow Rate:       15       Analytical Laboratory:       Apax         Sample Time:       1224       Final Depth to Water:       20,92       Did Well Dewater:       N         No. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         Z × 1L       HCL       TPH									111111		
Sample ID:       MW-10       Sampling Flow Rate:       15       Analytical Laboratory:       Apax         Sample Time:       1224       Final Depth to Water:       20,92       Did Well Dewater:       N         No. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         Z × 1L       HCL       TPH											
Sample ID:       MW-10       Sampling Flow Rate:       15       Analytical Laboratory:       Apax         Sample Time:       1224       Final Depth to Water:       20,92       Did Well Dewater:       N         No. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         Z × 1L       HCL       TPH											
Sample ID:       MW-10       Sampling Flow Rate:       15       Analytical Laboratory:       Apax         Sample Time:       1224       Final Depth to Water:       20,92       Did Well Dewater:       N         No. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         Z × 1L       HCL       TPH											
Sample ID:       MW-10       Sampling Flow Rate:       15       Analytical Laboratory:       Apax         Sample Time:       1224       Final Depth to Water:       20,92       Did Well Dewater:       N         No. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         Z × 1L       HCL       TPH					1	PURGIN	G DATA				
Sample Time:     1224     Final Depth to Water:     20,92     Did Well Dewater:     N       No. of Containers/Type     Preservative     Analysis/Method     Field Filtered     Filter Size     MS/MSD     Duplicate ID       2×1L     HCL     TPH	Sample ID.		MIA (.	-10	Sampling Flo	the second s		15	Analytical Lab	oratory:	Aner
No. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         2×1L       HCL       TPH	and the second s						20				- XI
ZXIL HCL TPH							the second secon				15
3×40 Hel voc	2.	11	11	10	T						
	CX	L	H					· · ·			
	3×1	40	H	UL	JV	)C	-				
NOTES/ADDITIONAL COMMENTS											
NOTES/ADDITIONAL COMMENTS											
NOTES/ADDITIONAL COMMENTS											5
NOTES/ADDITIONAL COMMENTS											
NOTES/ADDITIONAL COMMENTS											
					NC	DTES/ADDITIO	NAL COMMEN	TS			and the second
						and the second			, ,		
							-				

			WELL	MONITORI	NG DATA SHI	EET			
			Well ID:	MI	N-3		Job Number:		<u></u>
M& Cas	cadia		Client:	N.	Star		Date:	81	29
Cus	cadia otes, LLC		Project:	Vanne	× GWM	3019	Sampler:	1	fer
Associo	nes, LLC		Weather:	Sur			Time In/Out:	1250	- 1315
					DATA				
(	Flush-mount/	stick-up		Well Diamet	er:	2"	Depth to Free	Product:	
Monument Type:	Other:			Well Depth:		35	Free Product 1		-
Manager 1 Constitution	Δ								
Monument Condition:		acks		Depth to Wa		31.33	Water Columr		
Well Cap Lock Present:	Yes No		16 A	Screened Int	erval:		Purge Volume	:	
Comments:	U								
Purge Volume = (Water H	leight) X (Multip	lier) X (# Casi	ng Volumes)					-	
Water height multipliers	(gal):	1-inch well =	0.041	2-inch = 0.16	52	4-inch = 0.65	3	1 gal = 3.785	liters
				PURGIN	IG DATA				
Purge Method:				Pump Intake	Depth:				
Sampling Method:				Tubing Mate	rial & Type:			NEW	/ DEDICATED
Time Volume (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
				+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
No 140 Da									
				PURGI	NG DATA	1	1		
Sample ID:			Sampling Flo	and the second se			Analytical Lab	oratory:	
Sample Time:	-		Final Depth t				Did Well Dew	the second s	
No. of Containers/Type	Droco	rvative	Analysis/Met	the second s	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
No 3 ompte	9)								
Water celu Pump uno	man 3° 6	dreus	nd of Ho - 2 50	the second s	A, air-	A 4			
5 attempt	s to get	Ban						8	

				WELL	MONITORIN	IG DATA SHE	ET			
				Well ID:	MW-	-2		Job Number:	~	_
NZ W	Casc	adia		Client:	Nu Sta	and		Date:	B/1	69
	Cusc	uulu		Project:	Vanne	x GWM	3919	Sampler:	1	In
- Aler	Associate	es, LLC		Weather:	Sur			Time In/Out:	1300	-1415
		$\sim$	)		WELL			hanne anna inne anna		20
	1	Flush-mount	/ Stick-up		Well Diamete	er:	20	Depth to Free	Product:	~
Monument Ty	/pe:	Other:	A		Well Depth:		ret	Free Product 1		-
Monument Co	andition		0		Depth to Wat		30,54	Water Colum		
		a good	×				20,59			
Well Cap Lock	Present:	Yes No	Y		Screened Inte	erval:	-	Purge Volume	:	-
Comments:	1	-polt								
and the second	and the second	ight) X (Multipl		encolo con anticipation and an						
Water height	multipliers (g	al):	1-inch well =	0.041	2-inch = 0.16		4-inch = 0.65	3	1 gal = 3.785 li	iters
D			•		PURGIN					
Purge Metho		P	A di		Pump Intake		-#19		R	\
Sampling Met	thod:		<u>No</u>	I	Tubing Mater	ial & Type:	LDPI	F	NÉW	DEDICATED
	Volume	Cumulative Volume	DTW	Durgo Pato		Tamp	Cond	DO	ORP	Clarity/Color
Time	Purged	Purged	(btc)	Purge Rate (L/min)	pН	Temp (°C)	Cond (µS/cm)	(ppm)	(mV)	Other Remarks
	(liters)	(liters)	(000)				(100/011)	(PPIII)	()	
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1321			1	,15	1019	17.59	151	779	133.2	dear
1004				110	6.19			207		un
13:39				4	6,04	17.24	151	3.07	132.2	-
1342				01	10.03	16.51	151	2.51	128.1	
1345				1	6.09	11.57	153	1.96	120,1	Ň
				1		10.10				- C
1348					6,10	16.67	153	1.93	118.5	
		5 - C - C								
<u></u>										
								i.		d as
					P		Sec.		×	*
							1			
					ļ					
. · · ·				dire.			×.,	2		ALC: NO
	2			3.17	-	-				
				L	PURGIN	G DATA	<u></u>		1	1
Sample ID:		MW	-2	Sampling Flo		0	. 1	Analytical Lab	oratory:	Apex
Sample Time:		100	IR	Final Depth t		30,	55	Did Well Dew		No
No. of Contai		Preser	vative	Analysis/Met		Field Filtered		MS/MSD	Duplicate ID	1.1
ZX	11	111	10	1-5	>11					
	-le-	LT .			11				2	
3×	40	AC	l		)C	~				
						· · ·				
			ter Strand and an open to a second							1
					ana a atat ta arena					
			4							Carls -
						NAL COMMEN				
Mun	wir h.	hhles	Mara	( 010 mas	n h.	+ clean	+ 54-	45	ant	
1. MAG	mv uu		TUBN	LOWIN	NG THE	Cican	7 012	acry D	1 v m	
				2	<u>.</u>			/		

Project: Vannex GWM Client: Nu Star Sampler: GW

Date: 8/28/19 Permit:

Client: N	n Ster	9			Permit:
Sampler: A	W				
Well ID:	Time:	DTP:	DTW:	Product Thickness:	Notes:
MW-4	0715	-	32.59		
MW-2	0720	-	30.63		bolt missing
MW-3	0727	4	31.51		
MW-11	0741	-	19.55		kolor kut no cuttine
MW-1	0746	+	19.04		10
MW-le	0757	-	19.66		in the second
MW. 10	0812	-	21.02	-	
MW-7	0829	-	13.99		
MW-51	0850		19.01	19 - C	
MW-5	0855		19.31		
MW-8	0901		19.94		
MJ-8D	0906	~	20.21		
MW-9	0911	L	21.74		No bolty
			· · ·		
					<i>Î</i> 1

A.

Project: Vanner GWM 4Q19 Client: Nu Star Sampler:

Date: 11/18 Permit: # 11265

Well ID:	Time:	DTP:	DTW:	Product Thickness:	Notes:
MW-4	0716		32.09		
MW-2		_	30.16	-	
MW-3	0739	-	31.06	/	
MW-1	0757	(	18.64	-	
MIS-11	0804	_	19.36	-	
MW-le	0811	~	19.31		
MW-10	0813	-	20.67	-	
MW-7	0829		13.76	~	
MW-9		~	21.28		
MW-8D	0841		19.00		
MW-3	0848	_	19.57	~	Monument puried
MW-5D	0854	/	18.62		
MW-5	0859		13.92	~	

•

				WELL	MONITORI	NG DATA SHE	EET			
				Well ID:	Ah	J-5D		Job Number:	7	-,-
WX C	'asc	adia		Client:	N	ustar		Date:	IVI	13/19
	ssociate	uuiu		Project:	GWI	1 4019	)	Sampler:		40
As	sociate	es, LLC		Weather:	(	londy		Time In/Out:	0915	- 100
		$\sim$			WELL	Sold in the sector was a far to be be a sector of the sect	Sec. 1		the the Amount	
	0	Flush-mount	Stick-up		Well Diamete	er:	7	Depth to Free	Product:	~
Monument Type:	X	Other:	٨		Well Depth:			Free Product		
Monument Condit	tion:				Depth to Wa	tor:	18.61 Water Column			
Well Cap Lock Pre		Yes No	bod		Screened Int		10.01			
	sent:	Yes No			Screened Int	ervai:		Purge Volume	2:	-
Comments:	Alabaalla		1:		1	T				
Purge Volume = (\ Water height mult		the second s	1-inch well =	CONTRACTOR OF CONT	2-inch = 0.16	2	4-inch = 0.65	2	1 gal = 3.785 l	itore
water neight mun	Thues (B	a may be the second second second	and the second se	0.041	and the second se	IG DATA	4-Inch = 0.05	5	1 gai = 2.782 i	ners
Purge Method:			P		Pump Intake			MS		
Sampling Method:	:		1		Tubing Mate		LDP		NEW	/ DEDICA
		Cumulative	0					T T		1 020101
- 20	olume	Volume	DTW	Purge Rate		Temp	Cond	DO	ORP	Clarity
	urged liters)	Purged	(btc)	(L/min)	рН	(°C)	. (µS/cm)	(ppm)	(mV)	Other F
		(liters)							-	
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
0930			18.61	.2	7.39	14.07	352	6.54	-34.7	de
0933			1	1	719	14.03	344	3.11	-43.1	
09210				. 15	7.18		331	122	- 21.5	
0120				. 17	4.10	13.98		I.TL		
2979	979 F				7.14	13.93	327	1.33	-20.3	
1942					7.13	13.92	325	1,19	-19.3	
19945	DEIE			1	7.14	13.42	324	99.	-19.5	
0195					7.11	1).7-	ULI		1 ( , )	
1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -										1.1.1
L/			R.							
		~		5 A						-
							1			-
*						-				
				×						
K		1.1.1								
			l.		PURCIN	IG DATA		1	<u></u>	l
178		MIL.	-57	Sampling Flo	100 March 100 Ma		5	Analytical Lab	oratory:	An
ample ID: MW-5D				Final Depth t	and the second s		63	Did Well Dew		The second
1	-	Prese	rvative	Analysis/Met		Field Filtered		MS/MSD	Duplicate ID	
Sample Time:	lo. of Containers/Type Preservative				(					
Sample Time: No. of Containers/										
ample Time:		H			11	1				1
Sample Time: No. of Containers/		HO	i i	TP	H					
ample Time: No. of Containers/		HO	Û	TP	4					
Sample Time: No. of Containers/		HO	Ľ	TP	H					
ample Time: No. of Containers/		HC		TP	H					
Sample Time: No. of Containers/		H (		TP	H					
ample Time: No. of Containers/				TP	H			, ,		
Sample Time: No. of Containers/				NC		NAL COMMEN	TS			
Sample Time: No. of Containers/				NC	H DTES/ADDITIO	NAL COMMEN	TS			
Sample Time: No. of Containers/				NC	H- DTES/ADDITIO	NAL COMMEN	TS			
Sample Time: No. of Containers/				NC	H- DTES/ADDITIO	NAL COMMEN	TS			

74			1.1.1	Well ID:	MW			Job Number:		1.0
	Case	adia		Client:		for Va	mia			19
21	Associate	es, LLC		Project:	GNI	ngal		Sampler:	inne	- 1150
				Weather:	WELL	DATA		Time In/Out:	1003-	- 1150
		Flush-mount/	Stick-up		Well Diamete		7	Depth to Free	Product:	-
Monument T	ype:	Other:			Well Depth:			Free Product		
Monument C	ondition:	gove	Q		Depth to Wa	ter:	14.21	Water Colum	n Length:	~
Well Cap Loci									:	-
Comments:			13 1 1							
Purge Volume	e = (Water He	ight) X (Multip							120	
Water height	multipliers (g	al):	1-inch well =	0.041	2-inch = 0.16	2 IG DATA	4-inch = 0.65	53	1 gal = 3.785 l	iters
Purge Metho	d:		0.0		Pump Intake			MS		
Sampling Me					Tubing Mate		L	DPE	NEW	DEDICATE
	Volume	Cumulative	U						0	
Time	Purged	Volume	DTW (btc)	Purge Rate	pН	Temp	Cond	DO (ppm)	ORP (m)()	Clarity/C Other Rei
	(liters)	Purged (liters)	(btc)	(L/min)	1	(°C)	. (μS/cm)	(ppm)	(mV)	other ker
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	4
1014			19.21	.1	6.96	14.04	358	2.77	2.9	de
1017			9:15	12	6.90	14,10	382	2.35	-13.8	1
010			19.30	.1	1.85	14.09	399	141	-719	
inge			19.37	61	1. 29	141	409	1.20	-213	
1061			19.45	1	1 12	14.11	412	1.14	201	
1027	24		11.97		6.11	17.4	117	1.19	- 71.1	
			- Dam			4.5				
			19			18				
•			No.		and the second s	St.				
					140					
		1				1.1.2				3
-	~		1. A. A.							
-										
								10,125,13		
	1				PURGIN	IG DATA				Α
Sample ID:		Ma	-5	Sampling Flo		. (		Analytical Lab	oratory:	Arge
Sample Time		102		Final Depth t			2,16	Did Well Dew		N
No. of Contai	ners/Type	1	rvative	Analysis/Met		Field Filtered	Filter Size	MS/MSD	Duplicate ID	
'5× "	tU	H	el	VC	) C					
2x	IL	4	el	T	VH					
3x	40	H	l	VC	) C				MW-51	JUD_
2x	IL	ik	L		PH				MW-5	DUP
							1.5			
			8. X.S							
				NC	DTES/ADDITIO	NAL COMMEN	TS			
		why h	×00 . A	elas		deng		55 4	fort cu	san
		<u> </u>	4.0		4 0		. 110	ID aL	t	
	1			reing	ODV M	cherg		10 010		

			A data da para da	Well ID:		G DATA SHI		Job Number:		
MA	<b>C</b> .			Client:		Her Va	an a M	Date:	11	118
	Lasa	adia		Project:	Gun	NUN	4 years	Sampler:		10
T	Associat	es, LLC		Weather:		ondis	1	Time In/Out:	1130-	-1330
		R	)		WELL	of the second state of the		1	- max	1010
Monument	- (	Flush-mount,	stick-up		Well Diamete	er:	2"	Depth to Free	Product:	-
Monument Ty	pe:	Other:	1		Well Depth:		Free Product Thickness:			
Monument Co	ndition:	2000	ľ		Depth to Wat	ater: 19.6		Water Colum	n Length:	
Well Cap Lock		Yes No	<u>`</u>		Screened Inte		1100			
Comments:								Purge Volume		
	= (Water He	eight) X (Multip	lier) X (# Casir	ng Volumes)						
Water height			1-inch well =	a state of the second	2-inch = 0.16	2	4-inch = 0.65	53	1 gal = 3.785 li	ters
					PURGIN					
Purge Method		-	Ch		Pump Intake	Depth:	T Star	MS	5	2
Sampling Met	hod:	5	CK_		Tubing Mater	rial & Type:	201	E	NEW	DEDICATED
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Colo Other Remar
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	1919 63 6
1202			19.60	2	6.54	13.24	364	5.27	-57.4	deer
1205		100			6.91	1319	301	3.4	-517	1
1208	-	1	2021	e	100	1215	2110	2.80	- 43.9	
100	-	1.00	20.71		6.07	3.17	695			
121		111	2.5		Ce. 77	13.09	259	2.96	-30.2	
1214		Storage 1	21.32	. 1	6.81	13,07	251	3.01	-29.1	¥
	and the second	11 2 3						1.1		
	a	1.00					1 h. h.			
No. 1					- the -	2.58				
1.1.1						7.8				
								2		
		12 14								
		12 -							-	1000
								-		
									1.0	
					PURGIN	G DATA				4
Sample ID:		MW.	-8	Sampling Flor	and the state of the deside			Analytical Lab	the second s	Apex
Sample Time:	and the second se	141	4	Final Depth t		21	.95	Did Well Dew		No
No. of Contair	ers/Type	and the second s	rvative	Analysis/Met		Field Filtered	Filter Size	MS/MSD	Duplicate ID	
JXC	10	H (	e	VO						Constant Pro-
2 x 1	L	H	ce	TP	rH		1			and the second
	1. S.									
E.					*				1.1	
								1996		
j.										
1										
Ala .		•		NC	TES/ADDITIO	NAL COMMEN	TS			
The second second	MALA MA	unt la	hun	molow	sm			25 resu		
	V V V V V V V	- VI		T N N						
- M		12.	15 11	1 1	land	e classine	0 12	15	P	

		22		WELL	and the second se	IG DATA SHE	EET				
				Well ID:		W-8D		Job Number:	T	-	
212	Casc	adia		Client:	Nust	arVan	nex	Date:		18	
2	Associate	es, LLC		Project:	Gun	4019		Sampler:	1240-1330		
The second second			-	Weather:	WELL	DATA		Time In/Out:	1240-	- [000	
		Flush-mount/S	- tale un		Well Diamete	and the second data and the se	22	Danth to Free	Dueduetu		
Monument Ty	/pe:		prick-up					Depth to Free Product:		C	
	Other:     Well Depth:     Free Product Thickness:       Int Condition:     Depth to Water:     19.30       Water Column Length:							~			
Monument C		guor	/		Depth to Wa		17.00	Water Columr			
Well Cap Lock	Present:	Yes No			Screened Inte	erval:	-	Purge Volume	:		
Comments:						1					
	and the second	ight) X (Multipl	ier) X (# Casir 1-inch well =	CONTRACTOR OF THE OWNER OWNE	2:	1		2	1 2 705 14		
Water height	multipliers (ga	al):	1-inch well =	0.041	2-inch = 0.16 PURGIN		4-inch = 0.65	3	1 gal = 3.785 lit	ters	
Purge Metho	d:	6	40		Pump Intake	the second state of the second state	1	MS	-		
Sampling Met			16		Tubing Mate	and the second second second second second	CDP		NEW	DEDICATED	
	Volume Cumulative		U			.,,				1	
Time	Volume Purged (liters)	Volume Purged ~ (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Col Other Rema	
				1220.02	+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV		
1250			19.80	.15	6.42	12.81	100	5,02	7.7	elec	
253		1.1.2	1	1	6.47	12.78	99	4.04	82		
1256					10	12.79					
1-1	Sec. 1		16.00		6.54		100	3.59	9.8		
1259			19:80		4.61	12.70	101	3.39	10.4		
1302			1	. (1	6.65	12.75	100	3.04	16.1	V	
1305			-		6.92	12.73	101	2.19	51	1	
(30 9					6.95	12.71	100	2.01	19		
	No.								1.1	4	
1311	-r <sup>a</sup> ll		V	N.	6,96	12,73	100	1.93	4.5		
1 100	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 84 6	and the second second								
	4	2									
1.										÷	
the growth								P			
								S.			
								1.1	the second second		
			05		and the state of the second second	IG DATA					
Sample ID:		mw.	JOD	Sampling Flo		. (5		Analytical Lab		Apex	
Sample Time No. of Contai		Presen	vativo	Final Depth t		Field Filtered		Did Well Dewi		NIN	
The contained of the co	ners/Type	Preser		Analysis/Met			Initiar Size	MS/MSD	Duplicate ID	- NAME OF BRIDE	
of	U	HC	Ľ_	VC				1001			
The	IL	He	L	T	14		and the second second			2011 1	
					64			1.16			
	12				-			1 200			
in the second se								1000		· · · · · · · · · · · · · · · · · · ·	
	<u>†</u>							1.20			
				NC	TES/ADDITIO	NAL COMMEN	TS				

					MONITORIN					
						IG DATA SHI	EET	Job Number:		_
MA	0	1.	199	Well ID: Client:	100		mex	Date:	11/	10
2	Case	adia	15. 18	Project:	Gwi	M 401	g	Sampler:		100
	Associate	es, LLC		Weather:	(L) o	ndy		Time In/Out:	1335	- 1410
1.8		a			WELL	DATA				
onument Ty	/ne'	Flush-mount/	Stick-up		Well Diamete	er:	2	Depth to Free	Product:	-
onument	,рс. . Д	Other:	0		Well Depth:		-	Free Product	Thickness:	-
onument Co	ondition:	goo	S		Depth to Wat	ter:	21.24	Water Colum	n Length:	
ell Cap Lock	Present:	Yes No			Screened Inte	erval:	-	Purge Volume	:	-
mments:		No.								
	and the second strate which the second strate second strat	ight) X (Multip		And the second second second			1			
ater height	multipliers (g	al):	1-inch well =	0.041	2-inch = 0.16	and the second se	4-inch = 0.65	3	1 gal = 3.785 li	ters
Irge Metho	d:	1	m		PURGIN Pump Intake	and the second		MS		
mpling Met			¥¥		Tubing Mater		10	PE	NEW	/ DEDICATED
	de la serie de	Cumulative	20				- u			
Time	Volume Purged	Volume	DTW	Purge Rate	рН	Temp	Cond	DO	ORP	Clarity/Color
	(liters)	Purged (liters)	(btc)	(L/min)		(°C)	(µS/cm)	(ppm)	(mV)	Other Remarks
19.62.5		(incers)	LO TRA LA	1	+/-0.1	+/-0.5 °C	+/35%	+/-0.5 ppm	+/-20 mV	
340		T	21.24	640	6.60	13.16	95	4.60	.4	clear
12/12			L1.17	6.64		1 14	97			city
1345		- 1 m	1	6.04	6.64			4.50		
1346			21.24	.2	6.57	13.18	95	4,90	3.2	
1349				1	4.52	13.23	93	5.85	5.9	
352		2.5	1	1	6,50	13.30	93	5.29	8.1	N
	7	17. AN		1						
	1						10 Million			
						1				
					100.0					
		and the second	-	- Mark	and the					4
					1					1304
					1.2.5				Ø.	
					- 12					1. 1
1	· · · · · · · · · · · · · · · · · · ·					1.1.1		-		
								-		
-					PURGIN	G DATA		1.1.2		
mple ID:		MI	5-9	Sampling Flo			7.	Analytical Lab	oratory:	And
imple Time:	120	13	52	Final Depth t	the second s	21	25	Did Well Dew		NO
o. of Contair			rvative	Analysis/Met	and the second se	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
3x	40	Ц	29	VK	)(	-				
10	11	I II	00		RA	~				
UX		H H			4 N		Constant of		1	
										1.1
		100								
- 11						120		·	-	
				NC	DTES/ADDITIO	NAL COMMEN	TS			
					1					
								and the second sec		

	Carlos -			Well ID:	MU	J-7		Job Number:	-	
NE	Case	adia		Client:	Alu 4	star Var	wet	Date:	IN	18
	Case	aula		Project:	Gint	14019		Sampler:		100
T	Associat	es, LLC		Weather:	R	un lin		Time In/Out:	7	1500
Contraction of the	-	~	7	Weddiler.	WELL	DATA		Time myoud.	2.2	1000
	1000	Flush-mount	/stick-up		Well Diamete		2	Depth to Free Product:		
Monument Typ	be:									
and the second	(ale	Other:	0		Well Depth:			Free Product		~~~~
Monument Co	ndition:	gro	a		Depth to Wat	ter:	13.79	Water Colum	n Length:	-
Well Cap Lock	Present:	Yes No			Screened Inte	erval:	~	Purge Volume	2:	-
Comments:			1.15					And a		
Purge Volume	urge Volume = (Water Height) X (Multiplier) X (									
Water height n	nultipliers (g	gal):	1-inch well =	0.041	2-inch = 0.16	2	4-inch = 0.65	53	1 gal = 3.785 lit	ters
					PURGIN	G DATA				
Purge Method			PP.		Pump Intake	Depth:		MS	0	
Sampling Meth	od:		Ph		Tubing Mater	rial & Type:	12	PE	NEW	DEDICATED
	Volume	Cumulative	-0							
Time	Purged	Volume	DTW	Purge Rate	pH	Temp	Cond	DO	ORP	Clarity/Colo
	(liters)	Purged	(btc)	(L/min)		(°C)	(µS/cm)	(ppm)	(mV)	Other Rema
		(liters)				10590	.1.5%	1/05	1/20-11	
1111			10 -10		+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1417	2	1.1.2	13.79	.2	6.38	15.55	356	7.81	26.9	dec
1422			1		6.44	BID	390	7.17	22.5	1
1475	15 5		13.79	. 15	10 -	12/1	399	L 11		
1707			10.11	• \7	6.51	10.61	1011	TIL	21.9	
1428				1	6,50	13.63	402	1.94	20.5	
1431			-		6.52	13.63	390	1.75	202	
1434				1	0.54	131.2	388	1 1 1	10° -	
104			-	alski -	4124	12.64	100	1,69	19.7	*
						1. 1				ch -
	1		A . 21		120. f		Sec.			
					1. 100	1.0000		111 Mar. 20		
	<u>.</u>	1	10	<u> </u>				1111		
and person		See 2		1. 1.	1		18. Cal			
2	10.0	1.		No al al	P. 11	1.1.1	12.2	1.	1998	18.00
	1315									
(	1	Berline B				- 65 <sup>2</sup>			Alexa A	
1				2				Cinc.		
		1.						1		1
	in the second				PURGIN	G DATA	L	1	I	ga ng mananaka kada da manaya matu
Sample ID:		A la	1-7	Sampling Flo	an action of the second s	, h	5	Analytical Lab	oratory I	daa .
Sample Time:	STO 75	14	34	Final Depth t		13.9		Did Well Dew		Aged
No. of Containe	rs/Type	Droce	rvative	Analysis/Met	and the second data was not as a se	Field Filtered		MS/MSD	Duplicate ID	NO
		11		and the second sec	the second s	rieu rittereg	A ILLEI SIZE			
3x1	-10	H	il .	V	OC.	4	1			
2x	IL	H	ce	T	PA	1		100 miles		
3.26	14 8	14	1 . JA	12			10 121	1.11	110	The set
		-	-		1	10 S. 1	-	-		
1		1			ales are		-			P. 38
						1.10				
	145	1.	1.100	100						
and the second						NAL COMMEN				
				NC		NAL CUIVIMEN	13			
An and a factor of the state of	10		1. 1.	10		1.11		199		
										E. 197.
10.10		1111	1				1.19		1	2000

						NG DATA SHI	EET		1	
MA				Well ID:	Me	1		Job Number:		1.6
24	Case	adia		Client:	Nu -		met	Date:	14	19
21	Associate	es, LLC		Project:	GWW	14919		Sampler:	1071- 0810	
and the second s			-	Weather:	1 Kt	DATA	-	Time In/Out:	0+15	-0810
		Flush-mound	Ctick		Well Diamet	THE REAL PROPERTY OF THE PARTY	170	Danth to F	Draducti	
Monument Ty	'pe:	ft	Stick-up			er:	2	Depth to Free Product:		
		Other:	$\times$		Well Depth:			Free Product		
Monument Co	ondition:	200	0		Depth to Wa	ter:	20.61	Water Colum	n Length:	
Well Cap Lock	Present:	Yes No			Screened Int	erval:	-	Purge Volume	2:	
Comments:										
	the second s	eight) X (Multip	and the second se	the second s			·			
Water height i	multipliers (g	;al):	1-inch well =	0.041	2-inch = 0.16	and the second s	4-inch = 0.6	53	1 gal = 3.785 l	iters
During Adaption	1.	T	0.0		and the second second second	IG DATA	1			
Purge Method			¥/		Pump Intake	and the second second second		NE-	A	
Sampling wiet	mpling Method:			1	Tubing Mate	rial & Type:	6	pre	( NEW	/ DEDICATED
	Volume	Volume	DTW	Purge Rate		Temp	Cond	DO	ORP	Clarity/Cold
Time	Purged	Purged	(btc)	(L/min)	pН	(°C)	(µS/cm)	(ppm)	(mV)	Other Rema
Sector Sector	(liters)	(liters)		4.2.000	2					
	and the second			C. C. S. S. K.	+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
737 1			20.61	.15	6.80	13.58	739	14.75	-79.9	cha
240			20 11		1. 13	13.60	787	1.51	-101.4	1
5102			10000	í	1.76	1 /	7.88	102		
141			20.79	e.	4.17	13.65	-	1.01	-101.2	
746			20.87		6.76	1363	789	1.69	-122.1	V
144			70.98	t	6.76	13 61	290	1.66	-101.8	F F
		-	00010					1000	10110	
						-				
					the second second second					
								5 e		
			-	1						1.
	<u></u>							+		
	_				-					-1
	,									
		1								
1		L		L	DUDCH	IG DATA	1		L	
Sample ID:			)-6	Sampling Flo		1		Analytical Lab	oratory	Apex
Sample Time:		0.7	G	Final Depth t		21:	26	Did Well Dew		No
No. of Contain		Prece	rvative	Analysis/Met	and a second	Field Filtered	the second se	MS/MSD	Duplicate ID	140
By L			N Ø				rincer Jize			
JA-	10	<u> </u>		V						
Zx	11	<u> </u> +	Cl	T	YH					
									1.1	
		+						-		
			· ·							
		<u></u>		NC	DTES/ADDITIC	NAL COMMEN	TS	- de prese an	4	
						1.000				

34	Casa	cadia		Well ID: Client: Project:	Ma NG		met	Job Number: Date: Sampler:	Inti	5
1	Associat	es, LLC		Weather:	71.14	men		Time In/Out:	845- 935	
	(	~				DATA			10/30	120
	(	Flush-mount/	Stick-up	6	Well Diamet	er:	2	Depth to Free	e Product:	
Monument Typ	e:	Other.			Well Depth:		-	Free Product	Thickness:	
Monument Cor	dition:	an	0	7.5.5	Depth to Wa	ter:	18,59	Water Colum	n length:	
Well Cap Lock F	1	Yes No		1997	Screened Int		10.51	Purge Volume		
Comments:				100 A.	Serectica int			I uige voluine	с.	The same of the same
Purge Volume =	= (Water He	eight) X (Multip	lier) X (# Casir	ng Volumes)	[					
Water height m		year	1-inch well =	And the second second second second second	2-inch = 0.16	i2	4-inch = 0.6	53	1 gal = 3.785 li	iters
P.C.					PURGIN	IG DATA				
Purge Method:			PP.		Pump Intake	Depth:		MS	$\langle \cap \rangle$	
Sampling Meth	od:	1.1.1	ep_		Tubing Mate	rial & Type:	6	SPE	( NEW	DEDICATED
Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Co Other Rema
			al and the second		+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
903			18.59	,2	6.71	13.21	609	10.69	-72.4	de
906					6.72	13.30	581.	5,83	-72.6	
925			18.45		1.22	1397	524	2,93	-lale.0	1
GIA					11.5	10 678		1	561	1. 44. 1. 1.
912		- 11 - 1 - 1 - 1	18.71		4.61	13.98	504	2.01	- 57.6	
915		ļ	2		6.66	14.02	495	1.96	-55.7	· · · ·
918			18.80		6.61	14.06	486	2.00	-53.5	9
Sample ID:		Mu		Sampling Flo		IG DATA		Analytical Lab		t. a
Sample Time:		0918		Final Depth t		1 1 1	.82	Did Well Dew		PPS
No. of Containe	rs/Type	1	vative	Analysis/Met		Field Filtered		MS/MSD	Duplicate ID	
Bx UT	)	14	0 0		DC					
0.1	-	11	NO		74					
14	/	H	U		14	-	1			
							1.30			
							200 - 20		1.1	
-										
				NC		NAL COMMEN	 TS			L
				NC	TLS/ADDITIO	INAL COMMULIN	13			
			-							
-										

line and				The second se		NG DATA SHI	EET	i de com		
MA				Well ID:	pru pru			Job Number:		1.0
24	Case	adia		Client:	Nu		mar	Date:	1	117
-	Associate	es. LLC		Project:	GWI	7 401	1	Sampler:	4	a
- Aller				Weather:	<u> </u>	India	-	Time In/Out:	940	~
		1	)		1	DATA	1 24		1	
Monument T	vpe: X	Flush-mount	Stick-up		Well Diamete	er:	21	Depth to Free	e Product:	
	·····	Other:	Δ		Well Depth:		-	Free Product	Thickness:	
Monument C	Condition:	900	d		Depth to Wa	ter:	20.12	Water Colum	n Length:	_
Well Cap Locl	k Present:	Yes No			Screened Int	erval:	-	Purge Volum	e:	
Comments:										
Purge Volum	e = (Water He	ight) X (Multip	lier) X (# Casir	ng Volumes)						
	multipliers (g	And the second second second	1-inch well =	A CONTRACTOR OF A CONTRACTOR O	2-inch = 0.16	2	4-inch = 0.65	53	1 gal = 3.785 li	ters
					PURGIN	IG DATA				
Purge Metho			10,1		Pump Intake	Depth:	1.1	MS	$\square$	
Sampling Me	thod:		Lh_		Tubing Mate	rial & Type:	6	DPE	NEW	/ DEDICATED
Time	me Purged (liters) Cumulativ Volume Purged (liters)		DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
0946			20.12	.2	6.37	13.BU	290	12.42	95.9	dear
0945			1		6.42	141.6	398	8.57	45.9	1
ng=1			10.12		1 Co	14 2/2	564	378	-86,4	
2011C	1		W.V.C		6.70	14.39	519	0.0	No 1	
0955		- 11 - 11 - 11 - 11 - 11 - 11 - 11 - 1			1.00		567	222	-165.4	
0958		L	A		7.08	14.40	570	2.01	-127.1	
1001					7.10	14.44	570	1.34	131.0	1
1004					7.13	14.46	510	1 11 -	132.5	
					1 .	1 1 1.1	In I	1.10	10	-1
1007					7.11	14.44	571	1.07	130,1	
				1		¥				4.51
										. 23
									1	Sector Sector
										and the second
Sample ID:		1/1/1	(-11	Sampling Flo				Application	oratory	
Sample ID: Sample Time		110	1-11	Final Depth t		10	10	Analytical Lal Did Well Dev		Ret
No. of Contai		Prese	rvative	Analysis/Met			Filter Size	MS/MSD	Duplicate ID	1117 -
	1D	1/	C D	and the second second second second	OC					×
JX OX	40	17	y	N				1	2000	
- <sup>-</sup> - X	14	1-1	UL	T	PH					
						1987 - 1997 - 19				
						S	1			
			14. 14.			1	1			180
12										
				N/C		NAL COMMEN				
1.1				NU		TAL CONTINIEN	13		Manager and the second	
4	1 1		A s						-	
Jan	nple de	epth i	mtake	(0) 0	prox	22.5				all and
	1	`								

		And the		WELL	MONITORIN	IG DATA SHE	EET			
				Well ID:	Ma			Job Number:	-	T
NA.	Case	ndia		Client:	N	n Starly	annes	Date:	11	117
-	Associate	es. LLC		Project:	GL	NM 4	29	Sampler:		yw
- aller filter				Weather:	C	loudy		Time In/Out:	1025	- 1110
		( )			WELL	and the second se				
Monument Ty	/pe: 🐧	Flush-mount	/Stick-up		Well Diamete	er:	U	Depth to Free		
		Other:	0		Well Depth:			Free Product	Thickness:	
Monument Co	ondition:	Gy1	Jal		Depth to Wat	ter:	20.69	Water Colum	n Length:	-1
Well Cap Lock	Present:	Yes Na			Screened Inte	erval:		Purge Volume	::	_
Comments:										
Purge Volume	the company of the local data and the second se		1		Sec.					1.
Water height	multipliers (g	al):	1-inch well =	0.041	2-inch = 0.16	statement of the second se	4-inch = 0.65	3	1 gal = 3.785 li	ters
Purge Method	4.	I	00 .	a second second	PURGIN		1	.AN <		
Sampling Met	and the second se		W/		Pump Intake Tubing Mater		1	note	NEW	/ DEDICATED
Sumpling met	· · · · · · · · · · · · · · · · · · ·	Cumulative	- AD		TUDING MALE	lar oc rype.		DIE		7 PLUICATED
Time	Volume Purged (liters)	Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	рН	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Clarity/Color Other Remarks
End Alexan	2014/04/201	(incers)	a turka sa s	20100000	+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1025	and the second transmission		20.64	,2	6.76	1300	535	1150	-111.0	Clear
1020			00.01	10		12/1	1/17	GIG	11/7	Clar
1000			1014		6.86	13.66	994	7.11	-113.T	
104			20.64		600	13.48	230	7.39	-74.5	
1044				X	682	13.47	210	6.81	-76.7	
1047					10 79	13.33	201	6.52	- 531	11
1050			1	1	120	12 18	196	La Lla	-514	V
1010					6.12	12.00	110	10. TH	= )(. (	
				,						
s ar										
						Sec. 1				
						Eye				
						<i>a</i> .			1	
								-		
		A	1-10-		PURGIN	G DATA				A
Sample ID:		M	W-10	Sampling Flo		32	10-	Analytical Lab	Construction of the second	Apen
Sample Time: No. of Contair		105	U rvative	Final Depth t		Cield Filtered	15	Did Well Dew	Section of the sectio	INO
	iers/Type	Prese		Analysis/Met	- /	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
UX	40	1	ý	V	O(					
27	L	1-1-	tel	T	YH+	$\sim$	1.5.10.10			
							1			
					ar o <del>11 de 1819 - 1919</del>					
							17			
				L					1	
		and the first of the second		NC	DIES/ADDITIO	NAL COMMEN	15			a second de la second
an she a										
	P.A.									
	1									

		- Constant and evenestic				IG DATA SHE	:21	le e se e e		
MA	-			Well ID:	MW	7 hr		Job Number:	11	1,0
20	Case	adia		Client:	GW	tar Va	nner	Date:	- (),1	(1/
71	Associate	es, LLC		Project:	gw!	MUQI	1	Sampler:	117 -	1230
		2		Weather:	WELL	DATA		Time In/Out:	1109 -	1250
		Flush-mount/	lick up	والوادود مخاطفين	Well Diamete		2*	Depth to Free	Product:	-
Monument Ty	vpe:						0			~
		Other:	-1		Well Depth:		20.00	Free Product 1		
Monument Co			bal		Depth to Wat	er:	32.09	Water Columr	Length:	
Well Cap Lock	Present:	Yes No			Screened Inte	erval:	-	Purge Volume		
Comments:										-
Purge Volume	the second	the second se	and the second se							
Water height	multipliers (g	al):	1-inch well =	0.041	2-inch = 0.162	and the second se	4-inch = 0.65	3	1 gal = 3.785 li	ters
Purge Method	4.	/			PURGIN	the second s	1	DAC		
Sampling Met			Yo O		Pump Intake			MS	NEW	DEDICATE
		Cumulative	D		Tubing Mater	агостуре:		LDre	INEVV	DEDICATE
<b>T</b> '	Volume	Volume	DTW	Purge Rate		Temp	Cond	DO	ORP	Clarity/C
Time	Purged	Purged	(btc)	(L/min)	рН	(°C)	(µS/cm)	(ppm)	(mV)	Other Ren
	(liters)	(liters)								
					+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
136			32.09	. (	6.37	13.81	154	4.97	27.7	die
1839				1	6.41	13.54	141	4.80	19.5	4
11 DA				4.1	10 43	13.65	139	1 91	16.5	
				4	4.95			0.11		
19-15		· · · · · · · · · · · · · · · · · · ·		4.1	6.42	13.66	135	2.82	15.2	
1048				d	6.44	13.63	135	2,75	14.9	0
	and a second									
		1		×	+					
	· · · · · · · · · · · · · · · · · · ·		1.1		N.					
					1					
					1.5					
				~						
		· · · · ·						- 1 × 1		
4										
	A						5		9	
					PURGIN	G DATA				4
Sample ID:		MW		Sampling Flo		K.1		Analytical Lab		Apt
Sample Time:			8	Final Depth t	and the second se		15	Did Well Dew		No
No. of Contair	ners/Type	Prese	rvative	Analysis/Met		Field Filtered	Filter Size	MS/MSD	Duplicate ID	. %.
3x	40	H	2	V	oc	7				~
7.	IL	11	0 1	T	PH					
								-		
								-		
			0							
							~ *			
		L		NC	DTES/ADDITIO	NAL COMMEN	TS	L		
1	NI I	1	noing.	4		sles s	1 1			

					and the second designed in			IG DATA SHE	ET			
MA				Well I			Mu			Job Number:	-	To
794	Case	adia		Client	-		yu:		met	Date:	1)	19
2	Associate	es, LLC		Proje			Gw	M 491	1	Sampler:	40	5
				Weat	her:		-	t Kuiv	1	Time In/Out:	1:240	
						L. II	WELL		12			
Monument Ty	lonument Type:						Diamete	er:	2*	Depth to Free		
1	Other:					Well	Depth:		-	Free Product T	hickness:	
Monument Co	ondition:	gue	95			Dept	n to Wa	ter:	31.01	Water Column	Length:	
Well Cap Lock	Present:	Yes No				Scree	ned Inte	erval:	-	Purge Volume	:	-
Comments:												
Purge Volume	= (Water He	ight) X (Multip	lier) X (# Casin	ng Volu	umes)							2
Water height i	multipliers (g	al):	1-inch well =	0.041		2-incl	n = 0.16	2	4-inch = 0.65	3	1 gal = 3.785 li	ters
		-	~ ^ ~			1		G DATA				
Purge Method			PPA-				Intake			MS	1	
Sampling Met	hod:		2h			Tubin	g Mate	rial & Type:	L	DPE	NEW	/ DEDICATED
	Volume	Cumulative Volume	DTW	Durg	e Rate			Toma	Cond	DO	ORP	Clarity/Co
Time	Purged	Purged	(btc)		min)		pН	Temp (°C)	(µS/cm)	(ppm)	(mV)	Other Rem
in the second	(liters)	(liters)		,-/					(, -, -, -, ·, ·, ·, ·, ·, ·, ·, ·, ·, ·, ·, ·, ·,	\FF'''/		
						+,	/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
1251			31.01		1	6.	12	3.64	158	6.81	162.6	de
1291						6	16	1322	159	5.87	125.8	1
10m				-	1	1	14	1.1.1	11	70.07	1	
125 +					1	Q.	24	19.11	165	5.99	79.0	
1300						6.	45	14,52	176	4,48	25,5	
1303						10,	49	14,57	1760	4.25	773	
1300					t	1 0			122		<i>CC</i> , <i>C</i>	J
1700		<u></u>			U.	14.	50	14.60	1.47	4.16	21.7	
		1. A.									· · · ·	
											1.25	
			10	1				1	2. 1			
										1 K		10
										1		
		a			-				1.1			
												0
		L				1		G DATA				
Sample ID:		Min	- 3	Samo	ling Flo		and the second se			Analytical Lab	oratory:	An
Sample Time:			06		Depth to			31	25	Did Well Dewa		The
No. of Contain			vative		sis/Met			Field Filtered	Filter Size	MS/MSD	Duplicate ID	100
321	10	AFd				DC						
	IV .	10							<u>.</u> )	100		
2x	IL	Ŧ	KI		T	PH						
		· · · ).	1						¥.			
					<del></del>							
									-			
								NAL COMMENT	rs			
	1	Air B			- 5'		1	nw-Y				

urge Volume = (Water Height) X (Multiplier) X (# Casing Volumes)       2-inch = 0.162       4-inch = 0.653       1 gal = 3.785 liters         varge Method:       PURGING DATA         ampling Method:       PUT be that a Depth:       PUT be that a Depth:<					WELL	MONITORIN	IG DATA SHE	ET			
Sobilities, LLC         Project:         GUMM         HQ 17         Sampler:         Low           Master         Weather         Weather         Weather         The Information         ISS D         - 144D           Informent Type:         Weather         Weather         Z         Depth to Free Product Thatkness:         -           Informent Condition:         Strongent:         Strongent:         3D, (1)         Weather         3D, (1)         Weather         -         Purge Values:         - <td>4</td> <td></td> <td></td> <td></td> <td>Well ID:</td> <td>MW</td> <td>-2</td> <td></td> <td>Job Number:</td> <td>-</td> <td></td>	4				Well ID:	MW	-2		Job Number:	-	
Sobilities, LLC         Project:         GUMM         HQ 17         Sampler:         Low           Master         Weather         Weather         Weather         The Information         ISS D         - 144D           Informent Type:         Weather         Weather         Z         Depth to Free Product Thatkness:         -           Informent Condition:         Strongent:         Strongent:         3D, (1)         Weather         3D, (1)         Weather         -         Purge Values:         - <td>NX</td> <td>Case</td> <td>adia</td> <td></td> <td>Client:</td> <td>Nus</td> <td>tery Von</td> <td>NNCK</td> <td>Date:</td> <td>111</td> <td>19</td>	NX	Case	adia		Client:	Nus	tery Von	NNCK	Date:	111	19
Weather:         Cloud         Time In/Out:         ISS 0         7/470           torument Type:         Well Damater:         Z         Doph to Free Product:         —           torument Condition:         Well Damater:         Z         Doph to Free Product:         —           torument Condition:         Well Damater:         Z         Doph to Free Product:         —           torument Condition:         Well Damater:         Z         Doph to Free Product:         —           torument Condition:         Well Damater:         Z         Doph to Tree Product:         —           torument Type:         Well Damater:         Z         Doph to Tree Product:         —           torument Type:         Well Obart Hight X (M Casing Volume:)         —         Purge Note:         —           torum torum         Torum torum         Purge Note:         DO         0.00         0.00           True Reveal         Units:         Yourne:         Units:         Yourne:         DO         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00         <	-	Accesiot	uuiu		Project:			9	Sampler:		1win
Informent Type:         Full Amount/Stip-up         Well Diameter:         Z         Depth to Free Product:           Groument Condition:	-	Associate	55, LLC		Weather:	C		Time In/Out		1350	- 1440
Wall Depth:		(	$\sim$			WELL	DATA				
Open:         Well Depth:         Free Product Thinkness:           Vell Cap Lock Present:         Vest / Ve		vne.	Flush-mount/	Stick-up		Well Diamete	er:	21	Depth to Free	Product:	
Vest (Vest No       Screened Intervel:       Purge Volume:         ommento:	violiditiene i	ypc.	Other:	0		Well Depth:			Free Product	Thickness:	
anments: urge Valuer = (Water Height) X (Multipler) X (# Casing Volumes) urge Valuer = 0.041 2 inch = 0.65 PURKING DATA PURKING DATA PUR	Monument C	ondition:	900	J		Depth to Wa	ter:	30,11	Water Colum	n Length:	-
anments:	Well Cap Lock	k Present:	1, 01			Screened Inte	erval:		Purge Volume		_
fater height multiplies (gal):       1: hoch well = 0.041       2: hoch = 0.162       1: hoch = 0.653       1: gal = 3.785 litters         PURBING DATA       PURBING DATA       PURBING DATA       PURS       PURS         ampling Method:       Purged       Purged       PUR       PURS       PURS         Time       Purged       Purged       Purged       PURS       PURS       PURS       PURS         (liters)       OUTW       Purge Rate       pH       Temp       Cond       DO       ORP       Clanity/Color         (liters)       OUTW       Purge Rate       pH       Temp       Cond       DO       ORP       Clanity/Color         (liters)       3D, 1       ./5       G. 4T       1/4.53       S.7.12       1/8.7.3         14000       3D, 1       ./5       G. 4T       1/4.75       1/3.5       1/4.7.4         1400       G.40       1/4.24       1/5       1/4.7.5       1/4.7.5       1/4.7.5       1/4.7.5         1400       G.40       1/4.24       1/5       1/4.7.5       1/4.7.5       1/4.7.5       1/4.7.5       1/4.7.5       1/4.7.5       1/4.7.5       1/4.7.5       1/4.7.5       1/4.7.5       1/4.7.5       1/4.7.5       1/4.7.5       <	Comments:										
PURSING DATA           PURSING DATA           ampling Method:         Cumulative Purged (liters)         Cumulative Purged (liters)         Purge Rate OTW         Purge Rate PH         Temp Property         Cond (us/cm)         DD (pm)         OD (pm)         ORV (mv)         OLST           14/00         30,11         .15         64         14.53         B2         7.35         Z2.4         1         clarky/Color Other Remarks           14/00         30,11         .15         64         14.753         B2         7.35         Z2.4         1         clarky/Color Other Remarks           14/00         30,11         .15         64         14.753         B2         7.35         Z2.4         1         clarky/Color           14/00         633         1/4.24         1/54         7.40         6/.4         1         1.57         7.37         Z2.4         1<	Purge Volume	e = (Water He	ight) X (Multip	lier) X (# Casir	ng Volumes)						
unge Method:         PUmp Intake Depth:         PUS           Time         Volume Purge Method:         Tubing Material & Type:         LD PC         NEW / DEDICATED           Time         Volume Purge Purge (Iters)         DTW         Purge Rate (L/min)         pH         Temp         Cond (LuS/cm)         DD         ORP         Clarity/Color (Iters)           14/00         30,11         ,15         C         H/4.53         BZL         7.353         Z14/L         Clarity/Color (Iters)           14/00         30,11         ,15         C         H/4.53         BZL         7.353         Z14/L         Clarity/Color (Iters)           14/00         0         0.11         ,15         C         H/4.53         BZL         7.353         Z14/L         Clarity/Color (Iters)           14/00         0         0.153         5.712         I&7.53         I         Clarity/Color (Iters)         Clarity	Water height	multipliers (g	al):	1-inch well =	0.041	2-inch = 0.16	2	4-inch = 0.65	53	1 gal = 3.785 li	ters
ampling Method:       Cumulative Purged (iters)       Tubing Material & Type:       LD PC       (NEW / DEDICATED         Time       Purged (iters)       OTW Purge Rate (iters)       Purge Rate (iters)       pH       Temp ('C)       Cond (is/cm)       DO (ppm)       ORP (mV)       Clarity/Color Other Remarks         14/00       30.11       ./5       G. 4F       /4.53       BZ       7.35       ZZ4.1       Je and Other Remarks         14/00       30.11       ./5       G. 4F       /4.75       BZ       7.35       ZZ4.1       Je and Other Remarks         14/00       30.11       ./5       G. 4F       /4.75       J.75       1.87.2       Je and Other Remarks         14/00       30.11       ./5       G. 4F       1/4.21       J.75       1.75       1.75       J.70.7       Je and Other Remarks       Je and Other Remarks         14/00       I       I       I       I.75       I.75       J.75       J.70.7       Je and Other A         14/10       I       I       I.75       I.75       I.75       J.74       Je and Other A         14/12       I       I.75       I.75       I.75       Analytical Laboratory:       Je and Other A       Je and Other       Je and Other A <tr< td=""><td></td><td></td><td></td><td>00</td><td></td><td></td><td>and the second /td><td></td><td></td><td></td><td></td></tr<>				00			and the second				
Time         Volume Purged (Iters)         Cumulative Volume (btc)         DTW (btc)         Purge Rate (Iters)         PH         Temp ('C)         Cond (us/cm)         DO (ppm)         ORP (mV)         Clarity/Color Other Remarks           14000         30,11         .15         E. 4/r         14.55*         97-75         72.35         72.44,1         clarity/Color Other Remarks           14000         30,11         .15         E. 4/r         14.55*         97-75         57.72         187-3           1400				PI			and the second se			A	
Time         Volume Purged (iters)         OW (bt)         Purge Rate (Umin)         pH         Temp ('C)         Cond (us/cm)         DO (ppm)         ORP (mV)         Clarity/Color Other Remarks           1400         30,11         .15         647         14.53         87.2         7.35         72.4,1         cle cov           1400         30,11         .15         647         14.53         87.2         7.35         72.4,1         cle cov           1400         .16         .35         14.21         1.55         4.75         87.2         1.87         1.11           1400         .16         .35         14.21         1.55         4.75         1.75         7.10         1.11           1400         .16         .35         14.21         1.55         1.75         1.14         1.14         1.14         1.15	Sampling Met	thod:		eh-	T	Tubing Mate	rial & Type:	60	re	NEW	DEDICATED
1400       30.11       ./5       4.35°C       4/35°F       4/25 pp       4/25 pp         1400       30.11       ./5       6.47       14.53       BZ       7.35       ZZ4.1       cle cw         403       6.24       14.53       BZ       7.35       ZZ4.1       cle cw         409       6.33       14.27       155       41.75       103.2       104.4         1409       6.33       14.27       155       41.75       103.2       104.4         1415       6.40       14.24       154       Z.11       59.1       114.4         1415       6.40       14.24       154       Z.11       59.1       114.4         1415       6.40       14.20       174       Z.07       12.40       14.4         1415       6.40       14.20       174       Z.07       12.40       14.4         1415       14.20       174       Z.07       12.40       14.40       1	Time	Purged	Volume Purged		-	рН					
1400       30,11       .15       6.45       14.53       82       7.35       724,1       clear         403       .6.24       14.30       153       5.72       187.3          1400       .6.33       14.27       155       47.55       103.2          1409                 1409                  1409						+/-0.1	+/-0.5 °C	+/-5%	+/-0.5 ppm	+/-20 mV	
UO       UO <td< td=""><td>1400</td><td></td><td></td><td>30 11</td><td>15</td><td>G UN</td><td>1</td><td>81/</td><td></td><td>7241</td><td>cleral</td></td<>	1400			30 11	15	G UN	1	81/		7241	cleral
1400       16.33       14.24       155       4.75       103.2         1409       16.34       14.24       154       7.40       61.4         112       16.40       14.24       154       7.40       61.4         112       16.40       14.24       154       7.11       59.1         115       16.40       14.24       154       7.11       59.1         115       16.40       14.24       154       7.11       59.1         115       16.40       14.20       154       7.11       59.1         115       16.40       14.20       154       7.12       50.4         115       16.40       14.20       154       7.12       50.4         115       16.40       14.20       154       7.12       50.4         115       16.40       14.20       154       154       154       154         116	10103			00,11	0/0	1 2 1		152		1012	CIEUU
1409       14.74       176       2,40       61.4         412       6,40       14.24       154       2.11       59.1         415       6,41       14.20       154       2.07       62.6         415       6,41       14.20       154       2.07       62.6         415       6,41       14.20       154       2.07       62.6         415       6,41       14.20       154       2.07       62.6         415       6,41       14.20       154       2.07       62.6         415       6,41       14.20       154       2.07       62.6         415       6,41       14.20       154       2.07       62.6         415       14.5       154       154       156       156         400       14.5       154       156       164       156       164         400       14.5       154       156       164       164       164       164       166         53.40       HOL       140       140       140       140       140       140       140       140         14.1       HOL       140       140       140       140 <td>12/00</td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td>155</td> <td>3.16</td> <td></td> <td>i</td>	12/00					1		155	3.16		i
112       1       6,40       14,24       154       2.11       59.1         1415       1       6,41       14,20       154       2.07       62.6         1       1       1       154       2.07       62.6       154         1       1       1       154       2.07       62.6       154         1       1       1       154       2.07       62.6       154         1       1       1       154       2.07       62.6       154         1       1       1       154       2.07       62.6       154         1       1       1       154       2.07       154       154         1       1       1       1415       156 </td <td>1400</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>14.27</td> <td>155</td> <td>4.15</td> <td></td> <td></td>	1400						14.27	155	4.15		
Image: Second State Sta	1409	and the				6.34	14.27	156	2,40	61,4	
Image: Second State Sta	1411,					6.40	1424	154	2.11	59.1	
PURGING DATA  PURGING DATA  PURGING DATA  PURGING DATA  ample ID:  mmunor  purging Flow Rate:  mmunor	1410	72 - S77	15			6 . 1 1	1100	6		12 10	d
ample ID:       MW-2       Sampling Flow Rate:       . /5       Analytical Laboratory:       Apex         ample Time:       1415       Final Depth to Water:       30, 19       Did Well Dewater:       Mo         io. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         3x 40       H U       VOC	01710				4	6.91	19.00	17 1	LOF	QL. Q	
ample ID:       MW-2       Sampling Flow Rate:       . /5       Analytical Laboratory:       Apex         ample Time:       1415       Final Depth to Water:       30, 19       Did Well Dewater:       Mo         io. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         3x 40       H U       VOC		-									
ample ID:       MW-2       Sampling Flow Rate:       . /5       Analytical Laboratory:       Apex         ample Time:       1415       Final Depth to Water:       30, 19       Did Well Dewater:       Mo         io. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         3x 40       H U       VOC			·		-				1		
ample ID:       MW-2       Sampling Flow Rate:       . /5       Analytical Laboratory:       Apex         ample Time:       1415       Final Depth to Water:       30, 19       Did Well Dewater:       Mo         io. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         3x 40       H U       VOC						. ~					
ample ID:       MW-2       Sampling Flow Rate:       . /5       Analytical Laboratory:       Apex         ample Time:       1415       Final Depth to Water:       30, 19       Did Well Dewater:       Mo         io. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         3x 40       H U       VOC	~										
ample ID:       MW-2       Sampling Flow Rate:       . /5       Analytical Laboratory:       Apex         ample Time:       1415       Final Depth to Water:       30, 19       Did Well Dewater:       Mo         io. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         3x 40       H U       VOC											
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ample ID:       MW-2       Sampling Flow Rate:       . /5       Analytical Laboratory:       Apex         ample Time:       1415       Final Depth to Water:       30, 19       Did Well Dewater:       Mo         io. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         3x 40       H U       VOC									~		
ample ID:       MW-2       Sampling Flow Rate:       . /5       Analytical Laboratory:       Apex         ample Time:       1415       Final Depth to Water:       30, 19       Did Well Dewater:       Mo         io. of Containers/Type       Preservative       Analysis/Method       Field Filtered       Filter Size       MS/MSD       Duplicate ID         3x 40       H U       VOC										a constitue a sta	
ample Time: 1415 Final Depth to Water: 30,19 Did Well Dewater: Wo o. of Containers/Type Preservative Analysis/Method Field Filtered Filter Size MS/MSD Duplicate ID 3 x 40 H CL VOC A DOMENTS 2 x 1L H CL TPH NOTES/ADDITIONAL COMMENTS						PURGIN	G DATA				
o. of Containers/Type     Preservative     Analysis/Method     Field Filtered     Filter Size     MS/MSD     Duplicate ID       3x40     HCL     VOC     Image: Contrainers/Type     Image: Contrainers/Type     Image: Contrainers/Type     Image: Contrainers/Type       3x40     HCL     VOC     Image: Contrainers/Type     Image: Contrainers/Type     Image: Contrainers/Type       3x40     HCL     VOC     Image: Contrainers/Type     Image: Contrainers/Type       2x11     HCL     Image: Contrainers/Type     Image: Contrainers/Type       Image: Contrainers/Type	Sample ID:		MW	-2			.15				Apex
3x40 Hel VOC 2x1L Hel TPH	and the second se		141	5			30,				10
	No. of Contai	ners/Type	Prese	rvative	Analysis/Me	thod	Field Filtered	Filter Size	MS/MSD	Duplicate ID	
	<u>5x</u>	40	H	el		vc	~	1			
	2x	IL	H	22	1 +	-PH	-				
							1				
											1000
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									1		
					NO	DTES/ADDITIO	NAL COMMEN	TS			
											1.12

## **APPENDIX D**

# HISTORICAL GROUNDWATER ANALYTICAL DATA

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)
	05/14/02	<0.080	0.455 <sup>5.</sup>	<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		
MW-1	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
	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		
MW-2	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
	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		
MW-3	02/27/08	2.14	0.387 <sup>6.</sup>	<0.500	<0.0005	<0.0005	0.17	0.17		
10100-3	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		
	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		

Please refer to notes at end of table.



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)
	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		
MW-3	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
	05/14/02	<0.080	0.358 <sup>5.</sup>	<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		
MW-4	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
	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		
MW-5	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 F-18	<0.151	<0.00200	<0.0100	0.190	0.936		
	8/30/2018 DUP	20.8	0.631 F-18	<0.151	<0.00200	<0.0100	0.212	1.06		
	02/18/19	29.2	1.06 F-18	<0.151	<0.00200	<0.0100	0.187	1.06	<0.010	
	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

Please refer to notes at end of table.



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)
	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		
MW-5D	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
	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		
MW-6	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 F-18	<0.151	0.212	0.0452	1.59	1.15		
	02/18/19	18.2	2.15 F-20	<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
	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	
MW-7	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
	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	
MW-8	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
	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	
MW-8D	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

Please refer to notes at end of table.



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)
	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	
MW-9	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
	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	
MW-10	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
	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	
MW-11	08/29/19	17.4	0.094	<0.0748	0.0038	0.24	1.18	2.52	<0.005	0.121
	11/19/19	45.0	0.239	<0.151	0.0526	0.159	4.33	7.73	<0.02	0.414
Washington Method A Cl		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 with silica gel cleanup.
- 3. TPHho = Total petroleum hydrocarbons ion heavy oil carbon range NW-TPHdx method with silica gel cleanup.
- 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

J = Reported result is an estimated value.

- J- = Reported result is estimated and biased low.
- Q = Sample prepared and/or analyzed outside of recommended holding time. Result is considered biased low.

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.

D = Laboratory report noted discreet peaks that are not indicative of diesel. The laboratory chemist confirmed the peaks were from non-petroleum organic material.



### **APPENDIX E**

# LABORATORY ANALYTICAL REPORTS AND QUALITY ASSURANCE/QUALITY CONTROL 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 2019 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
A9B0609	2/18/19-2/19/19	Groundwater monitoring	Apex Labs -
A)D000)	2/10/19-2/19/19	event	Portland, OR.
A9E0719	5/20/19-5/21/19	Groundwater monitoring	Apex Labs -
A9E0719	5/20/19-5/21/19	event	Portland, OR.
A9I0015	8/28/19-8/29/19	Groundwater monitoring	Apex Labs -
A910015	0/20/19-0/29/19	event	Portland, OR.
A9K0658	11/18/19-11/19/19	Groundwater monitoring	Apex Labs -
11,1100,50		event	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 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
- 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 is found to have possible bias or error was qualified and flagged. The flags used in the data table are below.



A-01	Blank Spike recovery is below in-house lower QC limit but passes recommended NWTPH method limits. Data quality is unaffected.
Е	Estimated Value. The result is above the calibration range of the instrument.
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-42	Matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample and percent recovery or RPD was outside control limits.
T-02	The Batch QC sample was analyzed outside of the method specified 12-hour tune window. Results are estimated.

# 3.0 ANALYTICAL METHODS

Soil and/or sample 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 with silica gel cleanup; and
- Benzene, toluene, ethylbenzene, and xylenes (collectively BTEX) and Naphthalene by U.S. Environmental Protection Agency (EPA) Method 8260C.



# 4.0 QUALITY ASSURANCE OBJECTIONS 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	Matri	Analyte	Preservative	Hold Time	
EPA 8260C	Water	BTEX, MTBE and	Hydrochloric Acid (HCl) to pH<2;	14 days	
LI A 0200C	water	naphthalene	No headspace; Glass VOA	14 days	
NWTPH-Gx	Water	Hydrochloric Acid (HCl) to pH<2;			
NWIFH-GX	water	Gasoline Range Organics	No headspace; Glass	14 days	
NWTPH-Dx	Water	Diogol Dongo Organica	Hydrochloric Acid (HCl) to pH<2;	14 dava	
NWIPH-DX	water	Diesel Range Organics	Amber glass container	14 days	

Samples were received on ice below 4<sup>o</sup>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 sampling containers. All chain-of-custodies were appropriately relinquished by the Cascadia Associates sampler and received by the intentional environmental laboratory. There were no major discrepancies found between the bottles and the chain of custodies 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 and 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.

## 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.

## 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, with one exception:

An MS/MSD analysis was performed on water sample MW-6 (batch A9I0015-10) and the % recovery or RPD for naphthalene was outside of control limits. Because the associated LCS/LCSD percent recovery for the sample batch was within acceptable limits, no data are flagged.



## 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. Surrogate recoveries were within control limits. 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.

## 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.

The laboratory duplicate for source sample MW-11 (batch A9K0658-10) reported results for ethylbenzene and xylenes that were above the calibration limits of the instrument. The source sample MW-11 was re-extracted and QC methods were within acceptable 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. Typically, one field duplicate is analyzed per 20 project samples during routine



monitoring events; however, duplicates were inadvertently not collected from the February 2019 groundwater monitoring event.

# 5.0 CONCLUSION

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



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 EPA ID: OR01039



Wednesday, March 6, 2019 Stephanie Salisbury Cascadia Associates 6915 SW Macadam, Suite 250 Portland, OR 97219

#### RE: A9B0609 - Nustar Vannex - 0060-001-005

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 A9B0609, which was received by the laboratory on 2/19/2019 at 4:04:00PM.

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

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

	Cooler Receip	t Information		
	(See Cooler Receip	ot Form for details)		
cooler#1	3.5 degC	Cooler#2	3.8 degC	
Cooler#3	2.4 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

Ausa A Jomenichini

Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### ANALYTICAL REPORT FOR SAMPLES

	SAMPLE INFORM	ATION		
Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-6	A9B0609-01	Water	02/18/19 09:10	02/19/19 16:04
MW-5D	A9B0609-02	Water	02/18/19 09:50	02/19/19 16:04
MW-5	A9B0609-03	Water	02/18/19 10:10	02/19/19 16:04
MW-4	A9B0609-04	Water	02/18/19 11:00	02/19/19 16:04
MW-9	A9B0609-05	Water	02/18/19 11:40	02/19/19 16:04
MW-8D	A9B0609-06	Water	02/18/19 12:10	02/19/19 16:04
MW-8	A9B0609-07	Water	02/18/19 12:40	02/19/19 16:04
MW-3	A9B0609-08	Water	02/18/19 13:40	02/19/19 16:04
MW-7	A9B0609-09	Water	02/19/19 08:00	02/19/19 16:04
MW-10	A9B0609-10	Water	02/19/19 08:40	02/19/19 16:04
MW-11	A9B0609-11	Water	02/19/19 09:30	02/19/19 16:04
MW-1	A9B0609-12	Water	02/19/19 09:55	02/19/19 16:04
MW-2	A9B0609-13	Water	02/19/19 10:40	02/19/19 16:04
Trip Blank#1962	A9B0609-14	Water	02/18/19 00:00	02/19/19 16:04

Apex Laboratories

Assa A Zomenighini

Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

<u>Cascadia Associates</u> 6915 SW Macadam, Suite 250		-	umber: 006				<u>Report</u>	
Portland, OR 97219		-	-	phanie Salisbury			A9B0609 - 03 06	5 19 1228
		ANALYTICA	AL SAMI	PLE RESULTS				
Dies	el and/or Oil Hy	/drocarbons by	/ NWTPH	-Dx with Silica	Gel Colu	mn Cleanu	p	
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-6 (A9B0609-01)				Matrix: Wate	ər	Ва	atch: 9021153	
Diesel	2.15		0.0755	mg/L	1	03/02/19	NWTPH-Dx/SGC	F-20
Oil	ND		0.151	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery	:: 68 %	Limits: 50-150 %	5 1	03/02/19	NWTPH-Dx/SGC	
MW-5D (A9B0609-02)				Matrix: Wate	er	Ba	atch: 9021153	
Diesel	ND		0.0748	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Oil	ND		0.150	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery	»: 72 %	Limits: 50-150 %	5 1	03/02/19	NWTPH-Dx/SGC	
MW-5 (A9B0609-03)			Matrix: Water		Batch: 9021153			
Diesel	1.06		0.0755	mg/L	1	03/02/19	NWTPH-Dx/SGC	F-18
Oil	ND		0.151	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery	v: 72 %	Limits: 50-150 %	1	03/02/19	NWTPH-Dx/SGC	
MW-4 (A9B0609-04)				Matrix: Wate	ər	Ва	atch: 9021153	
Diesel	ND		0.0755	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery	v: 79 %	Limits: 50-150 %	5 1	03/02/19	NWTPH-Dx/SGC	
MW-9 (A9B0609-05)				Matrix: Wate	er	Ва	atch: 9021153	
Diesel	ND		0.0748	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Oil	ND		0.150	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery	v: 80 %	Limits: 50-150 %	5 1	03/02/19	NWTPH-Dx/SGC	
MW-8D (A9B0609-06)				Matrix: Wate	ər	Ва	atch: 9021153	
Diesel	ND		0.0755	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery	<i>:</i> 78 %	Limits: 50-150 %	5 I	03/02/19	NWTPH-Dx/SGC	
MW-8 (A9B0609-07)				Matrix: Wate	ər	Ba	atch: 9021153	
Diesel	ND		0.0755	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery	<i>:</i> 72 %	Limits: 50-150 %	1	03/02/19	NWTPH-Dx/SGC	
MW-3 (A9B0609-08)				Matrix: Wate	ər	Ba	atch: 9021153	
Diesel	ND		0.0755	mg/L	1	03/02/19	NWTPH-Dx/SGC	

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12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### ANALYTICAL SAMPLE RESULTS

D	iesel and/or Oil H	drocarbons l	by NWTPH	-Dx with Silica	Gel Colu	mn Cleanu	р	
	Sample	Detection	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-3 (A9B0609-08)				Matrix: Wate	r	Ba	atch: 9021153	
Oil	ND		0.151	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recove	ery: 73 %	Limits: 50-150 %	1	03/02/19	NWTPH-Dx/SGC	
				Matrix: Wate	er	Ba	itch: 9021153	
Diesel	ND		0.0748	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Oil	ND		0.150	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recove	ery: 81 %	Limits: 50-150 %	1	03/02/19	NWTPH-Dx/SGC	
		Matrix: Water		Batch: 9021153				
Diesel	ND		0.0748	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Oil	ND		0.150	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recove	ery: 63 %	Limits: 50-150 %	1	03/02/19	NWTPH-Dx/SGC	
MW-11 (A9B0609-11)				Matrix: Wate	er	Ba	ntch: 9021153	
Diesel	ND		0.0748	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Oil	ND		0.150	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recove	ery: 75 %	Limits: 50-150 %	1	03/02/19	NWTPH-Dx/SGC	
MW-1 (A9B0609-12)				Matrix: Wate	er	Ba	ntch: 9021153	
Diesel	ND		0.0762	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Oil	ND		0.152	mg/L	1	03/02/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recove	ery: 68 %	Limits: 50-150 %	1	03/02/19	NWTPH-Dx/SGC	
				Matrix: Wate	er	Ba	ntch: 9021153	
Diesel	ND		0.0755	mg/L	1	03/01/19	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	03/01/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recove	ery: 54 %	Limits: 50-150 %	1	03/01/19	NWTPH-Dx/SGC	

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Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### ANALYTICAL SAMPLE RESULTS

	Sample	Detection	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-6 (A9B0609-01)				Matrix: Wate	er	Ba	atch: 9020940	
Gasoline Range Organics	18.2		1.00	mg/L	10	02/21/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 102 %	Limits: 50-150 %	1	02/21/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			108 %	50-150 %	5 1	02/21/19	NWTPH-Gx (MS)	
MW-5D (A9B0609-02RE1)				Matrix: Wate	er	Ва	atch: 9021007	
Gasoline Range Organics	0.165		0.100	mg/L	1	02/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 101 %	Limits: 50-150 %	1	02/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			99 %	50-150 %	5 1	02/22/19	NWTPH-Gx (MS)	
MW-5 (A9B0609-03)				Matrix: Wate	ər	Ва	atch: 9020940	
Gasoline Range Organics	29.2		1.00	mg/L	10	02/21/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recover	y: 96 %	Limits: 50-150 %	1	02/21/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			106 %	50-150 %	1	02/21/19	NWTPH-Gx (MS)	
MW-4 (A9B0609-04)				Matrix: Water		Batch: 9020987		
Gasoline Range Organics	ND		0.100	mg/L	1	02/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 106 %	Limits: 50-150 %	1	02/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			105 %	50-150 %	5 1	02/22/19	NWTPH-Gx (MS)	
MW-9 (A9B0609-05)				Matrix: Wate	ər	Ва	atch: 9020987	
Gasoline Range Organics	ND		0.100	mg/L	1	02/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 105 %	Limits: 50-150 %	1	02/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			106 %	50-150 %	5 1	02/22/19	NWTPH-Gx (MS)	
MW-8D (A9B0609-06)				Matrix: Wate	ər	Ва	atch: 9020987	
Gasoline Range Organics	ND		0.100	mg/L	1	02/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery.	: 107 %	Limits: 50-150 %	1	02/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			106 %	50-150 %	1	02/22/19	NWTPH-Gx (MS)	
MW-8 (A9B0609-07)				Matrix: Wate	ər	Ва	atch: 9020987	
Gasoline Range Organics	ND		0.100	mg/L	1	02/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery.		Limits: 50-150 %		02/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			107 %	50-150 %	5 1	02/22/19	NWTPH-Gx (MS)	
MW-3 (A9B0609-08)				Matrix: Wate	er	Ba	atch: 9020987	
Gasoline Range Organics	ND		0.100	mg/L	1	02/22/19	NWTPH-Gx (MS)	

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12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Project Number:	0060-001-005	Damas t ID.
	0000 001 000	<u>Report ID:</u>
Project Manager:	Stephanie Salisbury	A9B0609 - 03 06 19 1228
	Project Manager	Project Manager: Stephanie Salisbury

#### ANALYTICAL SAMPLE RESULTS

Gasor	пе капуе пу		enzene ti	nrough Naphtha	lierie) by	INVVIPE-G	X	
	Sample	Detection	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-3 (A9B0609-08)				Matrix: Wate	r	Ba	atch: 9020987	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	107 %	Limits: 50-150 %	1	02/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			106 %	50-150 %	1	02/22/19	NWTPH-Gx (MS)	
MW-7 (A9B0609-09)				Matrix: Wate	r	Ва	atch: 9020987	
Gasoline Range Organics	ND		0.100	mg/L	1	02/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	106 %	Limits: 50-150 %	1	02/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			105 %	50-150 %	1	02/22/19	NWTPH-Gx (MS)	
				Matrix: Wate	r	Ва	atch: 9020987	
Gasoline Range Organics	ND		0.100	mg/L	1	02/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	107 %	Limits: 50-150 %	1	02/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			107 %	50-150 %	1	02/22/19	NWTPH-Gx (MS)	
MW-11 (A9B0609-11)				Matrix: Wate	r	Ва	atch: 9021036	
Gasoline Range Organics	0.727		0.100	mg/L	1	02/24/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	106 %	Limits: 50-150 %	1	02/24/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			98 %	50-150 %	1	02/24/19	NWTPH-Gx (MS)	
MW-1 (A9B0609-12)				Matrix: Wate	r	Ва	atch: 9021007	
Gasoline Range Organics	ND		0.100	mg/L	1	02/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	105 %	Limits: 50-150 %	1	02/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			104 %	50-150 %	1	02/22/19	NWTPH-Gx (MS)	
MW-2 (A9B0609-13)				Matrix: Wate	r	Ва	atch: 9020940	
Gasoline Range Organics	ND		0.100	mg/L	1	02/21/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 91%	Limits: 50-150 %	1	02/21/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			106 %	50-150 %	1	02/21/19	NWTPH-Gx (MS)	

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Assa A Zomenighini

Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

## ANALYTICAL SAMPLE RESULTS

	BTEX Compounds by EPA 8260C								
	Sample	Detection	Reporting			Date			
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes	
Trip Blank#1962 (A9B0609-14)				Matrix: Wate	ər	Bat	tch: 9020940		
Benzene	ND		0.200	ug/L	1	02/21/19	EPA 8260C		
Toluene	ND		1.00	ug/L	1	02/21/19	EPA 8260C		
Ethylbenzene	ND		0.500	ug/L	1	02/21/19	EPA 8260C		
Xylenes, total	ND		1.50	ug/L	1	02/21/19	EPA 8260C		
Surrogate: 1,4-Difluorobenzene (Surr)		Recove	ry: 112 %	Limits: 80-120 %	6 1	02/21/19	EPA 8260C		
Toluene-d8 (Surr)			103 %	80-120 %	5 I	02/21/19	EPA 8260C		
4-Bromofluorobenzene (Surr)			102 %	80-120 %	5 I	02/21/19	EPA 8260C		

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Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 EPA ID: OR01039

<u>Cascadia Associates</u> 6915 SW Macadam, Suite 250 Portland, OR 97219		<u>Report</u> A9B0609 - 03 0						
		ANALYTICA	AL SAMI	PLE RESULTS				
	Select	ted Volatile Org	anic Con	pounds by EPA	A 8260C			
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
IW-6 (A9B0609-01)				Matrix: Wate	r	Ba	tch: 9020940	
Benzene	249		2.00	ug/L	10	02/21/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		10.0	ug/L	10	02/21/19	EPA 8260C	
Toluene	40.8		10.0	ug/L	10	02/21/19	EPA 8260C	
Xylenes, total	577		15.0	ug/L	10	02/21/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	109 %	Limits: 80-120 %	1	02/21/19	EPA 8260C	
Toluene-d8 (Surr)			103 %	80-120 %	1	02/21/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			93 %	80-120 %	1	02/21/19	EPA 8260C	
/W-6 (A9B0609-01RE1)	Matrix: Water				Batch: 9020940			
Ethylbenzene	1740		50.0	ug/L	100	02/21/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	: 111 %	Limits: 80-120 %	1	02/21/19	EPA 8260C	
Toluene-d8 (Surr)		104 %		80-120 %	1	02/21/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			97 %	80-120 %	1	02/21/19	EPA 8260C	
IW-5D (A9B0609-02RE1)		Matrix: Water				Ba	tch: 9021007	
Benzene	ND		0.200	ug/L	1	02/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	02/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	02/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	v: 99 %	Limits: 80-120 %	1	02/22/19	EPA 8260C	
Toluene-d8 (Surr)			98 %	80-120 %	1	02/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			101 %	80-120 %	1	02/22/19	EPA 8260C	
IW-5 (A9B0609-03)				Matrix: Wate	r	Ba	tch: 9020940	
Benzene	ND		2.00	ug/L	10	02/21/19	EPA 8260C	
Ethylbenzene	187		5.00	ug/L	10	02/21/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		10.0	ug/L	10	02/21/19	EPA 8260C	
Toluene	ND		10.0	ug/L	10	02/21/19	EPA 8260C	
Xylenes, total	1060		15.0	ug/L	10	02/21/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:		Limits: 80-120 %		02/21/19	EPA 8260C	
Toluene-d8 (Surr)			105 %	80-120 %		02/21/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			92 %	80-120 %	1	02/21/19	EPA 8260C	
-4 (A9B0609-04) Matrix: Water				Matrix: Wate	r	Ba	tch: 9020987	
1W-4 (A9B0609-04)								
<b>IW-4 (A9B0609-04)</b> Benzene	ND		0.200	ug/L	1	02/22/19	EPA 8260C	

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12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

<u>Cascadia Associates</u> 6915 SW Macadam, Suite 250 Portland, OR 97219		Proje Project 1 Project M	<u>Report ID:</u> A9B0609 - 03 06 19 1228					
	Select			pounds by EPA	8260C			
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-4 (A9B0609-04)				Matrix: Wate	r	Batch: 9020987		
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Toluene Xylenes, total	ND ND		1.00 1.50	ug/L ug/L	1	02/22/19 02/22/19	EPA 8260C EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recover	y: 105 %	Limits: 80-120 %	1	02/22/19	EPA 8260C	
Toluene-d8 (Surr)			97 %	80-120 %	1	02/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			102 %	80-120 %	1	02/22/19	EPA 8260C	
MW-9 (A9B0609-05)				Matrix: Wate	r	Batch: 9020987		
Benzene	ND		0.200	ug/L	1	02/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	02/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	02/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recover	y: 107 %	Limits: 80-120 %	1	02/22/19	EPA 8260C	
Toluene-d8 (Surr)			99 %	80-120 %	1	02/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			100 %	80-120 %	1	02/22/19	EPA 8260C	

MW-8D (A9B0609-06)				Matrix: Water		Bat	ch: 9020987
Benzene	ND		0.200	ug/L	1	02/22/19	EPA 8260C
Ethylbenzene	ND		0.500	ug/L	1	02/22/19	EPA 8260C
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	02/22/19	EPA 8260C
Toluene	ND		1.00	ug/L	1	02/22/19	EPA 8260C
Xylenes, total	ND		1.50	ug/L	1	02/22/19	EPA 8260C
Surrogate: 1,4-Difluorobenzene (Surr)		Recove	ery: 106 %	Limits: 80-120 %	1	02/22/19	EPA 8260C
Toluene-d8 (Surr)			98 %	80-120 %	1	02/22/19	EPA 8260C
4-Bromofluorobenzene (Surr)			100 %	80-120 %	1	02/22/19	EPA 8260C
MW-8 (A9B0609-07)				Matrix: Water		Bat	ch: 9020987
Benzene	ND		0.200	ug/L	1	02/22/19	EPA 8260C
Ethylbenzene	ND		0.500	ug/L	1	02/22/19	EPA 8260C
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	02/22/19	EPA 8260C
Toluene	ND		1.00	ug/L	1	02/22/19	EPA 8260C
Xylenes, total	ND		1.50	ug/L	1	02/22/19	EPA 8260C
Surrogate: 1,4-Difluorobenzene (Surr)		Recove	ery: 107 %	Limits: 80-120 %	1	02/22/19	EPA 8260C
· · ·	ND				1		

98 %

99 %

Surrogate: 1,4-Difluorobenzene (Surr) Toluene-d8 (Surr) 4-Bromofluorobenzene (Surr)

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

02/22/19

02/22/19

EPA 8260C

EPA 8260C

80-120 %

80-120 %

1

1



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

<u>Cascadia Associates</u>	Project: <u>Nustar Vannex</u>									
6915 SW Macadam, Suite 250	Project Number: <b>0060-001-005</b>	Report ID:								
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228								
	ANALYTICAL SAMPLE RESULTS									
Selected Volatile Organic Compounds by EPA 8260C										

	00100		<u>j</u>					
	Sample	Detection	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-3 (A9B0609-08)	/-3 (A9B0609-08)				Matrix: Water			
Benzene	ND		0.200	ug/L	1	02/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	02/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	02/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	: 107 %	Limits: 80-120 %	1	02/22/19	EPA 8260C	
Toluene-d8 (Surr)			98 %	80-120 %	1	02/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			100 %	80-120 %	1	02/22/19	EPA 8260C	
 MW-7 (A9B0609-09)	Matrix: Water				Ва	tch: 9020987		
Benzene	ND		0.200	ug/L	1	02/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	02/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	02/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	: 105 %	Limits: 80-120 %	1	02/22/19	EPA 8260C	
Toluene-d8 (Surr)			98 %	80-120 %	1	02/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			100 %	80-120 %	1	02/22/19	EPA 8260C	
MW-10 (A9B0609-10)				Matrix: Wate	ər	Batch: 9020987		
Benzene	ND		0.200	ug/L	1	02/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	02/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	02/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	: 108 %	Limits: 80-120 %	5 1	02/22/19	EPA 8260C	
Toluene-d8 (Surr)			99 %	80-120 %	1	02/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			100 %	80-120 %	1	02/22/19	EPA 8260C	
MW-11 (A9B0609-11)	J609-11) Matrix: Wa		Matrix: Wate	ər	Ва	tch: 9021036		
Benzene	1.62		0.200	ug/L	1	02/24/19	EPA 8260C	
Ethylbenzene	83.0		0.500	ug/L	1	02/24/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	02/24/19	EPA 8260C	
Toluene	1.76		1.00	ug/L	1	02/24/19	EPA 8260C	
Xylenes, total	65.2		1.50	ug/L	1	02/24/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recover	ry: 98 %	Limits: 80-120 %	5 1	02/24/19	EPA 8260C	
T 1 10 (C )			00.07	00 120 0/	· ,	02/24/10	ED4 02(0C	

99 %

Toluene-d8 (Surr)

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

02/24/19

EPA 8260C

1

80-120 %



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### ANALYTICAL SAMPLE RESULTS

	Select	ed Volatile Org	anic Corr	pounds by EPA	A 8260C			
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-11 (A9B0609-11)				Matrix: Wate	r	Bat	tch: 9021036	
Surrogate: 4-Bromofluorobenzene (Surr)		Recovery	.: <b>99</b> %	Limits: 80-120 %	1	02/24/19	EPA 8260C	
				Matrix: Wate	er	Bat	tch: 9021007	
Benzene	ND		0.200	ug/L	1	02/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	02/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	02/22/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	02/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	104 %	Limits: 80-120 %	1	02/22/19	EPA 8260C	
Toluene-d8 (Surr)			98 %	80-120 %	1	02/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			100 %	80-120 %	1	02/22/19	EPA 8260C	
 MW-2 (A9B0609-13)				Matrix: Wate	er	Bat	tch: 9020940	
Benzene	ND		0.200	ug/L	1	02/21/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	02/21/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	1.21		1.00	ug/L	1	02/21/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	02/21/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	02/21/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	107 %	Limits: 80-120 %	1	02/21/19	EPA 8260C	
Toluene-d8 (Surr)			105 %	80-120 %	1	02/21/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			101 %	80-120 %	1	02/21/19	EPA 8260C	

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Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **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 9021153 - EPA 3510C	(Fuels/Acid	Ext.) w/Silic	a Gel				Wat	er				
Blank (9021153-BLK1)		Prepared	: 02/28/19 07:	18 Analyz	ed: 03/01/1	9 23:45						
NWTPH-Dx/SGC												
Diesel	ND		0.0727	mg/L	1							
Oil	ND		0.145	mg/L	1							
Surr: o-Terphenyl (Surr)		Reco	overy: 90 %	Limits: 50	)-150 %	Dilt	ution: 1x					
LCS (9021153-BS1)		Prepared	: 02/28/19 07:	18 Analyz	ed: 03/02/1	9 00:05						
NWTPH-Dx/SGC												
Diesel	0.384		0.0800	mg/L	1	0.500		77	58-115%			
Surr: o-Terphenyl (Surr)		Reco	overy: 89 %	Limits: 50	)-150 %	Dili	ution: 1x					
LCS Dup (9021153-BSD1)		Prepared	: 02/28/19 07:	18 Analyz	ed: 03/02/1	9 00:25						Q-19
NWTPH-Dx/SGC												
Diesel	0.415		0.0800	mg/L	1	0.500		83	58-115%	8	20%	
Surr: o-Terphenyl (Surr)		Reco	overy: 87 %	Limits: 50	0-150 %	Dili	ution: 1x					

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Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	Report ID:
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **QUALITY CONTROL (QC) SAMPLE RESULTS**

	Gasolii	ne Range H	lydrocarbo	ons (Ben	zene thro	ugh Naph	thalene)	by NWTP	H-Gx			
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9020940 - EPA 5030B							Wat	er				
Blank (9020940-BLK1)		Prepared	02/21/19 08:	30 Analy	zed: 02/21/1	9 11:12						
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	1							
Surr: 4-Bromofluorobenzene (Sur)		Reco	overy: 93 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			109 %	5	0-150 %		"					
LCS (9020940-BS2)		Prepared	02/21/19 08:	30 Analy	zed: 02/21/1	9 10:45						
NWTPH-Gx (MS)												
Gasoline Range Organics	0.486		0.100	mg/L	1	0.500		97	80-120%			
Surr: 4-Bromofluorobenzene (Sur)		Reco	overy: 93 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			102 %	5	0-150 %		"					
Duplicate (9020940-DUP1)		Prepared	02/21/19 10:	19 Analyz	zed: 02/21/1	9 14:24						
QC Source Sample: MW-6 (A9B0	<u>)609-01)</u>											
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	17.3		1.00	mg/L	10		18.2			5	30%	
Surr: 4-Bromofluorobenzene (Sur)		Reco	overy: 97 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			104 %	5	0-150 %		"					

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Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	Report ID:
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **QUALITY CONTROL (QC) SAMPLE RESULTS**

	Gasolii	ne Range H	lydrocarbo	ons (Ben	zene thro	ugh Naph	thalene)	by NWTP	H-Gx			
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9020987 - EPA 5030B							Wat	er				
Blank (9020987-BLK1)		Prepared	02/22/19 08:	00 Analy	zed: 02/22/1	9 10:31						
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	. 1							
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 105 %	Limits: 5	0-150 %	Dili	ution: 1x					
1,4-Difluorobenzene (Sur)			106 %	5	0-150 %		"					
LCS (9020987-BS2)		Prepared	02/22/19 08:	00 Analy	zed: 02/22/1	9 10:03						
NWTPH-Gx (MS)												
Gasoline Range Organics	0.430		0.100	mg/L	, 1	0.500		86	80-120%			
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 101 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			97 %	5	0-150 %		"					
Duplicate (9020987-DUP1)		Prepared	02/22/19 09:	58 Analy	zed: 02/22/1	9 12:00						
QC Source Sample: MW-4 (A9B)	<u>)609-04)</u>											
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	. 1		ND				30%	
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 107 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			105 %	5	0-150 %		"					

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Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **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 9021007 - EPA 5030B Water												
Blank (9021007-BLK1)		Prepared:	02/22/19 14:	37 Analyz	zed: 02/22/1	9 18:01						
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	1							
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 106 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			104 %	50	0-150 %		"					
LCS (9021007-BS2)		Prepared	02/22/19 14:	37 Analyz	zed: 02/22/1	9 17:34						
NWTPH-Gx (MS)												
Gasoline Range Organics	0.440		0.100	mg/L	1	0.500		88	80-120%			
Surr: 4-Bromofluorobenzene (Sur)	Recovery: 100 % Limits: 50-150 % Dilution: 1x											
1,4-Difluorobenzene (Sur)			98 %	50	0-150 %		"					

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Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **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 9021036 - EPA 5030B Water												
Blank (9021036-BLK1)		Prepared:	02/23/19 18:	30 Analyz	zed: 02/23/1	9 21:18						
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	1							
Surr: 4-Bromofluorobenzene (Sur)		Recov	ery: 105 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			104 %	50	0-150 %		"					
LCS (9021036-BS2)		Prepared:	02/23/19 18:	30 Analyz	zed: 02/23/1	9 20:51						
NWTPH-Gx (MS)												
Gasoline Range Organics	0.454		0.100	mg/L	1	0.500		91	80-120%			
Surr: 4-Bromofluorobenzene (Sur)	Recovery: 101 % Limits: 50-150 % Dilution: 1x											
1,4-Difluorobenzene (Sur)			96 %	50	0-150 %		"					

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Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project:	Nustar Vannex	
6915 SW Macadam, Suite 250	Project Number:	0060-001-005	Report ID:
Portland, OR 97219	Project Manager:	Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **QUALITY CONTROL (QC) SAMPLE RESULTS**

			BTEX	Compou	inds by E	PA 8260C						
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Note
3atch 9020940 - EPA 5030B							Wat	er				
Blank (9020940-BLK1)		Prepared	: 02/21/19 08:	30 Analyz	ed: 02/21/19	9 11:12						
EPA 8260C												
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							
Surr: 1,4-Difluorobenzene (Surr)		Recon	very: 109 %	Limits: 80	-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			104 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			102 %	80	-120 %		"					
LCS (9020940-BS1)		Prepared	02/21/19 08:	30 Analvz	ed: 02/21/19	9 10:17						
EPA 8260C		1										
Benzene	21.2		0.200	ug/L	1	20.0		106	80-120%			
Toluene	19.7		1.00	ug/L	1	20.0		98	80-120%			
Ethylbenzene	20.5		0.500	ug/L	1	20.0		102	80-120%			
Xylenes, total	60.4		1.50	ug/L	1	60.0		101	80-120%			
Surr: 1,4-Difluorobenzene (Surr)		Recon	very: 105 %	Limits: 80	-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			99 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			89 %	80	-120 %		"					
Duplicate (9020940-DUP1)		Prepared	02/21/19 10:	19 Analyz	ed: 02/21/19	9 14:24						
QC Source Sample: MW-6 (A9B06	09-01)											
EPA 8260C	<u> </u>											
Benzene	236		2.00	ug/L	10		249			5	30%	
Toluene	41.7		10.0	ug/L	10		40.8			2	30%	
Ethylbenzene	2120		5.00	ug/L	10		2120			0.09	30%	Е
Xylenes, total	582		15.0	ug/L	10		577			0.9	30%	
urr: 1,4-Difluorobenzene (Surr)		Recon	very: 105 %	Limits: 80	)-120 %	Dilı	tion: 1x					
Toluene-d8 (Surr)			105 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			95 %	80	-120 %		"					
Matrix Spike (9020940-MS1)		Prenared	02/21/19 10:	10 Analyz	red: 02/21/10	0.16.13						

EPA 8260C

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6915 SW Macadam, Suite 250	Project Number:	0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager:	Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **QUALITY CONTROL (QC) SAMPLE RESULTS**

BTEX Compounds by EPA 8260C												
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9020940 - EPA 5030B							Wat	er				
Matrix Spike (9020940-MS1)		Prepared	: 02/21/19 10:	19 Analyz	ed: 02/21/1	9 16:13						
QC Source Sample: MW-2 (A9B0	<u>609-13)</u>											
Benzene	23.3		0.200	ug/L	1	20.0	ND	116	79-120%			
Toluene	21.1		1.00	ug/L	1	20.0	ND	105	80-121%			
Ethylbenzene	22.2		0.500	ug/L	1	20.0	ND	111	79-121%			
Xylenes, total	64.9		1.50	ug/L	1	60.0	ND	108	79-121%			
Surr: 1,4-Difluorobenzene (Surr)		Reco	very: 105 %	Limits: 80	)-120 %	Dilu	tion: 1x					
Toluene-d8 (Surr)			97 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			91 %	80	-120 %		"					

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Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Selec	ted Volati	le Organi	c Compo	unds by E	EPA 8260	C				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Note
Batch 9020940 - EPA 5030B							Wat	er				
Blank (9020940-BLK1)		Prepared:	02/21/19 08:	30 Analyz	ed: 02/21/1	9 11:12						
EPA 8260C												
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							
Toluene	ND		1.00	ug/L	1							
Xylenes, total	ND		1.50	ug/L	1							
Surr: 1,4-Difluorobenzene (Surr)		Recov	ery: 109 %	Limits: 80	)-120 %	Dil	ution: 1x					
Toluene-d8 (Surr)			104 %	80	)-120 %		"					
4-Bromofluorobenzene (Surr)			102 %	80	)-120 %		"					
LCS (9020940-BS1)		Prepared:	02/21/19 08:	30 Analyz	ed: 02/21/1	9 10:17						
EPA 8260C												
Benzene	21.2		0.200	ug/L	1	20.0		106	80-120%			
Ethylbenzene	20.5		0.500	ug/L	1	20.0		102	80-120%			
Methyl tert-butyl ether (MTBE)	17.9		1.00	ug/L	1	20.0		90	80-120%			
Toluene	19.7		1.00	ug/L	1	20.0		98	80-120%			
Xylenes, total	60.4		1.50	ug/L	1	60.0		101	80-120%			
Surr: 1,4-Difluorobenzene (Surr)		Recov	ery: 105 %	Limits: 80	)-120 %	Dil	ution: 1x					
Toluene-d8 (Surr)			99 %	80	)-120 %		"					
4-Bromofluorobenzene (Surr)			89 %	80	)-120 %		"					
Duplicate (9020940-DUP1)		Prepared:	02/21/19 10:	19 Analyz	ed: 02/21/1	9 14:24						
QC Source Sample: MW-6 (A9B0	609-01)											
EPA 8260C												
Benzene	236		2.00	ug/L	10		249			5	30%	
Ethylbenzene	2120		5.00	ug/L	10		2120			0.09	30%	Е
Methyl tert-butyl ether (MTBE)	ND		10.0	ug/L	10		ND				30%	
Toluene	41.7		10.0	ug/L	10		40.8			2	30%	
Xylenes, total	582		15.0	ug/L	10		577			0.9	30%	
Surr: 1,4-Difluorobenzene (Surr)		Recov	ery: 105 %	Limits: 80	0-120 %	Dil	ution: 1x					
Toluene-d8 (Surr)			105 %	80	)-120 %		"					

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Assa A Zomenighini



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

<u>Cascadia Associates</u>	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Sele	cted Volatil	e Organi	c Compo	unds by E	PA 8260	C				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
3atch 9020940 - EPA 5030B							Wat	er				
Duplicate (9020940-DUP1)		Prepared	: 02/21/19 10:	19 Analyz	ed: 02/21/1	9 14:24						
QC Source Sample: MW-6 (A9B06 Surr: 4-Bromofluorobenzene (Surr)	<u>509-01)</u>	Reco	overy: 95 %	Limits: 80	)-120 %	Dilı	ution: 1x					
Matrix Spike (9020940-MS1)		Prepared	: 02/21/19 10:	19 Analyz	ed: 02/21/1	9 16:13						
QC Source Sample: MW-2 (A9B06	<u> 09-13)</u>											
EPA 8260C												
Benzene	23.3		0.200	ug/L	1	20.0	ND	116	79-120%			
Ethylbenzene	22.2		0.500	ug/L	1	20.0	ND	111	79-121%			
Methyl tert-butyl ether (MTBE)	20.7		1.00	ug/L	1	20.0	1.21	98	71-124%			
Toluene	21.1		1.00	ug/L	1	20.0	ND	105	80-121%			
Xylenes, total	64.9		1.50	ug/L	1	60.0	ND	108	79-121%			
Surr: 1,4-Difluorobenzene (Surr)		Recon	very: 105 %	Limits: 80	-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			97 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			91 %	80	-120 %		"					

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Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Selec	ted Volati	le Organi	c Compo	unds by I	EPA 8260	C				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Note
Batch 9020987 - EPA 5030B							Wat	er				
Blank (9020987-BLK1)		Prepared:	02/22/19 08:	00 Analyz	ed: 02/22/1	9 10:31						
EPA 8260C												
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							
Toluene	ND		1.00	ug/L	1							
Xylenes, total	ND		1.50	ug/L	1							
Surr: 1,4-Difluorobenzene (Surr)		Recov	ery: 107 %	Limits: 80	)-120 %	Dil	ution: 1x					
Toluene-d8 (Surr)			99 %	80	)-120 %		"					
4-Bromofluorobenzene (Surr)			100 %	80	)-120 %		"					
LCS (9020987-BS1)		Prepared:	02/22/19 08:	00 Analyz	ed: 02/22/1	9 09:36						
EPA 8260C												
Benzene	18.4		0.200	ug/L	1	20.0		92	80-120%			
Ethylbenzene	20.1		0.500	ug/L	1	20.0		101	80-120%			
Methyl tert-butyl ether (MTBE)	19.6		1.00	ug/L	1	20.0		98	80-120%			
Toluene	18.8		1.00	ug/L	1	20.0		94	80-120%			
Xylenes, total	59.0		1.50	ug/L	1	60.0		98	80-120%			
Surr: 1,4-Difluorobenzene (Surr)		Reco	very: 96 %	Limits: 80	)-120 %	Dil	ution: 1x					
Toluene-d8 (Surr)			96 %	80	)-120 %		"					
4-Bromofluorobenzene (Surr)			99 %	80	)-120 %		"					
Duplicate (9020987-DUP1)		Prepared:	02/22/19 09:	58 Analyz	ed: 02/22/1	9 12:00						
QC Source Sample: MW-4 (A9B0	<u>)609-04)</u>											
EPA 8260C												
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%	
Toluene	ND		1.00	ug/L	1		ND				30%	
Xylenes, total	ND		1.50	ug/L	1		ND				30%	
Surr: 1,4-Difluorobenzene (Surr)		Recov	ery: 106 %	Limits: 80	0-120 %	Dil	ution: 1x					
Toluene-d8 (Surr)			98 %	80	)-120 %		"					

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12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **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 9020987 - EPA 50	30B						Wat	er				
Duplicate (9020987-DUP1	)	Prepared	: 02/22/19 09::	58 Analy	zed: 02/22/1	9 12:00						
<b>QC Source Sample: MW-4</b> Surr: 4-Bromofluorobenzene	· · · ·	Reco	very: 102 %	Limits: 8	80-120 %	Dilı	ution: 1x					

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Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	Report ID:
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Sele	cted Volati	e Organi	c Compo	unds by E	EPA 8260	C				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9021007 - EPA 5030B							Wat	er				
Blank (9021007-BLK1)		Prepared	: 02/22/19 14:	37 Analyz	ed: 02/22/1	9 18:01						
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	ND		1.00	ug/L	1							
(MTBE)												
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)		Reco	very: 105 %	Limits: 80	)-120 %	Dili	ution: 1x					
Toluene-d8 (Surr)			98 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			101 %	80	-120 %		"					
LCS (9021007-BS1)		Prepared	: 02/22/19 14:	37 Analyz	ed: 02/22/1	9 17:07						
EPA 8260C		1		<u> </u>								
Benzene	18.4		0.200	ug/L	1	20.0		92	80-120%			
1,2-Dibromoethane (EDB)	19.6		0.500	ug/L	1	20.0		98	80-120%			
1,2-Dichloroethane (EDC)	20.6		0.500	ug/L	1	20.0		103	80-120%			
Ethylbenzene	19.8		0.500	ug/L	1	20.0		99	80-120%			
Isopropylbenzene	19.3		1.00	ug/L	1	20.0		96	80-120%			
Methyl tert-butyl ether (MTBE)	19.5		1.00	ug/L	1	20.0		98	80-120%			
Naphthalene	16.5		2.00	ug/L	1	20.0		83	80-120%			
Toluene	18.5		1.00	ug/L	1	20.0			80-120%			
1,2,4-Trimethylbenzene	18.9		1.00	ug/L ug/L	1	20.0			80-120%			
1,3,5-Trimethylbenzene	18.7		1.00	ug/L	1	20.0			80-120%			
Xylenes, total	58.2		1.50	ug/L ug/L	1	60.0			80-120%			
Surr: 1,4-Difluorobenzene (Surr)	50.2		overy: 97 %	Limits: 80			ution: 1x	21	0.0 120/0			
Toluene-d8 (Surr)		Rec	96 %		-120 %	Dili	unon: 1x "					
10iuene-a8 (Surr) 4-Bromofluorobenzene (Surr)			90 % 99 %		-120 %		"					

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12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

#### **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Selec	cted Volatil	e Organi	c Compo	unds by E	PA 8260	c				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9021036 - EPA 5030B							Wate	er				
Blank (9021036-BLK1)		Prepared:	: 02/23/19 18:	30 Analyz	ed: 02/23/19	21:18						
EPA 8260C												
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)		Recov	very: 105 %	Limits: 80	7-120 %	Dilu	ution: 1x					
Toluene-d8 (Surr)			99 %	86	0-120 %		"					
4-Bromofluorobenzene (Surr)			100 %	86	0-120 %		"					
LCS (9021036-BS1)		Prepared:	: 02/23/19 18:3	30 Analyz	ed: 02/23/19	20:24						
EPA 8260C												
Benzene	18.3		0.200	ug/L	1	20.0		91	80-120%			
Ethylbenzene	19.4		0.500	ug/L	1	20.0		97	80-120%			
Methyl tert-butyl ether (MTBE)	19.7		1.00	ug/L	1	20.0		98	80-120%			
Naphthalene	16.7		2.00	ug/L	1	20.0		84	80-120%			
Toluene	18.2		1.00	ug/L	1	20.0		91	80-120%			
Xylenes, total	57.5		1.50	ug/L	1	60.0		96	80-120%			
Surr: 1,4-Difluorobenzene (Surr)		Reco	overy: 99 %	Limits: 80	)-120 %	Dilu	ution: 1x					
Toluene-d8 (Surr)			97 %	80	0-120 %		"					
4-Bromofluorobenzene (Surr)			98 %	80	0-120 %		"					

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Assa A Zomenighini

Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

Cascadia Associates	Project:	Nustar Vannex	
6915 SW Macadam, Suite 250	Project Number:	0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager:	Stephanie Salisbury	A9B0609 - 03 06 19 1228

### SAMPLE PREPARATION INFORMATION

	Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Silica Gel Column Cleanup											
Prep: EPA 3510C	(Fuels/Acid Ext.	) w/Silica Gel			Sample	Default	RL Prep					
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor					
Batch: 9021153												
A9B0609-01	Water	NWTPH-Dx/SGC	02/18/19 09:10	02/28/19 07:18			0.94					
A9B0609-02	Water	NWTPH-Dx/SGC	02/18/19 09:50	02/28/19 07:18			0.94					
A9B0609-03	Water	NWTPH-Dx/SGC	02/18/19 10:10	02/28/19 07:18			0.94					
A9B0609-04	Water	NWTPH-Dx/SGC	02/18/19 11:00	02/28/19 07:18			0.94					
A9B0609-05	Water	NWTPH-Dx/SGC	02/18/19 11:40	02/28/19 07:18			0.94					
A9B0609-06	Water	NWTPH-Dx/SGC	02/18/19 12:10	02/28/19 07:32			0.94					
A9B0609-07	Water	NWTPH-Dx/SGC	02/18/19 12:40	02/28/19 07:32			0.94					
A9B0609-08	Water	NWTPH-Dx/SGC	02/18/19 13:40	02/28/19 07:32			0.94					
A9B0609-09	Water	NWTPH-Dx/SGC	02/19/19 08:00	02/28/19 07:32			0.94					
A9B0609-10	Water	NWTPH-Dx/SGC	02/19/19 08:40	02/28/19 07:32			0.94					
A9B0609-11	Water	NWTPH-Dx/SGC	02/19/19 09:30	02/28/19 07:32			0.94					
A9B0609-12	Water	NWTPH-Dx/SGC	02/19/19 09:55	02/28/19 13:34			0.95					
A9B0609-13	Water	NWTPH-Dx/SGC	02/19/19 10:40	02/28/19 13:34			0.94					

	Gas	oline Range Hydrocart	oons (Benzene thro	ugh Naphthalene) b	y NWTPH-Gx		
Prep: EPA 5030B					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 9020940							
A9B0609-01	Water	NWTPH-Gx (MS)	02/18/19 09:10	02/21/19 10:19	5mL/5mL	5mL/5mL	1.00
A9B0609-03	Water	NWTPH-Gx (MS)	02/18/19 10:10	02/21/19 10:19	5mL/5mL	5mL/5mL	1.00
A9B0609-13	Water	NWTPH-Gx (MS)	02/19/19 10:40	02/21/19 10:19	5mL/5mL	5mL/5mL	1.00
Batch: 9020987							
A9B0609-04	Water	NWTPH-Gx (MS)	02/18/19 11:00	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
A9B0609-05	Water	NWTPH-Gx (MS)	02/18/19 11:40	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
A9B0609-06	Water	NWTPH-Gx (MS)	02/18/19 12:10	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
A9B0609-07	Water	NWTPH-Gx (MS)	02/18/19 12:40	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
A9B0609-08	Water	NWTPH-Gx (MS)	02/18/19 13:40	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
A9B0609-09	Water	NWTPH-Gx (MS)	02/19/19 08:00	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
A9B0609-10	Water	NWTPH-Gx (MS)	02/19/19 08:40	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
Batch: 9021007							
A9B0609-02RE1	Water	NWTPH-Gx (MS)	02/18/19 09:50	02/22/19 17:00	5mL/5mL	5mL/5mL	1.00
A9B0609-12	Water	NWTPH-Gx (MS)	02/19/19 09:55	02/22/19 17:00	5mL/5mL	5mL/5mL	1.00
Batch: 9021036							
A9B0609-11	Water	NWTPH-Gx (MS)	02/19/19 09:30	02/23/19 19:12	5mL/5mL	5mL/5mL	1.00

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Cascadia Associates	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228

### SAMPLE PREPARATION INFORMATION

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

BTEX Compounds by EPA 8260C							
Prep: EPA 5030B					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 9020940							
A9B0609-14	Water	EPA 8260C	02/18/19 00:00	02/21/19 10:19	5mL/5mL	5mL/5mL	1.00
Selected Volatile Organic Compounds by EPA 8260C							
Prep: EPA 5030B					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 9020940							
A9B0609-01	Water	EPA 8260C	02/18/19 09:10	02/21/19 10:19	5mL/5mL	5mL/5mL	1.00
A9B0609-01RE1	Water	EPA 8260C	02/18/19 09:10	02/21/19 10:19	5mL/5mL	5mL/5mL	1.00
A9B0609-03	Water	EPA 8260C	02/18/19 10:10	02/21/19 10:19	5mL/5mL	5mL/5mL	1.00
A9B0609-13	Water	EPA 8260C	02/19/19 10:40	02/21/19 10:19	5mL/5mL	5mL/5mL	1.00
Batch: 9020987							
A9B0609-04	Water	EPA 8260C	02/18/19 11:00	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
A9B0609-05	Water	EPA 8260C	02/18/19 11:40	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
A9B0609-06	Water	EPA 8260C	02/18/19 12:10	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
A9B0609-07	Water	EPA 8260C	02/18/19 12:40	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
A9B0609-08	Water	EPA 8260C	02/18/19 13:40	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
A9B0609-09	Water	EPA 8260C	02/19/19 08:00	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
A9B0609-10	Water	EPA 8260C	02/19/19 08:40	02/22/19 09:58	5mL/5mL	5mL/5mL	1.00
Batch: 9021007							
A9B0609-02RE1	Water	EPA 8260C	02/18/19 09:50	02/22/19 17:00	5mL/5mL	5mL/5mL	1.00
A9B0609-12	Water	EPA 8260C	02/19/19 09:55	02/22/19 17:00	5mL/5mL	5mL/5mL	1.00
Batch: 9021036							
A9B0609-11	Water	EPA 8260C	02/19/19 09:30	02/23/19 19:12	5mL/5mL	5mL/5mL	1.00

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Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

<u>Cascadia Associates</u>	Project:	Nustar Vannex
6915 SW Macadam, Suite 250	Project Number:	0060-001-005
Portland, OR 97219	Project Manager:	Stephanie Salisbury

<u>Report ID:</u> A9B0609 - 03 06 19 1228

#### **QUALIFIER DEFINITIONS**

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

#### Apex Laboratories

- **E** Estimated Value. The result is above the calibration range of the instrument.
- 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

Assa A Zomenighini

Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

#### <u>Cascadia Associates</u> 6915 SW Macadam, Suite 250 Portland, OR 97219

Project: Nustar Vannex

Project Number: 0060-001-005 Project Manager: Stephanie Salisbury <u>Report ID:</u> A9B0609 - 03 06 19 1228

#### **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

#### 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.

- <u>" dry"</u> 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

Ausa A Zomenichini

Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

#### <u>Cascadia Associates</u> 6915 SW Macadam, Suite 250 Portland, OR 97219

Project: Nustar Vannex

Project Number: 0060-001-005 Project Manager: Stephanie Salisbury <u>Report ID:</u> A9B0609 - 03 06 19 1228

#### **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

Ausa A Zomenichini

Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

ascadia Associat	tes	Project:	<u>Nustar Vannex</u>					
5915 SW Macadam, Suite 250		Project Number:	Project Number: 0060-001-005		<u>Report ID:</u>			
Portland, OR 97219		Project Manager:	er: Stephanie Salisbury		A9B0609 - 03 06 19 1228			
LABORATORY ACCREDITATION INFORMATION								
<u>TNI Certification ID: OR100062 (Primary Accreditation)</u> - <u>EPA ID: OR01039</u> All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the <u>exception</u> of any analyte(s) listed below:								
<u>Apex Labo</u> Matrix	o <u>ratories</u> 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

Assa A Zomenighini

Lisa Domenighini, Client Services Manager



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

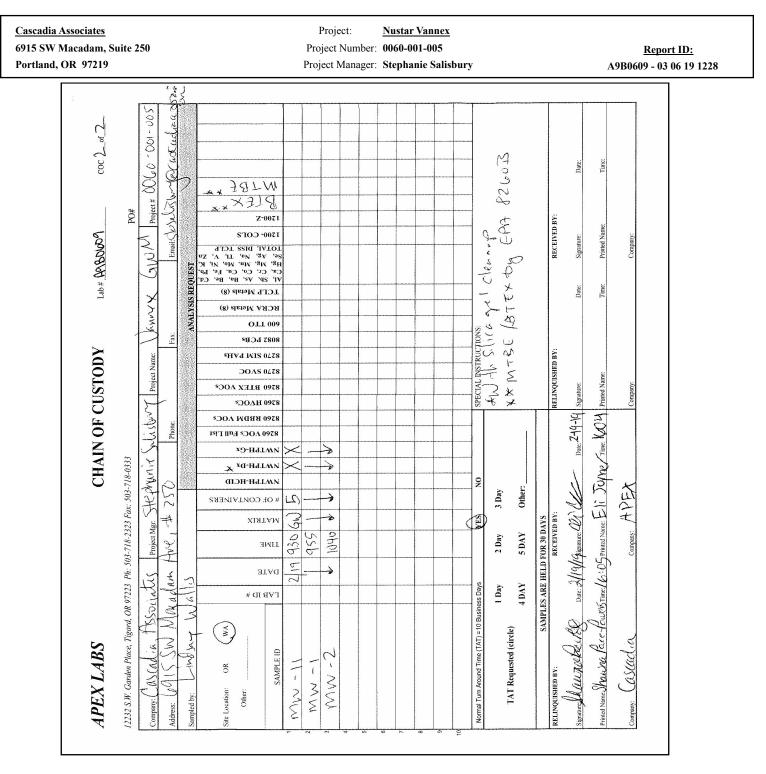
#### **Cascadia Associates** Project: Nustar Vannex 6915 SW Macadam, Suite 250 Project Number: 0060-001-005 **Report ID:** Portland, OR 97219 Project Manager: Stephanie Salisbury A9B0609 - 03 06 19 1228 RU may a Casta Mean 0060-005 coc 1 of 2 Date: Time JST M × -> D EPA P260 Project # sbidut YJI S 7 #04 Z-0071 ab # A980009 RECEIVED BY STOD -0071 Printed Nam Smail: AL, Sb, As, Ba, Ba, C Ca, Cr, Co, Cu, Fe, I Hg, Mg, Ma, Ma, Mo, W, Se, Ag, Wa, Wa, Ho, W, Signature: NCM 21-1-10-12 VZ K K 4d ANALYSIS REQUEST 62 TCLP Metals (8) Lime: Date RUNCH BIEX/WIGE RCRA Metals (8) OJ.I. 009 SPECIAL INSTRUCTIONS: \*\* W. T. S. I.C. X. ax 8085 bCBs CHAIN OF CUSTODY SHVA WIS 0228 Name ELINQUISHED BY: DOAS 0228 Project ? Printed Namu 8260 BTEX VOCs Date: 2-19-19 Signature \$DOAH 0978 Jahilburg 8260 RBDM VOCs Time 16:04 Printed Name, EN DAME Time, 1004 1SIT IInd SOOA 0978 xo-HdLMN 2232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333 Hedwin "". ×O-HALMN 5 **ШЭН-НАТИМ** Ş Other: 3 Day APEX # OF CONTAINERS 5 Date: 2/19/19/5ignature: 4. KES WATRIX RECEIVED BY: 5 > SAMPLES ARE HELD FOR 30 DAYS Project Mgr. 1240 140 950 1210 910 1010 11 00 1340 SHO 5 DAY X00 2 Day Ŧ TIME 2/18 5 2 DATE TJJdene ter > 2 N NAMINAL 4 DAY 1 Day # UI 8VI Turn Around Time (TAT) = 10 Business rywrachale-Powers $\left( \mathbb{A} \right)$ OSCabin TAT Requested (circle) DX VV 35 4PEX LABS , 0 C18 - MW SAMPLE UD 20 MW - 5T ナーくうい M MW -5 5 915 J- MW OR - NI M -MW NNV-- MW RELINQUISHED BY: MW 00 5 Site Location: Other: sampled by: vddreec.

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Ausa A Zomenighini



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

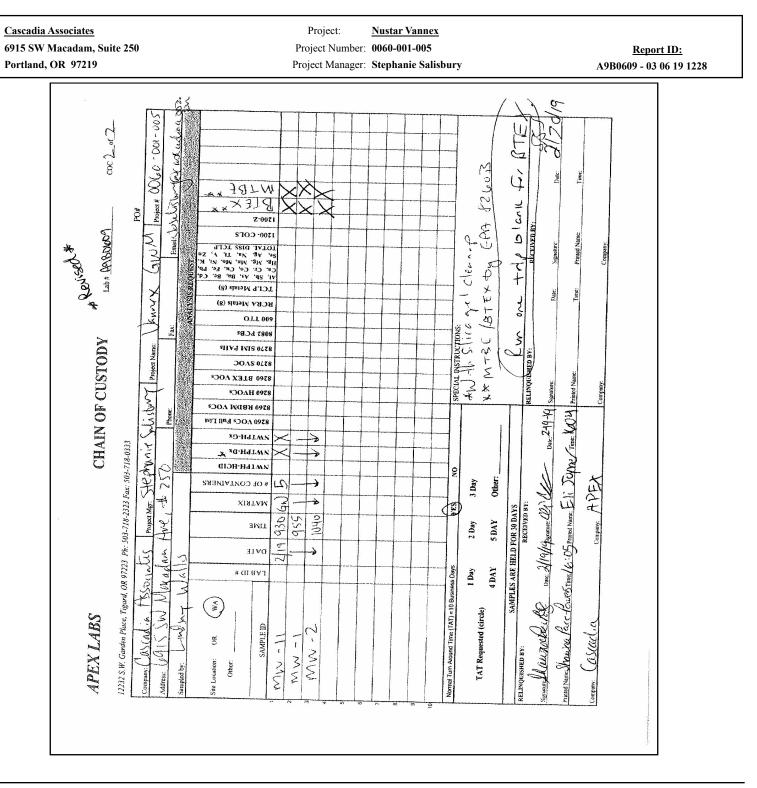


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12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

<u>Cascadia Associates</u>	Project: <u>Nustar Vannex</u>	
6915 SW Macadam, Suite 250	Project Number: 0060-001-005	Report ID:
Portland, OR 97219	Project Manager: Stephanie Salisbury	A9B0609 - 03 06 19 1228
Client: <u>Cascadia</u> Project/Project #: <u>Vannex</u> <u>Delivery Info</u> : Date/time received: <u>2-19-19</u> Delivered by: Apex <u>Client</u> <u>Cooler Inspection</u> Date/time in	APEX LABS COOLER RECEIPT FORM Associates Element WO#: A O060 -001 -005 0 By: ESSFedExUPSSwiftSenvoy 1spected: 2-19-19 @ 1645 By: ES X No Custody seals? Yes	SDSOther
	No Custody seals? Yes	No <u>X</u>
Cooler         Temperature (°C)       3.5         Received on ice? (Y/N)       Y         Temp. blanks? (Y/N)       Y         Ice type: (Gel/Real/Other)       Leal         Condition:       6w/l         Cooler out of temp? (Y/N)       Possible r         If some coolers are in temp and some       Out of temperature samples form initi         Samples Inspection:       Date/time insp         All samples intact?       Yes X	#1       Cooler #2       Cooler #3       Cooler #4       Cooler #5       Cooler #5 $3.8$ $2.4$	amples? Yes/No/NA
Bottle labels/COCs agree? Yes Not on COC	io / Comments: (5) Trip Blanks #	1962 provident
COC/container discrepancies form init Containers/volumes received appropria	iated? Yes No NA ✓ nte for analysis? Yes X No Comments:	
Do VOA vials have visible headspace? Comments		
Water samples: pH checked: Yes_ <u>×</u> No Comments: <u>MW・</u> テ& MW・	$\frac{NA_{pH} appropriate? Yes_No_NA_{nA_{pH}}}{0  _2 Ambers_PH_{7}}$	
Additional information:		
Labeled by: Witness:	Cooler Inspected by: See Project Co	miact Form:

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Assa A Zomenighini



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

Tuesday, June 4, 2019 Stephanie Salisbury Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239

# RE: A9E0719 - Nustar Vannex - 0060-001-005

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 A9E0719, which was received by the laboratory on 5/21/2019 at 3:10:00PM.

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

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

	Cooler Receip	t Information		
	(See Cooler Receip	ot Form for details)		
Cooler#1	1.4 degC	Cooler#2	1.2 degC	
Cooler#3	1.1 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

Assa A Jomenichini

Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	Report ID:
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301

# ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION									
Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received					
MW-10	A9E0719-01	Water	05/20/19 09:30	05/21/19 15:10					
MW-6	A9E0719-02	Water	05/20/19 10:25	05/21/19 15:10					
MW-3	A9E0719-03	Water	05/20/19 11:20	05/21/19 15:10					
MW-4	A9E0719-04	Water	05/20/19 12:00	05/21/19 15:10					
MW-2	A9E0719-05	Water	05/20/19 12:40	05/21/19 15:10					
MW-7	A9E0719-06	Water	05/20/19 13:20	05/21/19 15:10					
MW-1	A9E0719-07	Water	05/21/19 07:40	05/21/19 15:10					
MW-11	A9E0719-08	Water	05/21/19 08:20	05/21/19 15:10					
MW-5D	A9E0719-09	Water	05/21/19 08:55	05/21/19 15:10					
MW-5	A9E0719-10	Water	05/21/19 09:20	05/21/19 15:10					
MW-8D	A9E0719-11	Water	05/21/19 09:40	05/21/19 15:10					
MW-8	A9E0719-12	Water	05/21/19 10:20	05/21/19 15:10					
MW-9	A9E0719-13	Water	05/21/19 10:50	05/21/19 15:10					

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Lisa Domenighini, Client Services Manager



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

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239		Project: Project Nu Project Ma	mber: 006	<u>star Vannex</u> 0-001-005 phanie Salisbury			<u>Report l</u> A9E0719 - 06 04	
		ANALYTICA	L SAMI	PLE RESULTS				
	Diesel and/or Oil Hy	ydrocarbons by	NWTPH	-Dx with Silica	Gel Colu	mn Cleanu	ıp	
	Sample		Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-10 (A9E0719-01)				Matrix: Wate	er	Ba	atch: 9051316	
Diesel	ND		0.0755	mg/L	1	05/28/19	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	05/28/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery.	: 62 %	Limits: 50-150 %	1	05/28/19	NWTPH-Dx/SGC	
MW-6 (A9E0719-02)				Matrix: Wate	er	Ba	atch: 9051316	
Diesel	1.23		0.0755	mg/L	1	05/28/19	NWTPH-Dx/SGC	F-18
Oil	ND		0.151	mg/L	1	05/28/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery.	: 60 %	Limits: 50-150 %	1	05/28/19	NWTPH-Dx/SGC	
MW-3 (A9E0719-03)			atch: 9051316					
Diesel	ND		0.0755	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery.	: 65 %	Limits: 50-150 %	1	05/29/19	NWTPH-Dx/SGC	
MW-4 (A9E0719-04)				Matrix: Wate	r	Ba	atch: 9051316	
Diesel	ND		0.0755	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery.	: 66 %	Limits: 50-150 %	Ι	05/29/19	NWTPH-Dx/SGC	
MW-2 (A9E0719-05)				Matrix: Wate	r	Ba	atch: 9051316	
Diesel	ND		0.0755	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery.	: 58 %	Limits: 50-150 %	1	05/29/19	NWTPH-Dx/SGC	
MW-7 (A9E0719-06)				Matrix: Wate	er	Ba	atch: 9051316	
Diesel	ND		0.0755	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery.	: 73 %	Limits: 50-150 %	1	05/29/19	NWTPH-Dx/SGC	
MW-1 (A9E0719-07)				Matrix: Wate	er	Ba	atch: 9051316	
Diesel	ND		0.0748	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Oil	ND		0.150	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery.	: 71 %	Limits: 50-150 %	1	05/29/19	NWTPH-Dx/SGC	
MW-11 (A9E0719-08)				Matrix: Wate	er	Ba	atch: 9051316	
Diesel	ND		0.0748	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Apex Laboratories			The re	sults in this report ann	ly to the sam	unles analvzed i	n accordance with the ch	ain of

Apex Laboratories

Ausa A Zomenichini



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

Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	Report ID:
Cascadia Associates	Project: <u>Nustar Vannex</u>	

### ANALY FICAL SAMPLE RESULTS

L Die	esel and/or Oil H	ydrocarbons by	NWIPH	-Dx with Silica	Gel Colu	mn Cleanu	р	
	Sample	Detection F	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-11 (A9E0719-08)				Matrix: Wate	ər	Ba	itch: 9051316	
Oil	ND		0.150	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	61 %	Limits: 50-150 %	1	05/29/19	NWTPH-Dx/SGC	
				Matrix: Wate	er	Ba	itch: 9051316	
Diesel	ND		0.0755	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	05/29/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	70 %	Limits: 50-150 %	1	05/29/19	NWTPH-Dx/SGC	
			Matrix: Wat		ər	Ba	itch: 9051316	
Diesel	0.722		0.0784	mg/L	1	05/28/19	NWTPH-Dx/SGC	F-18
Oil	ND		0.157	mg/L	1	05/28/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	51 %	Limits: 50-150 %	1	05/28/19	NWTPH-Dx/SGC	
MW-8D (A9E0719-11)				Matrix: Water		Batch: 9051316		
Diesel	ND		0.0748	mg/L	1	05/28/19	NWTPH-Dx/SGC	
Oil	ND		0.150	mg/L	1	05/28/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	62 %	Limits: 50-150 %	1	05/28/19	NWTPH-Dx/SGC	
MW-8 (A9E0719-12RE1)				Matrix: Wate	er	Ва	ntch: 9051344	
Diesel	ND		0.0748	mg/L	1	05/30/19	NWTPH-Dx/SGC	
Oil	ND		0.150	mg/L	1	05/30/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	67 %	Limits: 50-150 %	1	05/30/19	NWTPH-Dx/SGC	
- MW-9 (A9E0719-13RE1)				Matrix: Wate	ər	Ba	ntch: 9051344	
Diesel	ND		0.0748	mg/L	1	05/30/19	NWTPH-Dx/SGC	
Oil	ND		0.150	mg/L	1	05/30/19	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	64 %	Limits: 50-150 %	1	05/30/19	NWTPH-Dx/SGC	

Apex Laboratories

Assa A Zomenighini

Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	Report ID:
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301

### ANALYTICAL SAMPLE RESULTS

	Sample	Detection	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-10 (A9E0719-01)				Matrix: Wate	ər	Ва	atch: 9051149	
Gasoline Range Organics	ND		0.100	mg/L	1	05/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recov	very: 96%	Limits: 50-150 %	5 1	05/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			107 %	50-150 %	5 1	05/22/19	NWTPH-Gx (MS)	
MW-6 (A9E0719-02)				Matrix: Wate	ər	Ва	atch: 9051149	
Gasoline Range Organics	20.0		2.00	mg/L	20	05/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recov	very: 99 %	Limits: 50-150 %	5 1	05/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			106 %	50-150 %	5 I	05/22/19	NWTPH-Gx (MS)	
MW-3 (A9E0719-03)				Matrix: Wate	ər	Ва	atch: 9051149	
Gasoline Range Organics	ND		0.100	mg/L	1	05/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recov	very: 96 %	Limits: 50-150 %	5 1	05/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			107 %	50-150 %	5 I	05/22/19	NWTPH-Gx (MS)	
MW-4 (A9E0719-04)				Matrix: Water		Batch: 9051149		
Gasoline Range Organics	ND		0.100	mg/L	1	05/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recov	very: 96 %	Limits: 50-150 %	5 1	05/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			107 %	50-150 %	5 1	05/22/19	NWTPH-Gx (MS)	
MW-2 (A9E0719-05)				Matrix: Wate	ər	Batch: 9051149		
Gasoline Range Organics	ND		0.100	mg/L	1	05/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recov	very: 96 %	Limits: 50-150 %	5 1	05/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			108 %	50-150 %	5 1	05/22/19	NWTPH-Gx (MS)	
MW-7 (A9E0719-06)				Matrix: Wate	ər	Ва	atch: 9051149	
Gasoline Range Organics	ND		0.100	mg/L	1	05/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recov	very: 97 %	Limits: 50-150 %	5 1	05/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			108 %	50-150 %	5 1	05/22/19	NWTPH-Gx (MS)	
MW-1 (A9E0719-07)		Matrix: Water		Ba	atch: 9051149			
Gasoline Range Organics	ND		0.100	mg/L	1	05/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recov	very: 95 %	Limits: 50-150 %		05/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			106 %	50-150 %	5 1	05/22/19	NWTPH-Gx (MS)	
MW-11 (A9E0719-08)				Matrix: Wate	er	Ва	atch: 9051149	
Gasoline Range Organics	3.05		0.100	mg/L	1	05/22/19	NWTPH-Gx (MS)	

Apex Laboratories

Ausa A Jomenighini



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

Cascadia Associates	Project: <u>Nustar</u>	Vannex	
5820 SW Kelly Ave Unit B	Project Number: 0060-00	1-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephar	nie Salisbury	A9E0719 - 06 04 19 1301

# ANALYTICAL SAMPLE RESULTS

Gasol	ine Range Hy	arocarbons (B	enzene th	nrough Naphtha	liene) by	NWIPH-G	X	
	Sample	Detection	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-11 (A9E0719-08)				Matrix: Wate	er	Ва	atch: 9051149	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 96%	Limits: 50-150 %	1	05/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			101 %	50-150 %	1	05/22/19	NWTPH-Gx (MS)	
MW-5D (A9E0719-09RE1)				Matrix: Wate	er	Ва	atch: 9051201	
Gasoline Range Organics	ND		0.100	mg/L	1	05/23/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 94 %	Limits: 50-150 %	1	05/23/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			107 %	50-150 %	1	05/23/19	NWTPH-Gx (MS)	
MW-5 (A9E0719-10)				Matrix: Water		Ва	atch: 9051149	
Gasoline Range Organics	22.0		2.00	mg/L	20	05/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	100 %	Limits: 50-150 %	1	05/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			104 %	50-150 %	1	05/22/19	NWTPH-Gx (MS)	
MW-8D (A9E0719-11)				Matrix: Water		Batch: 9051149		
Gasoline Range Organics	ND		0.100	mg/L	1	05/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 96%	Limits: 50-150 %	1	05/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			106 %	50-150 %	1	05/22/19	NWTPH-Gx (MS)	
				Matrix: Wate	er	Ва	atch: 9051149	
Gasoline Range Organics	ND		0.100	mg/L	1	05/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 96 %	Limits: 50-150 %	1	05/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			106 %	50-150 %	1	05/22/19	NWTPH-Gx (MS)	
MW-9 (A9E0719-13)				Matrix: Wate	er	Ва	atch: 9051149	
Gasoline Range Organics	ND		0.100	mg/L	1	05/22/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 96 %	Limits: 50-150 %	1	05/22/19	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			108 %	50-150 %	1	05/22/19	NWTPH-Gx (MS)	

Apex Laboratories

Assa A Zomenighini

Lisa Domenighini, Client Services Manager



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

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239		Project	ject: <u>Nust</u> t Number: <b>0060</b> Manager: <b>Step</b>		y		<u>Report</u> A9E0719 - 06 0	
			CAL SAMP					
		ted Volatile C		bounds by E	PA 8260C	D.(		
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-10 (A9E0719-01)				Matrix: W	ater	Bat	ch: 9051149	
Benzene	ND		0.200	ug/L	1	05/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	05/22/19	EPA 8260C	

EPA 8260C Methyl tert-butyl ether (MTBE) ND 1.00 ug/L 05/22/19 1 ---EPA 8260C Toluene ND ---1.00 ug/L 1 05/22/19 ug/L Xylenes, total ND 1.50 1 05/22/19 EPA 8260C ---Recovery: 107 % Surrogate: 1,4-Difluorobenzene (Surr) Limits: 80-120 % 1 05/22/19 EPA 8260C Toluene-d8 (Surr) 103 % 80-120 % 05/22/19 1 EPA 8260C 101 % 80-120 % 1 05/22/19 4-Bromofluorobenzene (Surr) EPA 8260C

MW-6 (A9E0719-02)				Matrix: Water		Bat	ch: 9051149	
Benzene	218		4.00	ug/L	20	05/22/19	EPA 8260C	
Ethylbenzene	1860		10.0	ug/L	20	05/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		20.0	ug/L	20	05/22/19	EPA 8260C	
Toluene	42.6		20.0	ug/L	20	05/22/19	EPA 8260C	
Xylenes, total	937		30.0	ug/L	20	05/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recover	y: 106 %	Limits: 80-120 %	1	05/22/19	EPA 8260C	
Toluene-d8 (Surr)			102 %	80-120 %	1	05/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			95 %	80-120 %	1	05/22/19	EPA 8260C	

MW-3 (A9E0719-03)				Matrix: Water		Bat	ch: 9051149
Benzene	ND		0.200	ug/L	1	05/22/19	EPA 8260C
Ethylbenzene	ND		0.500	ug/L	1	05/22/19	EPA 8260C
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	05/22/19	EPA 8260C
Toluene	ND		1.00	ug/L	1	05/22/19	EPA 8260C
Xylenes, total	ND		1.50	ug/L	1	05/22/19	EPA 8260C
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	v: 107 %	Limits: 80-120 %	1	05/22/19	EPA 8260C
Toluene-d8 (Surr)			103 %	80-120 %	1	05/22/19	EPA 8260C
4-Bromofluorobenzene (Surr)			101 %	80-120 %	1	05/22/19	EPA 8260C

ND		0.000				
		0.200	ug/L	1	05/22/19	EPA 8260C
ND		0.500	ug/L	1	05/22/19	EPA 8260C
ND		1.00	ug/L	1	05/22/19	EPA 8260C
ND		1.00	ug/L	1	05/22/19	EPA 8260C
ND		1.50	ug/L	1	05/22/19	EPA 8260C
	Recovery:	108 %	Limits: 80-120 %	1	05/22/19	EPA 8260C
		103 %	80-120 %	1	05/22/19	EPA 8260C
	ND ND	ND ND ND	ND          1.00           ND          1.00           ND          1.50           Recovery: 108 %	ND          1.00         ug/L           ND          1.00         ug/L           ND          1.50         ug/L           Recovery: 108 % Limits: 80-120 %	ND          1.00         ug/L         1           ND          1.00         ug/L         1           ND          1.50         ug/L         1           Recovery: 108 % Limits: 80-120 % I	ND          1.00         ug/L         1         05/22/19           ND          1.00         ug/L         1         05/22/19           ND          1.50         ug/L         1         05/22/19           ND          1.50         ug/L         1         05/22/19           Recovery:         108 %         Limits: 80-120 %         1         05/22/19

Apex Laboratories

Ausa A Zomenighini



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

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239			<u>Report</u> A9E0719 - 06 0					
		ANALYTICA	L SAMI	PLE RESULTS				
	Select	ed Volatile Orga	anic Corr	npounds by EPA	8260C			
Angleta	Sample Result	Detection Limit	Reporting Limit	Unita	Dilution	Date Analyzed	Method Ref.	
	Kesuit	Liinit	Linit			,		Notes
/IW-4 (A9E0719-04)				Matrix: Water			itch: 9051149	
Surrogate: 4-Bromofluorobenzene (Surr)		Recovery:	102 %	Limits: 80-120 %	1	05/22/19	EPA 8260C	
1W-2 (A9E0719-05)				Matrix: Water	r	Ba	itch: 9051149	
Benzene	ND		0.200	ug/L	1	05/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	05/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	3.10		1.00	ug/L	1	05/22/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	05/22/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	05/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	109 %	Limits: 80-120 %	1	05/22/19	EPA 8260C	
Toluene-d8 (Surr)			104 %	80-120 %	1	05/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			103 %	80-120 %	1	05/22/19	EPA 8260C	
IW-7 (A9E0719-06)				Matrix: Water	r	Ва	ntch: 9051149	
Benzene	ND		0.200	ug/L	1	05/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	05/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	05/22/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	05/22/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	05/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	108 %	Limits: 80-120 %	1	05/22/19	EPA 8260C	
Toluene-d8 (Surr)			103 %	80-120 %	1	05/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			102 %	80-120 %	1	05/22/19	EPA 8260C	
/IW-1 (A9E0719-07)				Matrix: Water	r	Ba	itch: 9051149	
Benzene	ND		0.200	ug/L	1	05/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	05/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	05/22/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	05/22/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	05/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	107 %	Limits: 80-120 %	1	05/22/19	EPA 8260C	
Toluene-d8 (Surr)		-	104 %	80-120 %	1	05/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			103 %	80-120 %	1	05/22/19	EPA 8260C	
/W-11 (A9E0719-08)				Matrix: Water	r	Ва	itch: 9051149	
Benzene	64.3		0.200	ug/L	1	05/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	05/22/19	EPA 8260C	
Toluene	8.43		1.00	ug/L	1	05/22/19	EPA 8260C	
Xylenes, total	35.5		1.50	ug/L	1	05/22/19	EPA 8260C	
Apex Laboratories Assa A Zmenighini				sults in this report apply by document. This analy				hain of



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

							<u>EPA ID: O</u>	<u>K01039</u>
Cascadia Associates		Project	<u>Nus</u>	star Vannex				
5820 SW Kelly Ave Unit B		Project Nu	umber: 006	0-001-005			<b>Report</b>	ID:
Portland, OR 97239		Project Ma	nager: Stej	phanie Salisbury			A9E0719 - 06 0	4 19 1301
		ANALYTICA	L SAMP	PLE RESULTS				
	Select	ed Volatile Orga	anic Com	pounds by EPA	8260C			
	Sample		Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-11 (A9E0719-08)				Matrix: Water		Ba	tch: 9051149	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	101 %	Limits: 80-120 %	1	05/22/19	EPA 8260C	
Toluene-d8 (Surr)			102 %	80-120 %	1	05/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			98 %	80-120 %	1	05/22/19	EPA 8260C	
/IW-11 (A9E0719-08RE1)				Matrix: Water Ba			tch: 9051201	
Ethylbenzene	359		5.00	ug/L	10	05/23/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	103 %	Limits: 80-120 %	1	05/23/19	EPA 8260C	
Toluene-d8 (Surr)			102 %	80-120 %	1	05/23/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			101 %	80-120 %	1	05/23/19	EPA 8260C	
/W-5D (A9E0719-09RE1)				Matrix: Water		Ва	tch: 9051201	
Benzene	ND		0.200	ug/L	1	05/23/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	05/23/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	05/23/19	EPA 8260C	
Naphthalene	ND		2.00	ug/L	1	05/23/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	05/23/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	05/23/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:		Limits: 80-120 %	1	05/23/19	EPA 8260C	
Toluene-d8 (Surr)			105 %	80-120 %	1	05/23/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			101 %	80-120 %	1	05/23/19	EPA 8260C	
/W-5 (A9E0719-10)				Matrix: Water	•	Ва	tch: 9051149	
Benzene	ND		4.00	ug/L	20	05/22/19	EPA 8260C	
Ethylbenzene	252		10.0	ug/L	20	05/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		20.0	ug/L	20	05/22/19	EPA 8260C	
Toluene	ND		20.0	ug/L	20	05/22/19	EPA 8260C	
Xylenes, total	1040		30.0	ug/L	20	05/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:		Limits: 80-120 %	1	05/22/19	EPA 8260C	
Toluene-d8 (Surr)			101 %	80-120 %	1	05/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			98 %	80-120 %	1	05/22/19	EPA 8260C	
/IW-8D (A9E0719-11)				Matrix: Water		Ba	tch: 9051149	
Benzene	ND		0.200	ug/L	1	05/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	05/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	05/22/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	05/22/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	05/22/19	EPA 8260C	

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

ANALYTICAL SAMPLE RESULTS										
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301								
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	Report ID:								
Cascadia Associates	Project: Nustar Vannex									

	Selec	ted Volatile Org	anic Com	pounds by EPA	A 8260C			
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-8D (A9E0719-11)				Matrix: Wate	r	Ba		
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery.	106 %	Limits: 80-120 %	1	05/22/19	EPA 8260C	
Toluene-d8 (Surr)			102 %	80-120 %	1	05/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			99 %	80-120 %	1	05/22/19	EPA 8260C	
MW-8 (A9E0719-12)				Matrix: Wate	r	Batch: 9051149		
Benzene	ND		0.200	ug/L	1	05/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	05/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	05/22/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	05/22/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	05/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery.	107 %	Limits: 80-120 %	1	05/22/19	EPA 8260C	
Toluene-d8 (Surr)			102 %	80-120 %	1	05/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			99 %	80-120 %	1	05/22/19	EPA 8260C	
MW-9 (A9E0719-13)				Matrix: Wate	r	Ba	tch: 9051149	
Benzene	ND		0.200	ug/L	1	05/22/19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	05/22/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	05/22/19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	05/22/19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	05/22/19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery.	108 %	Limits: 80-120 %	1	05/22/19	EPA 8260C	
Toluene-d8 (Surr)			102 %	80-120 %	1	05/22/19	EPA 8260C	
4-Bromofluorobenzene (Surr)			102 %	80-120 %	1	05/22/19	EPA 8260C	

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Assa A Zomenighini

Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301

## **QUALITY CONTROL (QC) SAMPLE RESULTS**

	Diesel a	and/or Oil	Hydrocarbo	ons by N	NTPH-D>	with Silio	ca Gel Co	olumn Cl	eanup				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Note	es
Batch 9051316 - EPA 3510C	(Fuels/Acid	Ext.) w/Silio	a Gel				Wat	er					
Blank (9051316-BLK1)		Prepared	: 05/28/19 13:	14 Analyz	ed: 05/28/1	9 22:34							
NWTPH-Dx/SGC													
Diesel	ND		0.0727	mg/L	1								
Oil	ND		0.145	mg/L	1								
Surr: o-Terphenyl (Surr)		Reco	overy: 79 %	Limits: 50	-150 %	Dil	ution: 1x						
LCS (9051316-BS1)		Prepared	: 05/28/19 13:	14 Analyz	ed: 05/28/1	9 22:55							
NWTPH-Dx/SGC													
Diesel	0.356		0.0800	mg/L	1	0.500		71	58 - 115%				
Surr: o-Terphenyl (Surr)		Reco	overy: 78 %	Limits: 50	-150 %	Dil	ution: 1x						
LCS Dup (9051316-BSD1)		Prepared	: 05/28/19 13:	14 Analyz	ed: 05/28/1	9 23:16							Q-1
NWTPH-Dx/SGC		1											<u> </u>
Diesel	0.339		0.0800	mg/L	1	0.500		68	58 - 115%	5	20%		
Surr: o-Terphenyl (Surr)		Reco	overy: 73 %	Limits: 50	-150 %	Dil	ution: 1x						
Batch 9051344 - EPA 3510C	(Fuels/Acid	Ext.) w/Silid	a Gel				Wat	er					_
Blank (9051344-BLK1)	(		: 05/29/19 10:	05 Analyz	ed: 05/30/1	9 00:51							
NWTPH-Dx/SGC		1											
Diesel	ND		0.0727	mg/L	1								
Oil	ND		0.145	mg/L	1								
Surr: o-Terphenyl (Surr)		Rece	overy: 84 %	Limits: 50	-150 %	Dil	ution: 1x						
LCS (9051344-BS1)		Prepared	: 05/29/19 10:	05 Analyz	ed: 05/30/1	9 01:14							
NWTPH-Dx/SGC													
Diesel	0.274		0.0800	mg/L	1	0.500		55	58 - 115%			A-01	
Surr: o-Terphenyl (Surr)		Reco	overy: 81 %	Limits: 50	-150 %	Dil	ution: 1x						
LCS Dup (9051344-BSD1)		Prepared	: 05/29/19 10:	05 Analyz	ed: 05/30/1	9 01:37							Q-1
NWTPH-Dx/SGC				-									
Diesel	0.288		0.0800	mg/L	1	0.500		58	58 - 115%	5	20%		
				-									

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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	Report ID:
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301

# **QUALITY CONTROL (QC) SAMPLE RESULTS**

L	Jasuili	ie italiye r	lydrocarbo			ugii mapii	inalene)	<b>J J J J J J J J J J</b>	11-07			
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9051149 - EPA 5030B							Wat	er				
Blank (9051149-BLK1)		Prepared	: 05/22/19 10:	00 Analyz	ed: 05/22/1	9 13:27						
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	1							
Surr: 4-Bromofluorobenzene (Sur)		Reco	overy: 95 %	Limits: 50	0-150 %	Dil	ution: 1x					
1,4-Difluorobenzene (Sur)			106 %	50	-150 %		"					
LCS (9051149-BS2)		Prepared	: 05/22/19 10:	00 Analyz	ed: 05/22/1	9 13:00						
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	0.485		0.100	mg/L	1	0.500		97	80 - 120%			
Surr: 4-Bromofluorobenzene (Sur)		Reco	very: 101 %	Limits: 50	0-150 %	Dil	ution: 1x					
1,4-Difluorobenzene (Sur)			103 %	50	-150 %		"					
Duplicate (9051149-DUP1)		Prepared	: 05/22/19 12:	51 Analyz	ed: 05/22/1	9 20:39						
QC Source Sample: MW-6 (A9E0	719-02)											
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	19.7		2.00	mg/L	20		20.0			2	30%	
Surr: 4-Bromofluorobenzene (Sur)		Reco	very: 100 %	Limits: 50	0-150 %	Dil	ution: 1x					
1,4-Difluorobenzene (Sur)			103 %	50	-150 %		"					
Duplicate (9051149-DUP2)		Prepared	: 05/22/19 12:	51 Analyz	ed: 05/22/1	9 22:00						
QC Source Sample: MW-5 (A9E0 NWTPH-Gx (MS)	<u>719-10)</u>											
Gasoline Range Organics	22.1		2.00	mg/L	20		22.0			0.2	30%	
Surr: 4-Bromofluorobenzene (Sur)		Reco	overy: 98 %	Limits: 50	)-150 %	Dil	ution: 1x					
1,4-Difluorobenzene (Sur)			105 %	50	-150 %		"					

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301

# **QUALITY CONTROL (QC) SAMPLE RESULTS**

	Gasoli	ne Range H	lydrocarbo	ons (Ben	zene thro	ugh Naph	thalene)	by NWT	PH-Gx			
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9051201 - EPA 5030B							Wat	er				
Blank (9051201-BLK1)		Prepared	05/23/19 10:	10 Analyz	zed: 05/23/1	9 13:06						
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	1							
Surr: 4-Bromofluorobenzene (Sur)		Reco	overy: 93 %	Limits: 5	0-150 %	Dili	ution: 1x					
1,4-Difluorobenzene (Sur)			107 %	5	0-150 %		"					
LCS (9051201-BS2)		Prepared	05/23/19 10:	10 Analy	zed: 05/23/1	9 12:39						
NWTPH-Gx (MS)												
Gasoline Range Organics	0.500		0.100	mg/L		0.500		100	80 - 120%			
Surr: 4-Bromofluorobenzene (Sur)		Reco	overy: 95 %	Limits: 5	0-150 %	Dili	ution: 1x					
1,4-Difluorobenzene (Sur)			105 %	5	0-150 %		"					
Duplicate (9051201-DUP1)		Prepared	05/23/19 12:	00 Analyz	zed: 05/23/1	9 17:10						
QC Source Sample: MW-11 (A9E	0719-08RE1	<u>1)</u>										
<u>NWTPH-Gx (MS)</u>	2.42		1.00	a.	10		0.55			~	200/	
Gasoline Range Organics	2.42		1.00	mg/L			2.55			5	30%	
Surr: 4-Bromofluorobenzene (Sur)		Reco	overy: 95 %	Limits: 5		Dili	ution: 1x					
1,4-Difluorobenzene (Sur)			103 %	5	0-150 %		"					

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

Cascadia Associates	Project: <u>Nustan</u>	Vannex	
5820 SW Kelly Ave Unit B	Project Number: 0060-0	01-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stepha	nie Salisbury	A9E0719 - 06 04 19 1301

## **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Selec	ted Volati	le Organi	c Compo	unds by E	-PA 8260					
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Note
Batch 9051149 - EPA 5030B							Wat	er				
Blank (9051149-BLK1)		Prepared:	05/22/19 10:	00 Analyz	ed: 05/22/1	9 13:27						
EPA 8260C												
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							
Toluene	ND		1.00	ug/L	1							
Xylenes, total	ND		1.50	ug/L	1							
Surr: 1,4-Difluorobenzene (Surr)		Recov	ery: 106 %	Limits: 80	)-120 %	Dil	ution: 1x					
Toluene-d8 (Surr)			102 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			102 %	80	-120 %		"					
LCS (9051149-BS1)		Prepared:	05/22/19 10:	00 Analyz	ed: 05/22/1	9 12:33						
EPA 8260C												
Benzene	20.3		0.200	ug/L	1	20.0		101 8	80 - 120%			
Ethylbenzene	18.6		0.500	ug/L	1	20.0		93 8	80 - 120%			
Methyl tert-butyl ether (MTBE)	18.0		1.00	ug/L	1	20.0		90 8	80 - 120%			
Toluene	18.7		1.00	ug/L	1	20.0		94 8	80 - 120%			
Xylenes, total	57.0		1.50	ug/L	1	60.0		95 8	80 - 120%			
Surr: 1,4-Difluorobenzene (Surr)		Recov	ery: 104 %	Limits: 80	)-120 %	Dil	ution: 1x					
Toluene-d8 (Surr)			100 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			94 %	80	-120 %		"					
Duplicate (9051149-DUP1)		Prepared:	05/22/19 12:	51 Analyz	ed: 05/22/1	9 20:39						
QC Source Sample: MW-6 (A9E0	719-02)											
EPA 8260C												
Benzene	211		4.00	ug/L	20		218			3	30%	
Ethylbenzene	1850		10.0	ug/L	20		1860			0.4	30%	
Methyl tert-butyl ether (MTBE)	ND		20.0	ug/L	20		ND				30%	
Toluene	41.8		20.0	ug/L	20		42.6			2	30%	
Xylenes, total	938		30.0	ug/L	20		937			0.1	30%	
Surr: 1,4-Difluorobenzene (Surr)		Recov	ery: 103 %	Limits: 80	-120 %	Dil	ution: 1x					
Toluene-d8 (Surr)			101 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			97 %	80	-120 %		"					

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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	Report ID:
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301

# **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Sele	cted Volati	e Organi	ic Compo	unds by E	EPA 8260	С				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9051149 - EPA 5030B							Wat	er				
Duplicate (9051149-DUP2)		Prepared	: 05/22/19 12:	51 Analyz	zed: 05/22/1	9 22:00						
OC Source Sample: MW-5 (A9E0 EPA 8260C	7 <u>19-10)</u>											
Benzene	ND		4.00	ug/L	20		ND				30%	
Ethylbenzene	255		10.0	ug/L	20		252			1	30%	
Methyl tert-butyl ether (MTBE)	ND		20.0	ug/L	20		ND				30%	
Toluene	ND		20.0	ug/L	20		ND				30%	
Xylenes, total	1060		30.0	ug/L	20		1040			2	30%	
Surr: 1,4-Difluorobenzene (Surr)		Reco	very: 105 %	Limits: 80	0-120 %	Dili	ution: 1x					
Toluene-d8 (Surr)			103 %	80	0-120 %		"					
4-Bromofluorobenzene (Surr)			95 %	80	0-120 %		"					

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Lisa Domenighini, Client Services Manager



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

<u>Cascadia Associates</u>	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301

## **QUALITY CONTROL (QC) SAMPLE RESULTS**

		2616	cted Volatil	e organi	c Compo	unus by E	FA 02000	ر ا				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9051201 - EPA 5030B							Wate	er				
Blank (9051201-BLK1)		Prepared	: 05/23/19 10:	10 Analyz	ed: 05/23/1	9 13:06						
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)		Reco	very: 107 %	Limits: 80	-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			105 %		-120 %		"					
4-Bromofluorobenzene (Surr)			104 %	80	-120 %		"					
LCS (9051201-BS1)		Prepared	: 05/23/19 10:	10 Analyz	ed: 05/23/1	9 12:12						
EPA 8260C		1		5								
Benzene	19.8		0.200	ug/L	1	20.0		99 8	80 - 120%			
1,2-Dibromoethane (EDB)	20.1		0.500	ug/L	1	20.0		100	80 - 120%			
1,2-Dichloroethane (EDC)	21.3		0.500	ug/L	1	20.0			80 - 120%			
Ethylbenzene	18.3		0.500	ug/L	1	20.0		92 8	80 - 120%			
Isopropylbenzene	18.3		1.00	ug/L	1	20.0			80 - 120%			
Methyl tert-butyl ether (MTBE)	17.7		1.00	ug/L	1	20.0			80 - 120%			
Naphthalene	16.5		2.00	ug/L	1	20.0		82 8	80 - 120%			
Toluene	18.4		1.00	ug/L	1	20.0			80 - 120%			
1,2,4-Trimethylbenzene	19.0		1.00	ug/L	1	20.0			80 - 120%			
1,3,5-Trimethylbenzene	18.5		1.00	ug/L ug/L	1	20.0			80 - 120%			
Xylenes, total	55.7		1.50	ug/L ug/L	1	60.0			80 - 120%			
Surr: 1,4-Difluorobenzene (Surr)		Reco	very: 104 %	Limits: 80			ution: 1x		. , •			
Toluene-d8 (Surr)		neco	99 %		-120 %	Diii	" "					
4-Bromofluorobenzene (Surr)			93 %		-120 %		"					

Duplicate (9051201-DUP1)

Prepared: 05/23/19 12:00 Analyzed: 05/23/19 17:10

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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301

# **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Seleo	cted Volati	e Organi	c Compo	unds by E	PA 8260	С				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9051201 - EPA 5030B							Wat	er				
Duplicate (9051201-DUP1)		Prepared	05/23/19 12:	00 Analyz	zed: 05/23/1	9 17:10						
OC Source Sample: MW-11 (A9E) EPA 8260C	)719-08RE1	<u>)</u>										
Benzene	50.7		2.00	ug/L	10		53.8			6	30%	
1,2-Dibromoethane (EDB)	ND		5.00	ug/L	10		ND				30%	
1,2-Dichloroethane (EDC)	ND		5.00	ug/L	10		ND				30%	
Ethylbenzene	345		5.00	ug/L	10		359			4	30%	
Isopropylbenzene	16.2		10.0	ug/L	10		16.6			3	30%	
Methyl tert-butyl ether (MTBE)	ND		10.0	ug/L	10		ND				30%	
Naphthalene	27.8		20.0	ug/L	10		28.4			2	30%	
Toluene	ND		10.0	ug/L	10		7.46			***	30%	
1,2,4-Trimethylbenzene	59.3		10.0	ug/L	10		62.0			4	30%	
1,3,5-Trimethylbenzene	ND		10.0	ug/L	10		ND				30%	
Xylenes, total	24.7		15.0	ug/L	10		25.7			4	30%	
Surr: 1,4-Difluorobenzene (Surr)		Recov	very: 103 %	Limits: 80	0-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			102 %	80	)-120 %		"					
4-Bromofluorobenzene (Surr)			101 %	80	)-120 %		"					

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301

# SAMPLE PREPARATION INFORMATION

Prep: EPA 3510C (		sel and/or Oil Hydrocar ) w/Silica Gel	bons by NWTPH-D	x with Silica Gel Col	umn Cleanup Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 9051316							
A9E0719-01	Water	NWTPH-Dx/SGC	05/20/19 09:30	05/28/19 13:14			0.94
A9E0719-02	Water	NWTPH-Dx/SGC	05/20/19 10:25	05/28/19 13:14			0.94
A9E0719-03	Water	NWTPH-Dx/SGC	05/20/19 11:20	05/28/19 13:14			0.94
A9E0719-04	Water	NWTPH-Dx/SGC	05/20/19 12:00	05/28/19 13:14			0.94
A9E0719-05	Water	NWTPH-Dx/SGC	05/20/19 12:40	05/28/19 13:14			0.94
A9E0719-06	Water	NWTPH-Dx/SGC	05/20/19 13:20	05/28/19 13:14			0.94
A9E0719-07	Water	NWTPH-Dx/SGC	05/21/19 07:40	05/28/19 13:14			0.94
A9E0719-08	Water	NWTPH-Dx/SGC	05/21/19 08:20	05/28/19 13:14			0.94
A9E0719-09	Water	NWTPH-Dx/SGC	05/21/19 08:55	05/28/19 13:14			0.94
A9E0719-10	Water	NWTPH-Dx/SGC	05/21/19 09:20	05/28/19 13:36			0.98
A9E0719-11	Water	NWTPH-Dx/SGC	05/21/19 09:40	05/28/19 13:36			0.94
Batch: 9051344							
A9E0719-12RE1	Water	NWTPH-Dx/SGC	05/21/19 10:20	05/29/19 10:05			0.94
A9E0719-13RE1	Water	NWTPH-Dx/SGC	05/21/19 10:50	05/29/19 10:05			0.94

	Gas	soline Range Hydrocart	oons (Benzene thro	ugh Naphthalene) b	y NWTPH-Gx		
Prep: EPA 5030B					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 9051149							
A9E0719-01	Water	NWTPH-Gx (MS)	05/20/19 09:30	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-02	Water	NWTPH-Gx (MS)	05/20/19 10:25	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-03	Water	NWTPH-Gx (MS)	05/20/19 11:20	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-04	Water	NWTPH-Gx (MS)	05/20/19 12:00	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-05	Water	NWTPH-Gx (MS)	05/20/19 12:40	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-06	Water	NWTPH-Gx (MS)	05/20/19 13:20	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-07	Water	NWTPH-Gx (MS)	05/21/19 07:40	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-08	Water	NWTPH-Gx (MS)	05/21/19 08:20	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-10	Water	NWTPH-Gx (MS)	05/21/19 09:20	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-11	Water	NWTPH-Gx (MS)	05/21/19 09:40	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-12	Water	NWTPH-Gx (MS)	05/21/19 10:20	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-13	Water	NWTPH-Gx (MS)	05/21/19 10:50	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
Batch: 9051201							
A9E0719-09RE1	Water	NWTPH-Gx (MS)	05/21/19 08:55	05/23/19 12:00	5mL/5mL	5mL/5mL	1.00

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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301

# SAMPLE PREPARATION INFORMATION

Selected Volatile Organic Compounds by EPA 8260C							
Prep: EPA 5030B					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 9051149							
A9E0719-01	Water	EPA 8260C	05/20/19 09:30	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-02	Water	EPA 8260C	05/20/19 10:25	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-03	Water	EPA 8260C	05/20/19 11:20	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-04	Water	EPA 8260C	05/20/19 12:00	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-05	Water	EPA 8260C	05/20/19 12:40	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-06	Water	EPA 8260C	05/20/19 13:20	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-07	Water	EPA 8260C	05/21/19 07:40	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-08	Water	EPA 8260C	05/21/19 08:20	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-10	Water	EPA 8260C	05/21/19 09:20	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-11	Water	EPA 8260C	05/21/19 09:40	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-12	Water	EPA 8260C	05/21/19 10:20	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
A9E0719-13	Water	EPA 8260C	05/21/19 10:50	05/22/19 12:51	5mL/5mL	5mL/5mL	1.00
Batch: 9051201							
A9E0719-08RE1	Water	EPA 8260C	05/21/19 08:20	05/23/19 12:00	5mL/5mL	5mL/5mL	1.00
A9E0719-09RE1	Water	EPA 8260C	05/21/19 08:55	05/23/19 12:00	5mL/5mL	5mL/5mL	1.00

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Assa A Zomenighini

Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9E0719 - 06 04 19 1301

# **QUALIFIER DEFINITIONS**

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

### Apex Laboratories

A-01	Blank Spike recovery is below in-house lower QC limit but passes recommended NWTPH method limits. Data quality is unaffected.
F-18	Result for Diesel (Diesel Range Organics, C12-C24) is due to overlap from Gasoline or a Gasoline Range product.

Q-19 Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.

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Lisa Domenighini, Client Services Manager



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

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

Project: Nustar Vannex

Project Number: 0060-001-005 Project Manager: Stephanie Salisbury <u>Report ID:</u> A9E0719 - 06 04 19 1301

# **REPORTING NOTES AND CONVENTIONS:**

### Abbreviations:

DET	Analyte DETECTED at or above the detection or reporting li	imit.
-----	--	-------

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.

- <u>" dry"</u> 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

Assa A Zomenighini



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

## <u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland. OR 97239

Project: <u>Nustar Vannex</u>

Project Number: 0060-001-005 Project Manager: Stephanie Salisbury <u>Report ID:</u> A9E0719 - 06 04 19 1301

# **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

Ausa A Zomenichini

Lisa Domenighini, Client Services Manager



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

Cascadia Associates	<u>s</u>	Project:	Nustar Vannex					
5820 SW Kelly Ave Unit B Portland, OR 97239		Project Number:	0060-001-005	Report ID:				
		Project Manager:	Stephanie Salisbury	A9E0719 - 06 04 19 1301				
		LABORATORY ACCREDI	TATION INFORMATION	1				
	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 <u>exception</u> of any analyte(s) listed below:							
<u>Apex Labor</u>	<u>ratories</u>							
Matrix	Analysis	TNI_ID	Analyte	TNI_ID Accreditation				
	<u>All</u>	reported analytes are included in Apex	Laboratories' current ORELAP sco	<u>pe.</u>				

### **Secondary Accreditations**

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

## **Subcontract Laboratory Accreditations**

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

## **Field Testing Parameters**

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

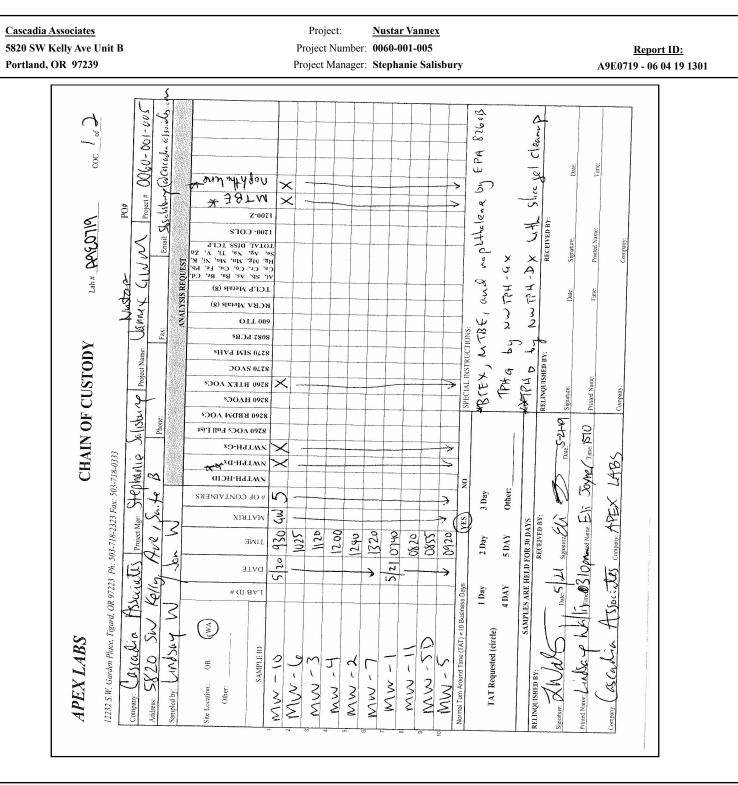
Apex Laboratories

Ausa A Zomenighini

Lisa Domenighini, Client Services Manager



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

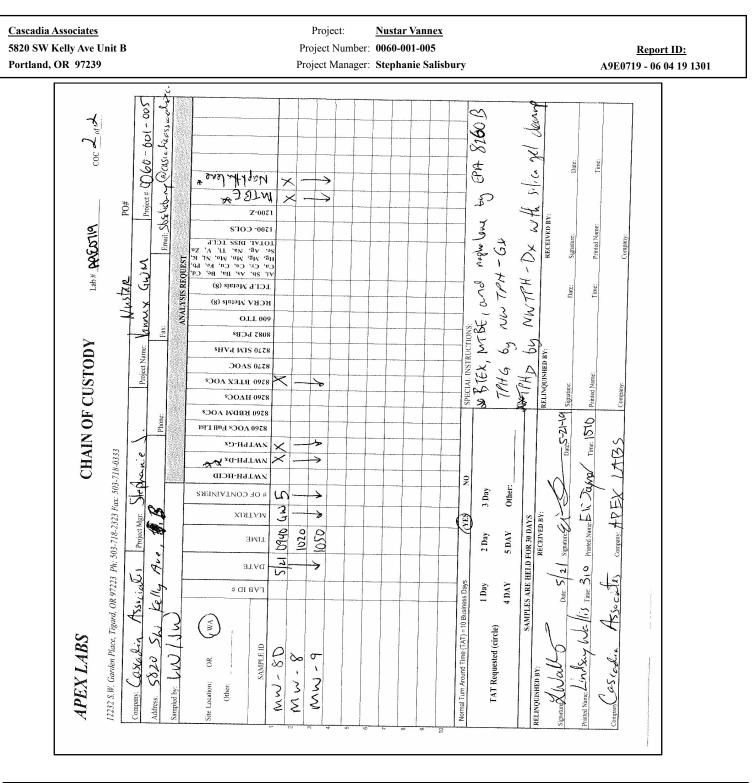


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6700 S.W. Sandburg Street Tigard, OR 97223 503-718-2323 EPA ID: OR01039

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project:Nustar VannexProject Number:0060-001-005Project Manager:Stephanie Salisbury	<u>Report ID:</u> A9E0719 - 06 04 19 1301
Project/Project #:QAWA         Delivery Info:         Date/time received:5-21-         Delivered by: Apex_X Client         Cooler Inspection Date/t         Chain of Custody included?         Signed/dated by client?         Signed/dated by Apex?         C         Temperature (°C)         Received on ice? (Y/N)         Temp. blanks? (Y/N)         Ice type: (Gel/Real/Other)         Q         Condition:         G         Cooler out of temp? (YM) Poss         If some coolers are in temp and         Out of temperature samples for         Samples Inspection:       Date/tir         All samples intact? Yes       N         Bottle labels/COCs agree? Yes         COC/container discrepancies for         Containers/volumes received app         Do VOA vials have visible heads         Comments_ MW-8       3/3	Yes $\times$ No Yes $\times$ No Yes $\times$ No 200ler #1 Cooler #2 Cooler #3 Cooler #4 Cooler #5 Cooler $\times$ 1.7 $\vee$ 2.7 $\vee$ 2.7 Y 2.7 Y 2.7 Zeal Eeal cool Good Good some out were group determalised	<pre></pre>
Labeled by: Witness:	Cooler Inspected by: ET See Project Conta	ct Form: Y

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Assa A Zomenighini



Tuesday, September 10, 2019 Stephanie Salisbury Cascadia Associates 5820 SW Kelly Ave Unit B

Portland, OR 97239

# RE: A9I0015 - Nustar Vannex - 0060-001-005

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 A9I0015, which was received by the laboratory on 8/30/2019 at 1:54:00PM.

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

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

	Cooler Receip	ot Information				
(See Cooler Receipt Form for details)						
Cooler #1	1.1 degC	Cooler #2	2.7 degC			
Cooler #3	0.9 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

Ausa A Jomenichini

Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9I0015 - 09 10 19 0932

# ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION						
Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received		
	A9I0015-01	Water	08/28/19 09:40	08/30/19 13:54		
MW-5	A9I0015-02	Water	08/28/19 10:39	08/30/19 13:54		
MW-5 DUP	A9I0015-03	Water	08/28/19 10:39	08/30/19 13:54		
MW-5D	A9I0015-04	Water	08/28/19 11:39	08/30/19 13:54		
MW-8	A9I0015-05	Water	08/28/19 12:26	08/30/19 13:54		
MW-8D	A9I0015-06	Water	08/28/19 13:30	08/30/19 13:54		
MW-7	A9I0015-07	Water	08/28/19 14:40	08/30/19 13:54		
MW-1	A9I0015-08	Water	08/29/19 09:24	08/30/19 13:54		
MW-11	A9I0015-09	Water	08/29/19 10:21	08/30/19 13:54		
MW-6	A9I0015-10	Water	08/29/19 11:14	08/30/19 13:54		
MW-10	A9I0015-11	Water	08/29/19 12:24	08/30/19 13:54		
MW-2	A9I0015-12	Water	08/29/19 13:48	08/30/19 13:54		
Trip Blank	A9I0015-13	Water	08/28/19 00:00	08/30/19 13:54		

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates		Project:	Nus	star Vannex				
5820 SW Kelly Ave Unit B		Project Nu					<b>Report ID:</b>	
Portland, OR 97239	Project Manager: Stephanie Salisbury A910015 - 09 10 19 09							0932
		ANALYTICA	L SAMI	PLE RESULTS				
	Diesel and/or Oil Hy	ydrocarbons by	NWTPH	-Dx with Silica	Gel Colu	mn Cleanup		
	Sample	Detection F	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-9 (A9I0015-01)				Matrix: Wate	er	Batch	: 9090490	
Diesel	ND		0.0748	mg/L	1	09/05/19 01:10	NWTPH-Dx/SGC	
Oil	ND		0.150	mg/L	1	09/05/19 01:10	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	62 %	Limits: 50-150 %	1	09/05/19 01:10	NWTPH-Dx/SGC	
MW-5 (A9l0015-02)		Matrix: Water Batch: 9090490				: 9090490		
Diesel	0.963		0.0769	mg/L	1	09/05/19 01:34	NWTPH-Dx/SGC	F-18
Oil	ND		0.154	mg/L	1	09/05/19 01:34	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	67 %	Limits: 50-150 %	1	09/05/19 01:34	NWTPH-Dx/SGC	
MW-5 DUP (A910015-03)				Matrix: Wate	er	Batch	: 9090490	
Diesel	0.879		0.0769	mg/L	1	09/05/19 02:00	NWTPH-Dx/SGC	F-18
Oil	ND		0.154	mg/L	1	09/05/19 02:00	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	: 73 %	Limits: 50-150 %	1	09/05/19 02:00	NWTPH-Dx/SGC	
MW-5D (A910015-04)				Matrix: Wate	ər	Batch	: 9090490	
Diesel	ND		0.0748	mg/L	1	09/05/19 02:25	NWTPH-Dx/SGC	
Oil	ND		0.150	mg/L	1	09/05/19 02:25	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	: 72 %	Limits: 50-150 %	1	09/05/19 02:25	NWTPH-Dx/SGC	
MW-8 (A9I0015-05)				Matrix: Wate	ər	Batch	: 9090490	
Diesel	ND		0.0825	mg/L	1	09/05/19 02:50	NWTPH-Dx/SGC	
Oil	ND		0.165	mg/L	1	09/05/19 02:50	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	: 84 %	Limits: 50-150 %	1	09/05/19 02:50	NWTPH-Dx/SGC	
MW-8D (A910015-06)				Matrix: Wate	er	Batch	: 9090490	
Diesel	ND		0.0755	mg/L	1	09/05/19 03:16	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	09/05/19 03:16	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	: 85 %	Limits: 50-150 %	1	09/05/19 03:16	NWTPH-Dx/SGC	
MW-7 (A9l0015-07)				Matrix: Wate	er	Batch	: 9090490	
Diesel	ND		0.0777	mg/L	1	09/05/19 03:41	NWTPH-Dx/SGC	
Oil	ND		0.155	mg/L	1	09/05/19 03:41	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	84 %	Limits: 50-150 %	1	09/05/19 03:41	NWTPH-Dx/SGC	
MW-1 (A910015-08)				Matrix: Wate	er	Batch	: 9090490	

0.0748

----

mg/L

Diesel

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ND

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.

1

09/05/19 04:06

NWTPH-Dx/SGC



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	Report ID:
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9I0015 - 09 10 19 0932

# ANALYTICAL SAMPLE RESULTS

	Diesel and/or Oil Hy	drocarbons by	NWTPH	-Dx with Silica (	Gel Colu	mn Cleanup		
	Sample	Detection	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-1 (A9I0015-08)				Matrix: Wate	r	Batch	: 9090490	
Oil	ND		0.150	mg/L	1	09/05/19 04:06	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery	: 80 %	Limits: 50-150 %	1	09/05/19 04:06	NWTPH-Dx/SGC	
					r	Batch	: 9090490	
Diesel	0.0940		0.0748	mg/L	1	09/05/19 04:32	NWTPH-Dx/SGC	F-18
Oil	ND		0.150	mg/L	1	09/05/19 04:32	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery	: 74 %	Limits: 50-150 %	1	09/05/19 04:32	NWTPH-Dx/SGC	
MW-6 (A910015-10)				Matrix: Water		Batch: 9090490		
Diesel	1.64		0.0755	mg/L	1	09/05/19 04:57	NWTPH-Dx/SGC	F-20
Oil	ND		0.151	mg/L	1	09/05/19 04:57	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery	: 59%	Limits: 50-150 %	1	09/05/19 04:57	NWTPH-Dx/SGC	
MW-10 (A9I0015-11)				Matrix: Wate	r	Batch	: 9090490	
Diesel	ND		0.0748	mg/L	1	09/05/19 05:22	NWTPH-Dx/SGC	
Oil	ND		0.150	mg/L	1	09/05/19 05:22	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery	: 61 %	Limits: 50-150 %	1	09/05/19 05:22	NWTPH-Dx/SGC	
MW-2 (A910015-12)		Mat		Matrix: Wate	r	Batch: 9090490		
Diesel	ND		0.0755	mg/L	1	09/05/19 05:48	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	09/05/19 05:48	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery	: 62 %	Limits: 50-150 %	1	09/05/19 05:48	NWTPH-Dx/SGC	

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9I0015 - 09 10 19 0932

## ANALYTICAL SAMPLE RESULTS

	Sample	Detection	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-9 (A910015-01)				Matrix: Water Batch: 9090423				
Gasoline Range Organics	ND		0.100	mg/L	1	09/03/19 18:47	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 108 %	Limits: 50-150 %	5 I	09/03/19 18:47	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			102 %	50-150 %	6 I	09/03/19 18:47	NWTPH-Gx (MS)	
MW-5 (A9I0015-02)				Matrix: Wate	ər	Batch	: 9090423	
Gasoline Range Organics	24.8		2.00	mg/L	20	09/03/19 21:56	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 105 %	Limits: 50-150 %	5 I	09/03/19 21:56	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			99 %	50-150 %	6 1	09/03/19 21:56	NWTPH-Gx (MS)	
MW-5 DUP (A910015-03)				Matrix: Water Batch: 9090422				
Gasoline Range Organics	21.7		2.00	mg/L	20	09/03/19 22:17	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 104 %	Limits: 50-150 %	5 I	09/03/19 22:17	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			134 %	50-150 %	5 I	09/03/19 22:17	NWTPH-Gx (MS)	
MW-5D (A910015-04)				Matrix: Water Batch: 9090423				
Gasoline Range Organics	0.309		0.100	mg/L	1	09/03/19 19:14	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 102 %	Limits: 50-150 %	6 I	09/03/19 19:14	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			97 %	50-150 %	6 I	09/03/19 19:14	NWTPH-Gx (MS)	
MW-8 (A910015-05)				Matrix: Wate	ər	Batch	: 9090423	
Gasoline Range Organics	ND		0.100	mg/L	1	09/03/19 19:41	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 105 %	Limits: 50-150 %	5 I	09/03/19 19:41	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			103 %	50-150 %	6 I	09/03/19 19:41	NWTPH-Gx (MS)	
MW-8D (A910015-06)				Matrix: Wate	ər	Batch	: 9090423	
Gasoline Range Organics	ND		0.100	mg/L	1	09/03/19 20:08	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery.	: 106 %	Limits: 50-150 %	5 I	09/03/19 20:08	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			102 %	50-150 %	6 I	09/03/19 20:08	NWTPH-Gx (MS)	
MW-7 (A910015-07)				Matrix: Wate	ər	Batch	: 9090423	
Gasoline Range Organics	ND		0.100	mg/L	1	09/03/19 20:35	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery.		Limits: 50-150 %		09/03/19 20:35	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			103 %	50-150 %	6 I	09/03/19 20:35	NWTPH-Gx (MS)	
MW-1 (A9I0015-08)				Matrix: Wate	ər	Batch	: 9090423	
Gasoline Range Organics	ND		0.100	mg/L	1	09/03/19 21:02	NWTPH-Gx (MS)	

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

Project: <u>Nu</u>	istar Vannex	
Project Number: 00	60-001-005	<u>Report ID:</u>
Project Manager: Ste	ephanie Salisbury	A9I0015 - 09 10 19 0932
	Project Number: 00	Project:Nustar VannexProject Number:0060-001-005Project Manager:Stephanie Salisbury

# ANALYTICAL SAMPLE RESULTS

		(=		nrough Naphtha	· · · · , ~ <b>,</b>			
	Sample	Detection	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-1 (A9I0015-08)				Matrix: Water		Batch	: 9090423	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	106 %	Limits: 50-150 %	5 I	09/03/19 21:02	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			103 %	50-150 %	5 1	09/03/19 21:02	NWTPH-Gx (MS)	
MW-11 (A9I0015-09RE1)		Matrix: Water		Batch	: 9090470			
Gasoline Range Organics	17.4		1.00	mg/L	10	09/04/19 17:09	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 111 %	Limits: 50-150 %	5 1	09/04/19 17:09	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			102 %	50-150 %	5 1	09/04/19 17:09	NWTPH-Gx (MS)	
MW-6 (A910015-10)				Matrix: Water		Batch: 9090423		
Gasoline Range Organics	16.8		2.00	mg/L	20	09/03/19 22:50	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	104 %	Limits: 50-150 %	5 1	09/03/19 22:50	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			98 %	50-150 %	5 1	09/03/19 22:50	NWTPH-Gx (MS)	
MW-10 (A9I0015-11)				Matrix: Wate	ər	Batch	: 9090422	
Gasoline Range Organics	ND		0.100	mg/L	1	09/03/19 21:23	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	101 %	Limits: 50-150 %	5 1	09/03/19 21:23	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			101 %	50-150 %	5 1	09/03/19 21:23	NWTPH-Gx (MS)	
MW-2 (A910015-12)				Matrix: Water		Batch	: 9090423	
Gasoline Range Organics	ND		0.100	mg/L	1	09/03/19 21:29	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	106 %	Limits: 50-150 %	5 1	09/03/19 21:29	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			103 %	50-150 %	5 I	09/03/19 21:29	NWTPH-Gx (MS)	

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Ausa A Zomenighini

Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9I0015 - 09 10 19 0932
	ANALYTICAL SAMPLE RESULTS	

		BTEX Co	mpounds b	oy EPA 8260C				
	Sample	Detection	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
Trip Blank (A9I0015-13)		Matrix: Water Batch: 909						
Benzene	ND		0.200	ug/L	1	09/03/19 18:19	EPA 8260C	
Toluene	ND		1.00	ug/L	1	09/03/19 18:19	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	09/03/19 18:19	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	09/03/19 18:19	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recove	ery: 104 %	Limits: 80-120 %	5 I	09/03/19 18:19	EPA 8260C	
Toluene-d8 (Surr)			96 %	80-120 %	5 1	09/03/19 18:19	EPA 8260C	
4-Bromofluorobenzene (Surr)			97 %	80-120 %	5 1	09/03/19 18:19	EPA 8260C	

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Lisa Domenighini, Client Services Manager



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

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239		<u>Report ID:</u> A910015 - 09 10 19 0	932					
	Select	ted Volatile O	rganic Com	pounds by EP	A 8260C			
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-9 (A910015-01)				Matrix: Wate	ər	Batch: 9090423		
Benzene	ND		0.200	ug/L	1	09/03/19 18:47	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	09/03/19 18:47	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	09/03/19 18:47	EPA 8260C	
Naphthalene	ND		2.00	ug/L	1	09/03/19 18:47	EPA 8260C	
Toluene	ND		1.00	ug/L	1	09/03/19 18:47	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	09/03/19 18:47	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recove	ery: 104 %	Limits: 80-120 %	5 1	09/03/19 18:47	EPA 8260C	
Toluene-d8 (Surr)			97 %	80-120 %	1	09/03/19 18:47	EPA 8260C	
4-Bromofluorobenzene (Surr)			97 %	80-120 %	1	09/03/19 18:47	EPA 8260C	

MW-5 (A9l0015-02)				Matrix: Water		Batch: 9090423	
Benzene	ND		4.00	ug/L	20	09/03/19 21:56	EPA 8260C
Ethylbenzene	239		10.0	ug/L	20	09/03/19 21:56	EPA 8260C
Methyl tert-butyl ether (MTBE)	ND		20.0	ug/L	20	09/03/19 21:56	EPA 8260C
Naphthalene	2070		40.0	ug/L	20	09/03/19 21:56	EPA 8260C
Toluene	ND		20.0	ug/L	20	09/03/19 21:56	EPA 8260C
Xylenes, total	1100		30.0	ug/L	20	09/03/19 21:56	EPA 8260C
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	: 102 %	Limits: 80-120 %	1	09/03/19 21:56	EPA 8260C
Toluene-d8 (Surr)			98 %	80-120 %	1	09/03/19 21:56	EPA 8260C
4-Bromofluorobenzene (Surr)			95 %	80-120 %	1	09/03/19 21:56	EPA 8260C

W-5 DUP (A910015-03)				Matrix: Water		Batch: 9090422		
Benzene	ND		4.00	ug/L	20	09/03/19 22:17	EPA 8260C	
Ethylbenzene	179		10.0	ug/L	20	09/03/19 22:17	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		20.0	ug/L	20	09/03/19 22:17	EPA 8260C	
Naphthalene	1440		40.0	ug/L	20	09/03/19 22:17	EPA 8260C	
Toluene	ND		20.0	ug/L	20	09/03/19 22:17	EPA 8260C	
Xylenes, total	836		30.0	ug/L	20	09/03/19 22:17	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recove	ry: 106 %	Limits: 80-120 %	1	09/03/19 22:17	EPA 8260C	
Toluene-d8 (Surr)			100 %	80-120 %	1	09/03/19 22:17	EPA 8260C	
4-Bromofluorobenzene (Surr)			101 %	80-120 %	1	09/03/19 22:17	EPA 8260C	
MW-5D (A910015-04)				Matrix: Water Batch: 9090423		9090423		
Benzene	ND		0.200	ug/L	1	09/03/19 19:14	EPA 8260C	
Ethylbenzene	0.780		0.500	ug/L	1	09/03/19 19:14	EPA 8260C	

1.00

2.00

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Naphthalene

Methyl tert-butyl ether (MTBE)

Ausa A Zomenighini

ND

ND

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

1

1

ug/L

ug/L

09/03/19 19:14

09/03/19 19:14

EPA 8260C

EPA 8260C



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

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239		Project Project Nu Project Ma		<u>Report ID:</u> A910015 - 09 10 19 0932				
		ANALYTICA	AL SAMI	PLE RESULTS				
	Select	ed Volatile Org	anic Con	pounds by EPA	8260C			
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
/W-5D (A910015-04)	itesuit	Linit	Linin	Matrix: Wate			9090423	Totes
Toluene	ND		1.00	ug/L	1	09/03/19 19:14	EPA 8260C	
Xylenes, total	ND		1.50	ug/L ug/L	1	09/03/19 19:14	EPA 8260C	
· · ·	ND .	D						
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:		Limits: 80-120 %	1	09/03/19 19:14	EPA 8260C	
Toluene-d8 (Surr) 4-Bromofluorobenzene (Surr)			97 % 100 %	80-120 % 80-120 %	1 1	09/03/19 19:14 09/03/19 19:14	EPA 8260C EPA 8260C	
4-bromojiuorobenzene (Surr)			100 %	80-120 %	1	09/03/19 19.14	EIA 8200C	
/W-8 (A9I0015-05)			Matrix: Water				9090423	
Benzene	ND		0.200	ug/L	1	09/03/19 19:41	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	09/03/19 19:41	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	09/03/19 19:41	EPA 8260C	
Naphthalene	ND		2.00	ug/L	1	09/03/19 19:41	EPA 8260C	
Toluene	ND		1.00	ug/L	1	09/03/19 19:41	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	09/03/19 19:41	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	105 %	Limits: 80-120 %	1	09/03/19 19:41	EPA 8260C	
Toluene-d8 (Surr)		2	97 %	80-120 %	1	09/03/19 19:41	EPA 8260C	
4-Bromofluorobenzene (Surr)			97 %	80-120 %	1	09/03/19 19:41	EPA 8260C	
				Matrix: Water Bate		Batch:	n: 9090423	
Benzene	ND		0.200	ug/L	1	09/03/19 20:08	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	09/03/19 20:08	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	09/03/19 20:08	EPA 8260C	
Naphthalene	ND		2.00	ug/L	1	09/03/19 20:08	EPA 8260C	
Toluene	ND		1.00	ug/L	1	09/03/19 20:08	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	09/03/19 20:08	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:		Limits: 80-120 %	1	09/03/19 20:08	EPA 8260C	
Toluene-d8 (Surr)		Recovery.	96 %	80-120 %	1 1	09/03/19 20:08	EPA 8260C	
4-Bromofluorobenzene (Surr)			98 %	80-120 %	1	09/03/19 20:08	EPA 8260C	
/W-7 (A9I0015-07)				Matrix: Wate	r	Batch:	9090423	
Benzene	ND		0.200	ug/L	1	09/03/19 20:35	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L ug/L	1	09/03/19 20:35	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L ug/L	1	09/03/19 20:35	EPA 8260C	
Naphthalene	ND		2.00	ug/L ug/L	1	09/03/19 20:35	EPA 8260C	
Toluene	ND		1.00	ug/L ug/L	1	09/03/19 20:35	EPA 8260C	
Xylenes, total	ND		1.50	ug/L ug/L	1	09/03/19 20:35	EPA 8260C	
•		D			-			
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:		Limits: 80-120 %	1	09/03/19 20:35	EPA 8260C	
Toluene-d8 (Surr)			97 %	80-120 %	1	09/03/19 20:35	EPA 8260C	

## Lisa Domenighini, Client Services Manager

Assa A Zomenighini



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

Projec	et: <u>Nus</u>	star Vannex				
Project N	Number: 006	0-001-005			<b>Report ID:</b>	
Project M	lanager: Ste		A	A9I0015 - 09 10 19 (	932	
ANALYTIC	AL SAMI	PLE RESULTS				
ted Volatile Org	ganic Corr	pounds by EPA	8260C			
Detection Limit	Reporting Limit	Units I	Dilution	Date Analyzed	Method Ref.	Note
		Matrix: Water		Batch:	9090423	
Recover	ry: 95 %	Limits: 80-120 %	1	09/03/19 20:35	EPA 8260C	
		Matrix: Water		Batch:	9090423	
	0.200	ug/L	1	09/03/19 21:02	EPA 8260C	
	0.500	ug/L	1	09/03/19 21:02	EPA 8260C	
	1.00	ug/L	1	09/03/19 21:02	EPA 8260C	
	2.00	ug/L	1	09/03/19 21:02	EPA 8260C	
	1.00	ug/L	1	09/03/19 21:02	EPA 8260C	
	1.50	ug/L	1	09/03/19 21:02	EPA 8260C	
Recover	: 106 %	Limits: 80-120 %	1	09/03/19 21:02	EPA 8260C	
	97 %	80-120 %	1	09/03/19 21:02	EPA 8260C	
	97 %	80-120 %	1	09/03/19 21:02	EPA 8260C	
		Matrix: Water		Batch:	9090470	
	2.00	ug/L	10	09/04/19 17:09	EPA 8260C	
	5.00	ug/L	10	09/04/19 17:09	EPA 8260C	
	10.0	ug/L	10	09/04/19 17:09	EPA 8260C	
	20.0	ug/L	10	09/04/19 17:09	EPA 8260C	
	10.0	ug/L	10	09/04/19 17:09	EPA 8260C	
	15.0	ug/L	10	09/04/19 17:09	EPA 8260C	
Recovery	: 103 %	Limits: 80-120 %	1	09/04/19 17:09	EPA 8260C	
-	97 %	80-120 %	1	09/04/19 17:09	EPA 8260C	
	98 %	80-120 %	1	09/04/19 17:09	EPA 8260C	
		Matrix: Water		Batch:	9090423	
	4.00	ug/L	20	09/03/19 22:50	EPA 8260C	
	10.0	ug/L	20	09/03/19 22:50	EPA 8260C	
	20.0	ug/L	20	09/03/19 22:50	EPA 8260C	
	40.0	ug/L	20	09/03/19 22:50	EPA 8260C	Q-42
	20.0	ug/L	20	09/03/19 22:50	EPA 8260C	
	30.0	ug/L	20	09/03/19 22:50	EPA 8260C	
Recovery	: 101 %	Limits: 80-120 %	1	09/03/19 22:50	EPA 8260C	
	<b>9</b> 7 %	80-120 %	1	09/03/19 22:50	EPA 8260C	
	97 %	80-120 %	1	09/03/19 22:50	EPA 8260C	
		Matrix: Water		Batch:	9090422	
	0.200	ug/L	1	09/03/19 21:23	EPA 8260C	
		Recovery: 101 % 97 % 97 % 0.200	Recovery:         101 %         Limits:         80-120 %           97 %         80-120 %         80-120 %           97 %         80-120 %         80-120 %           Matrix:         Water            0.200         ug/L	Recovery:         101 %         Limits:         80-120 %         1           97 %         80-120 %         1           97 %         80-120 %         1           Matrix:         Water            0.200         ug/L         1	Recovery:         101 %         Limits:         80-120 %         1         09/03/19 22:50           97 %         80-120 %         1         09/03/19 22:50           97 %         80-120 %         1         09/03/19 22:50           Matrix:         Water         Batch:            0.200         ug/L         1         09/03/19 21:23	Recovery: 101 %       Limits: 80-120 %       1       09/03/19 22:50       EPA 8260C         97 %       80-120 %       1       09/03/19 22:50       EPA 8260C         97 %       80-120 %       1       09/03/19 22:50       EPA 8260C         97 %       80-120 %       1       09/03/19 22:50       EPA 8260C         97 %       80-120 %       1       09/03/19 22:50       EPA 8260C         Matrix: Water         Batch: 9090422

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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A910015 - 09 10 19 0932

# ANALYTICAL SAMPLE RESULTS

	Select	ed Volatile Or	ganic Corr	pounds by EPA	A 8260C			
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-10 (A910015-11)				Matrix: Wate	er	Batch:	9090422	
Ethylbenzene	ND		0.500	ug/L	1	09/03/19 21:23	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	09/03/19 21:23	EPA 8260C	
Naphthalene	ND		2.00	ug/L	1	09/03/19 21:23	EPA 8260C	
Toluene	ND		1.00	ug/L	1	09/03/19 21:23	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	09/03/19 21:23	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	v: 103 %	Limits: 80-120 %	1	09/03/19 21:23	EPA 8260C	
Toluene-d8 (Surr)			103 %	80-120 %	1	09/03/19 21:23	EPA 8260C	
4-Bromofluorobenzene (Surr)			101 %	80-120 %	1	09/03/19 21:23	EPA 8260C	
				Matrix: Wate	er	Batch:	9090423	
Benzene	ND		0.200	ug/L	1	09/03/19 21:29	EPA 8260C	
Ethylbenzene	0.690		0.500	ug/L	1	09/03/19 21:29	EPA 8260C	
Methyl tert-butyl ether (MTBE)	1.25		1.00	ug/L	1	09/03/19 21:29	EPA 8260C	
Naphthalene	ND		2.00	ug/L	1	09/03/19 21:29	EPA 8260C	
Toluene	ND		1.00	ug/L	1	09/03/19 21:29	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	09/03/19 21:29	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	v: 107 %	Limits: 80-120 %	1	09/03/19 21:29	EPA 8260C	
Toluene-d8 (Surr)			97 %	80-120 %	1	09/03/19 21:29	EPA 8260C	
4-Bromofluorobenzene (Surr)			96 %	80-120 %	1	09/03/19 21:29	EPA 8260C	

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A910015 - 09 10 19 0932

## **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 9090490 - EPA 3510C	(Fuels/Acid	Ext.) w/Silio	ca Gel				Wat	er				
Blank (9090490-BLK1)		Prepared	: 09/04/19 13:	00 Analyz	ed: 09/04/1	9 23:53						
NWTPH-Dx/SGC		-		-								
Diesel	ND		0.0727	mg/L	1							
Oil	ND		0.145	mg/L	1							
Surr: o-Terphenyl (Surr)		Reco	overy: 82 %	Limits: 50	-150 %	Dilı	ution: 1x					
LCS (9090490-BS1)		Prepared	: 09/04/19 13:	00 Analyz	ed: 09/05/1	9 00:19						
NWTPH-Dx/SGC		-		-								
Diesel	0.363		0.0800	mg/L	1	0.500		73	58 - 115%			
Surr: o-Terphenyl (Surr)		Reco	overy: 87 %	Limits: 50	-150 %	Dilı	ution: 1x					
LCS Dup (9090490-BSD1)		Prepared	: 09/04/19 13:	00 Analyz	ed: 09/05/1	9 00:45						Q-1
NWTPH-Dx/SGC		-										
Diesel	0.364		0.0800	mg/L	1	0.500		73	58 - 115%	0.4	20%	
Surr: o-Terphenyl (Surr)		Reco	overy: 87 %	Limits: 50	-150 %	Dilı	ution: 1x					

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9I0015 - 09 10 19 0932

## **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 9090422 - EPA 5030B							Wat	er				
Blank (9090422-BLK1)		Prepared:	09/03/19 09:	00 Analyz	zed: 09/03/1	9 12:48						
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	1							
Surr: 4-Bromofluorobenzene (Sur)		Reco	overy: 97 %	Limits: 50	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			95 %	50	)-150 %		"					
LCS (9090422-BS1)		Prepared:	09/03/19 09:	00 Analyz	zed: 09/03/19	9 11:27						
NWTPH-Gx (MS)												
Gasoline Range Organics	0.539		0.100	mg/L	1	0.500		108	80 - 120%			
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 104 %	Limits: 50	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			117 %	50	)-150 %		"					

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A910015 - 09 10 19 0932

## **QUALITY CONTROL (QC) SAMPLE RESULTS**

	Gasoli	ne Range H	lydrocarbo	ns (Ben	zene thro	ugh Naph	thalene)	by NWTP	H-Gx			
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9090423 - EPA 5030B							Wat	er				
Blank (9090423-BLK1)		Prepared	09/03/19 10:	00 Analy	zed: 09/03/1	9 12:27						
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	1							
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 103 %	Limits: 5	0-150 %	Dili	ution: 1x					
1,4-Difluorobenzene (Sur)			103 %	5	0-150 %		"					
LCS (9090423-BS2)		Prepared	09/03/19 10:	00 Analy	zed: 09/03/1	9 12:00						
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	0.476		0.100	mg/L	1	0.500		95 8	30 - 120%			
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 101 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			96 %	5	0-150 %		"					
Duplicate (9090423-DUP2)		Prepared	09/03/19 12:	07 Analy:	zed: 09/03/1	9 22:23						
QC Source Sample: MW-5 (A910	015-02)											
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	24.1		2.00	mg/L	20		24.8			3	30%	
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 102 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			99 %	5	0-150 %		"					

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9I0015 - 09 10 19 0932

## **QUALITY CONTROL (QC) SAMPLE RESULTS**

	Gasoliı	ne Range H	lydrocarbo	ns (Ben	zene thro	ugh Naph	thalene) l	by NWTP	H-Gx			
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9090470 - EPA 5030B							Wat	er				
Blank (9090470-BLK1)		Prepared	09/04/19 09:	00 Analy	zed: 09/04/1	9 11:17						
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	1							
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 104 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			102 %	5	0-150 %		"					
LCS (9090470-BS2)		Prepared	09/04/19 09:	00 Analy	zed: 09/04/1	9 10:49						
NWTPH-Gx (MS)												
Gasoline Range Organics	0.491		0.100	mg/L	. 1	0.500		98 8	80 - 120%			
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 102 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			98 %	5	0-150 %		"					
Duplicate (9090470-DUP1)		Prepared	09/04/19 11:	29 Analy	zed: 09/04/1	9 17:36						
QC Source Sample: MW-11 (A9I0	0015-09RE1	)										
NWTPH-Gx (MS)												
Gasoline Range Organics	16.0		1.00	mg/L	10		17.4			9	30%	
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 108 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			101 %	5	0-150 %		"					

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Lisa Domenighini, Client Services Manager



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

<u>Cascadia Associates</u>	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9I0015 - 09 10 19 0932

## **QUALITY CONTROL (QC) SAMPLE RESULTS**

			BIEX	Compou	inds by E	PA 8260C	,					
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9090423 - EPA 5030B							Wat	er				
Blank (9090423-BLK1)		Prepared:	09/03/19 10:	00 Analyz	ed: 09/03/19	9 12:27						
EPA 8260C												
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							
Surr: 1,4-Difluorobenzene (Surr)		Recov	ery: 105 %	Limits: 80	)-120 %	Dili	ution: 1x					
Toluene-d8 (Surr)			98 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			97 %	80	-120 %		"					
LCS (9090423-BS1)		Prepared:	09/03/19 10:	00 Analyz	ed: 09/03/19	9 11:33						
EPA 8260C		*										
Benzene	19.4		0.200	ug/L	1	20.0		97	80 - 120%			
Toluene	18.3		1.00	ug/L	1	20.0		92	80 - 120%			
Ethylbenzene	19.5		0.500	ug/L	1	20.0		97	80 - 120%			
Xylenes, total	57.3		1.50	ug/L	1	60.0		95	80 - 120%			
Surr: 1,4-Difluorobenzene (Surr)		Reco	very: 98 %	Limits: 80	)-120 %	Dili	ution: 1x					
Toluene-d8 (Surr)			97 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			97 %	80	-120 %		"					
Duplicate (9090423-DUP2)		Prepared:	09/03/19 12:	07 Analyz	ed: 09/03/19	9 22:23						
QC Source Sample: MW-5 (A9100)	<u>15-02)</u>											
EPA 8260C												
Benzene	ND		4.00	ug/L	20		ND				30%	
Toluene	ND		20.0	ug/L	20		ND				30%	
Ethylbenzene	244		10.0	ug/L	20		239			2	30%	
Xylenes, total	1140		30.0	ug/L	20		1100			4	30%	
Surr: 1,4-Difluorobenzene (Surr)		Recov	ery: 103 %	Limits: 80	-120 %	Dilt	ution: 1x					
Toluene-d8 (Surr)			97 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			97 %	80	-120 %		"					
Matrix Spike (9090423-MS1)		Dava and	09/03/19 12:	07 4 1	1.00/02/11							1

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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:	0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager:	Stephanie Salisbury	A910015 - 09 10 19 0932

## **QUALITY CONTROL (QC) SAMPLE RESULTS**

			BTEX	Compou	inds by E	PA 8260C						
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% RE	% REC C Limits	RPD	RPD Limit	Notes
Batch 9090423 - EPA 5030B							Wat	er				
Matrix Spike (9090423-MS1)		Prepared	: 09/03/19 12:	07 Analyz	ed: 09/03/19	9 23:17						<b>T-0</b> 2
QC Source Sample: MW-6 (A9100	<u>)15-10)</u>											
Benzene	629		4.00	ug/L	20	400	177	113	79 - 120%			
Toluene	447		20.0	ug/L	20	400	39.4	102	80 - 121%			
Ethylbenzene	2170		10.0	ug/L	20	400	1690	120	79 - 121%			
Xylenes, total	1930		30.0	ug/L	20	1200	585	112	79 - 121%			
Surr: 1,4-Difluorobenzene (Surr)		Reco	very: 101 %	Limits: 80	)-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			96 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			97 %	80	-120 %		"					

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A910015 - 09 10 19 0932

## **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Sele	cted Volatil	e Organi	c Compo	unds by E	PA 8260					
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9090422 - EPA 5030B							Wat	er				
Blank (9090422-BLK1)		Prepared	: 09/03/19 09:	00 Analyz	ed: 09/03/1	9 12:48						
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)		Reco	very: 104 %	Limits: 80	)-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			105 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			100 %	80	-120 %		"					
LCS (9090422-BS2)		Prepared	: 09/03/19 09:	00 Analyz	ed: 09/03/1	9 11:54						
EPA 8260C												
Benzene	21.8		0.200	ug/L	1	20.0		109	80 - 120%			
1,2-Dibromoethane (EDB)	19.2		0.500	ug/L	1	20.0		96	80 - 120%			
1,2-Dichloroethane (EDC)	20.4		0.500	ug/L	1	20.0		102	80 - 120%			
Ethylbenzene	18.0		0.500	ug/L	1	20.0		90	80 - 120%			
Isopropylbenzene	17.3		1.00	ug/L	1	20.0		87	80 - 120%			
Methyl tert-butyl ether (MTBE)	19.5		1.00	ug/L	1	20.0		97	80 - 120%			
Naphthalene	18.9		2.00	ug/L	1	20.0		94	80 - 120%			
Toluene	18.9		1.00	ug/L	1	20.0		94	80 - 120%			
1,2,4-Trimethylbenzene	19.6		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	53.2		1.50	ug/L	1	60.0		89	80 - 120%			
Surr: 1,4-Difluorobenzene (Surr)		Reco	very: 105 %	Limits: 80	)-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			101 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			103 %	80	-120 %		"					

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Lisa Domenighini, Client Services Manager



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

<u>Cascadia Associates</u>	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A910015 - 09 10 19 0932

## **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Sele	cted Volati	e Organi	c Compo	unds by E	PA 82600	C				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Note
Batch 9090423 - EPA 5030B							Wate	er				
Blank (9090423-BLK1)		Prepared	: 09/03/19 10:	00 Analyz	zed: 09/03/1	9 12:27						
EPA 8260C												
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)		Reco	very: 105 %	Limits: 80	0-120 %	Dili	ution: 1x					
Toluene-d8 (Surr)			98 %	80	)-120 %		"					
4-Bromofluorobenzene (Surr)			97 %	80	0-120 %		"					
LCS (9090423-BS1)		Prepared	: 09/03/19 10:	00 Analyz	zed: 09/03/1	9 11:33						
EPA 8260C		1										
Benzene	19.4		0.200	ug/L	1	20.0		97	80 - 120%			
Ethylbenzene	19.5		0.500	ug/L	1	20.0		97	80 - 120%			
Methyl tert-butyl ether (MTBE)	21.0		1.00	ug/L	1	20.0		105	80 - 120%			
Naphthalene	21.7		2.00	ug/L	1	20.0		108	80 - 120%			
Toluene	18.3		1.00	ug/L	1	20.0		92	80 - 120%			
Xylenes, total	57.3		1.50	ug/L	1	60.0		95	80 - 120%			
Surr: 1,4-Difluorobenzene (Surr)		Rec	overy: 98 %	Limits: 80	0-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			97 %	80	)-120 %		"					
4-Bromofluorobenzene (Surr)			97 %	80	0-120 %		"					
Duplicate (9090423-DUP2)		Prepared	: 09/03/19 12:	07 Analyz	zed: 09/03/1	9 22:23						
QC Source Sample: MW-5 (A9I0) EPA 8260C	<u>015-02)</u>											
Benzene	ND		4.00	ug/L	20		ND				30%	
Ethylbenzene	ND 244		4.00 10.0	ug/L ug/L	20 20		ND 239			2	30%	
Methyl tert-butyl ether (MTBE)	244 ND		20.0	ug/L ug/L	20 20		ND				30%	
• • • • •	ND 2160		20.0 40.0	-	20 20		ND 2070				30%	
Naphthalene Toluene	2160 ND		40.0 20.0	ug/L	20 20		2070 ND				30%	
			20.0 30.0	ug/L	20 20		ND 1100					
Xylenes, total	1140			ug/L						4	30%	
Surr: 1,4-Difluorobenzene (Surr)		Reco	very: 103 %	Limits: 80		Dilı	ution: 1x "					
Toluene-d8 (Surr)			97 %	80	)-120 %		"					

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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A910015 - 09 10 19 0932

## **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Sele	cted Volatil	e Organi	c Compo	unds by E	EPA 8260	с					
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	No	tes
Batch 9090423 - EPA 5030B							Wat	er					
Duplicate (9090423-DUP2)		Prepared	: 09/03/19 12:	07 Analyz	ed: 09/03/1	9 22:23							
QC Source Sample: MW-5 (A9100	15-02)												
Surr: 4-Bromofluorobenzene (Surr)		Reco	overy: 97 %	Limits: 80	)-120 %	Dili	ution: 1x						
Matrix Spike (9090423-MS1)		Prepared	: 09/03/19 12:	07 Analyz	ed: 09/03/1	9 23:17							T-(
OC Source Sample: MW-6 (A9100	<u>15-10)</u>												
<u>EPA 8260C</u>													
Benzene	629		4.00	ug/L	20	400	177	113	79 - 120%				
Ethylbenzene	2170		10.0	ug/L	20	400	1690	120	79 - 121%				
Methyl tert-butyl ether (MTBE)	454		20.0	ug/L	20	400	ND	113	71 - 124%				
Naphthalene	1090		40.0	ug/L	20	400	561	131	61 - 128%			Q-01	
Toluene	447		20.0	ug/L	20	400	39.4	102	80 - 121%				
Xylenes, total	1930		30.0	ug/L	20	1200	585	112	79 - 121%				
Surr: 1,4-Difluorobenzene (Surr)		Reco	very: 101 %	Limits: 80	-120 %	Dili	ution: 1x						
Toluene-d8 (Surr)			96 %	80	-120 %		"						
4-Bromofluorobenzene (Surr)			97 %	80	-120 %		"						

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A910015 - 09 10 19 0932

## **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Sele	cted Volatil	e Organi	c Compo	unds by E	PA 8260					
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Note
Batch 9090470 - EPA 5030B							Wate	er				
Blank (9090470-BLK1)		Prepared	: 09/04/19 09:	00 Analyz	ed: 09/04/1	9 11:17						
EPA 8260C												
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)		Reco	very: 106 %	Limits: 80	0-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			97 %	80	)-120 %		"					
4-Bromofluorobenzene (Surr)			97 %	80	)-120 %		"					
LCS (9090470-BS1)		Prepared	: 09/04/19 09:	00 Analyz	ed: 09/04/1	9 10:22						
EPA 8260C		*										
Benzene	20.3		0.200	ug/L	1	20.0		102	80 - 120%			
Ethylbenzene	19.9		0.500	ug/L	1	20.0		100	80 - 120%			
Methyl tert-butyl ether (MTBE)	21.9		1.00	ug/L	1	20.0		109	80 - 120%			
Naphthalene	22.5		2.00	ug/L	1	20.0		112	80 - 120%			
Toluene	18.9		1.00	ug/L	1	20.0		95	80 - 120%			
Xylenes, total	58.6		1.50	ug/L	1	60.0		98	80 - 120%			
Surr: 1,4-Difluorobenzene (Surr)		Reco	very: 100 %	Limits: 80	0-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			96 %	80	)-120 %		"					
4-Bromofluorobenzene (Surr)			97 %	80	)-120 %		"					
Duplicate (9090470-DUP1)		Prepared	: 09/04/19 11:	29 Analyz	ed: 09/04/1	9 17:36						
QC Source Sample: MW-11 (A9I)	0015-09RE1	)										
<u>EPA 8260C</u>			• • • •	~			• • • •			~	2021	
Benzene	3.80		2.00	ug/L	10		3.80			0	30%	
Ethylbenzene	1100		5.00	ug/L	10		1180			7	30%	
Methyl tert-butyl ether (MTBE)	ND		10.0	ug/L	10		ND				30%	
Naphthalene	116		20.0	ug/L	10		121			5	30%	
Toluene	227		10.0	ug/L	10		240			6	30%	
Xylenes, total	2350		15.0	ug/L	10		2520			7	30%	
Surr: 1,4-Difluorobenzene (Surr)		Reco	very: 104 %	Limits: 80	0-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			97 %	80	)-120 %		"					

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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A910015 - 09 10 19 0932

## **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 9090470 - EPA 5030B							Wat	er				
Duplicate (9090470-DUP1)		Prepared	: 09/04/19 11:2	29 Analy	zed: 09/04/19	9 17:36						
QC Source Sample: MW-11 (A		-	00.0/	<i>T</i> · · · · ·	120.0/	D.1						
Surr: 4-Bromofluorobenzene (Surr,	1	Reco	overy: 98 %	Limits: 8	0-120 %	Dilı	ution: 1x					

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Lisa Domenighini, Client Services Manager



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:	0060-001-005	Report ID:
Portland, OR 97239	Project Manager:	Stephanie Salisbury	A9I0015 - 09 10 19 0932

# SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Silica Gel Column Cleanup							
Prep: EPA 3510C	(Fuels/Acid Ext.	) w/Silica Gel			Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 9090490							
A9I0015-01	Water	NWTPH-Dx/SGC	08/28/19 09:40	09/04/19 13:00			0.94
A9I0015-02	Water	NWTPH-Dx/SGC	08/28/19 10:39	09/04/19 13:00			0.96
A9I0015-03	Water	NWTPH-Dx/SGC	08/28/19 10:39	09/04/19 13:00			0.96
A9I0015-04	Water	NWTPH-Dx/SGC	08/28/19 11:39	09/04/19 13:00			0.94
A9I0015-05	Water	NWTPH-Dx/SGC	08/28/19 12:26	09/04/19 13:00			1.03
A9I0015-06	Water	NWTPH-Dx/SGC	08/28/19 13:30	09/04/19 13:00			0.94
A9I0015-07	Water	NWTPH-Dx/SGC	08/28/19 14:40	09/04/19 13:00			0.97
A9I0015-08	Water	NWTPH-Dx/SGC	08/29/19 09:24	09/04/19 13:00			0.94
A9I0015-09	Water	NWTPH-Dx/SGC	08/29/19 10:21	09/04/19 13:00			0.94
A9I0015-10	Water	NWTPH-Dx/SGC	08/29/19 11:14	09/04/19 14:26			0.94
A9I0015-11	Water	NWTPH-Dx/SGC	08/29/19 12:24	09/04/19 14:26			0.94
A9I0015-12	Water	NWTPH-Dx/SGC	08/29/19 13:48	09/04/19 14:26			0.94

Prep: EPA 5030B					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 9090422							
A9I0015-03	Water	NWTPH-Gx (MS)	08/28/19 10:39	09/03/19 13:50	5mL/5mL	5mL/5mL	1.00
A9I0015-11	Water	NWTPH-Gx (MS)	08/29/19 12:24	09/03/19 13:50	5mL/5mL	5mL/5mL	1.00
Batch: 9090423							
A9I0015-01	Water	NWTPH-Gx (MS)	08/28/19 09:40	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-02	Water	NWTPH-Gx (MS)	08/28/19 10:39	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-04	Water	NWTPH-Gx (MS)	08/28/19 11:39	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-05	Water	NWTPH-Gx (MS)	08/28/19 12:26	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-06	Water	NWTPH-Gx (MS)	08/28/19 13:30	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-07	Water	NWTPH-Gx (MS)	08/28/19 14:40	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-08	Water	NWTPH-Gx (MS)	08/29/19 09:24	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-10	Water	NWTPH-Gx (MS)	08/29/19 11:14	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-12	Water	NWTPH-Gx (MS)	08/29/19 13:48	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
Batch: 9090470							
A9I0015-09RE1	Water	NWTPH-Gx (MS)	08/29/19 10:21	09/04/19 11:29	5mL/5mL	5mL/5mL	1.00

BTEX Compounds by EPA 8260C

Apex Laboratories

Assa A Zomenighini



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

<u>Cascadia Associates</u> 5820 SW Kelly Ave I Portland, OR 97239	Kelly Ave Unit B     Project Number: 0060-001-005				<u>Report ID</u> A910015 - 09 10 19	-	
		SAMPL	E PREPARATION I	NFORMATION			
		BT	EX Compounds by E	PA 8260C			
Prep: EPA 5030B					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 9090423							
A9I0015-13	Water	EPA 8260C	08/28/19 00:00	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
		Selected Vo	latile Organic Compo	unds by EPA 8260C	;		
Prep: EPA 5030B					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 9090422			1	1			
A9I0015-03	Water	EPA 8260C	08/28/19 10:39	09/03/19 13:50	5mL/5mL	5mL/5mL	1.00
A9I0015-11	Water	EPA 8260C	08/29/19 12:24	09/03/19 13:50	5mL/5mL	5mL/5mL	1.00
Batch: 9090423							
A9I0015-01	Water	EPA 8260C	08/28/19 09:40	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-02	Water	EPA 8260C	08/28/19 10:39	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-04	Water	EPA 8260C	08/28/19 11:39	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-05	Water	EPA 8260C	08/28/19 12:26	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-06	Water	EPA 8260C	08/28/19 13:30	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-07	Water	EPA 8260C	08/28/19 14:40	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-08	Water	EPA 8260C	08/29/19 09:24	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-10	Water	EPA 8260C	08/29/19 11:14	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
A9I0015-12	Water	EPA 8260C	08/29/19 13:48	09/03/19 12:07	5mL/5mL	5mL/5mL	1.00
Batch: 9090470							
A9I0015-09RE1	Water	EPA 8260C	08/29/19 10:21	09/04/19 11:29	5mL/5mL	5mL/5mL	1.00

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Assa A Zomenighini

Lisa Domenighini, Client Services Manager



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

0932

<u>Cascadia Associates</u>	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: 0060-001-005	Report ID:
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9I0015 - 09 10 19 0

## **QUALIFIER DEFINITIONS**

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

### Apex Laboratories

- 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-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-42 Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)
- T-02 This Batch QC sample was analyzed outside of the method specified 12 hour tune window. Results are estimated.

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Lisa Domenighini, Client Services Manager



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

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

Project: Nustar Vannex

Project Number: 0060-001-005 Project Manager: Stephanie Salisbury <u>Report ID:</u> A9I0015 - 09 10 19 0932

# **REPORTING NOTES AND CONVENTIONS:**

### Abbreviations:

DET Analyte DETECT	ED at or above the detection	on 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.

- <u>" dry"</u> 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

Assa A Zomenighini



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

### <u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland. OR 97239

Project: <u>Nustar Vannex</u>

Project Number: 0060-001-005 Project Manager: Stephanie Salisbury <u>Report ID:</u> A9I0015 - 09 10 19 0932

# **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

Ausa A Zomenichini

Lisa Domenighini, Client Services Manager



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

Cascadia Associate	<u>es</u>	Project:	Nustar Vannex							
5820 SW Kelly Ave	820 SW Kelly Ave Unit B		0060-001-005	Report ID:						
Portland, OR 9723	39	Project Manager:	Stephanie Salisbury	A9I0015 - 09 10 19 0932						
	LABORATORY ACCREDITATION INFORMATION									
			IATION INFORMA	lion						
	<u>TNI Certification ID: OR100062 (Primary Accreditation)</u> - <u>EPA ID: OR01039</u> All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the <u>exception</u> of any analyte(s) listed below:									
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.

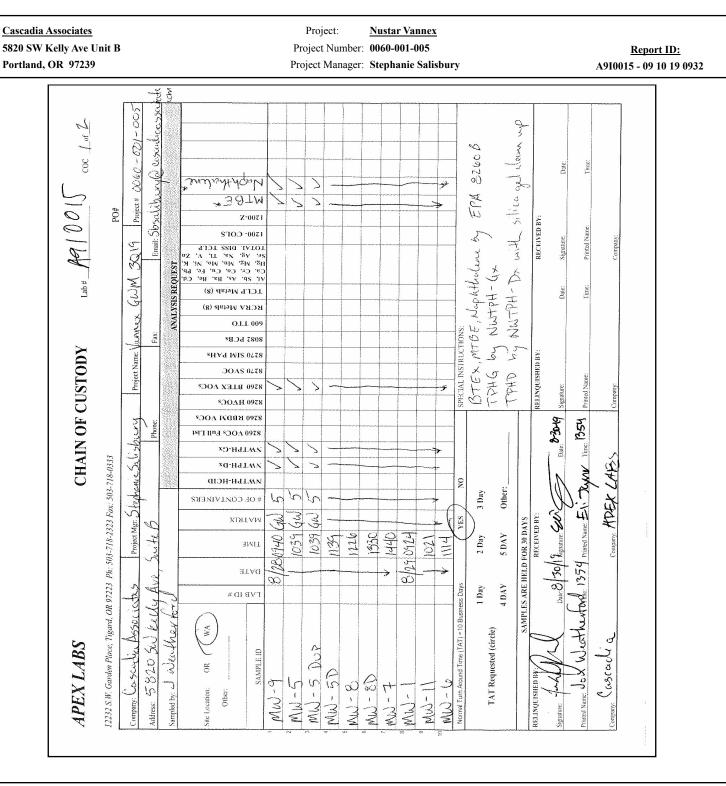
Apex Laboratories

Assa A Zomenighini

Lisa Domenighini, Client Services Manager



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

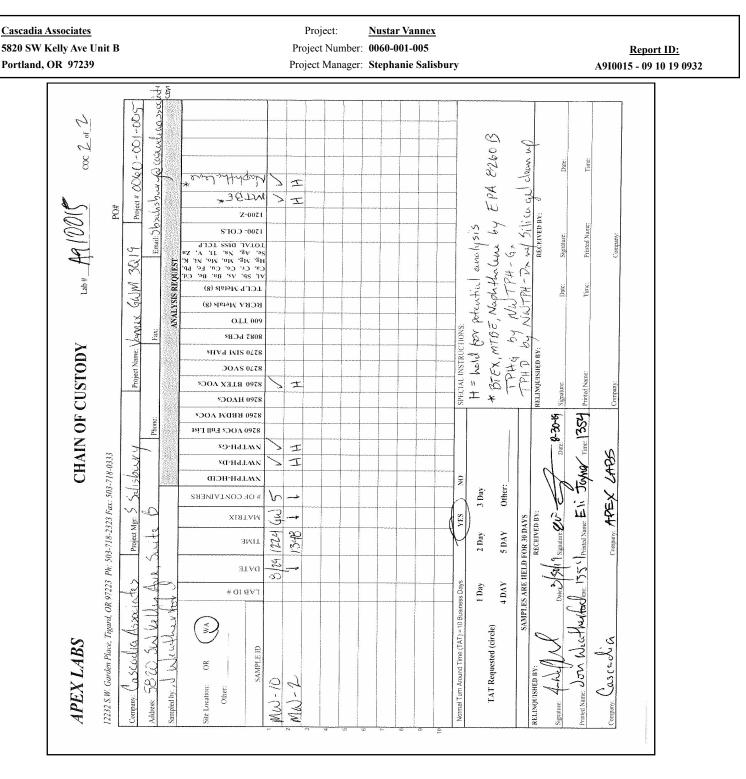


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6700 S.W. Sandburg Street Tigard, OR 97223 503-718-2323 EPA ID: OR01039

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B	Project: <u>Nustar Vannex</u> Project Number: 0060-001-005	Report ID:
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9I0015 - 09 10 19 0932
Portland, OR 97239	Project Manager: Stephanie Salisbury         APEX LABS COOLER RECEIPT FORM         Cascadia       Element WO#: A9       Cascadia         Element WO#: A9       Cascadia       Element WO#: A9       Cascadia         End to the state       Color Color       Cascadia       Element WO#: A9       Cascadia         End to the state       Color Color       Color Color       Cascadia       Cascadia       Cascadia         End to the state       Color Color       Color Color       Cascadia       Cascadia       Cascadia         Ether to the state       Color Color       Color Color       Cascadia       Cascadia       Cascadia         Ether to the state       Color Color       Color Color       Cascadia       Cascadia       Cascadia         Ether to the state       Color Color       Cascadia       Cascadia       Cascadia       Cascadia         Ether to the state       Color Color       Cascadia       Cascadia       Cascadia       Cascadia         Ether to the state       Color Color       Cascadia       Cascadia       Cascadia       Cascadia       Cascadia         Ether to the state       Color Color       Cascadia       Cascadia       Cascadia       Cascadia       Cascadia       Cascadia       Ca	A910015 - 09 10 19 0932

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Assa A Zomenighini



<u>Apex Laboratories, LLC</u>

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

Wednesday, December 4, 2019 Stephanie Salisbury Cascadia Associates 5820 SW Kelly Ave Unit B Portland, OR 97239

# RE: A9K0658 - Nustar Vannex - [none]

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 A9K0658, which was received by the laboratory on 11/20/2019 at 10:55:00AM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: <u>ldomenighini@apex-labs.com</u>, 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 Receip	t Information					
(See Cooler Receipt Form for details)							
Cooler#1	1.1 degC	Cooler#2	2.3 degC				
Cooler#3	0.3 degC		-				

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

Ausa A Jomenichini

Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project:	<u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number:	[none]	<u>Report ID:</u>
Portland, OR 97239	Project Manager:	Stephanie Salisbury	A9K0658 - 12 04 19 1217

# ANALYTICAL REPORT FOR SAMPLES

	SAMPLE INFORM	ATION		
Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-5D	A9K0658-01	Water	11/18/19 09:45	11/20/19 10:55
MW-5	A9K0658-02	Water	11/18/19 10:27	11/20/19 10:55
MW-5 Dup	A9K0658-03	Water	11/18/19 10:27	11/20/19 10:55
MW-8	A9K0658-04	Water	11/18/19 12:14	11/20/19 10:55
MW-8D	A9K0658-05	Water	11/18/19 13:11	11/20/19 10:55
MW-9	A9K0658-06	Water	11/18/19 13:52	11/20/19 10:55
MW-7	A9K0658-07	Water	11/18/19 14:34	11/20/19 10:55
MW-6	A9K0658-08	Water	11/19/19 07:49	11/20/19 10:55
MW-1	A9K0658-09	Water	11/19/19 09:18	11/20/19 10:55
MW-11	A9K0658-10	Water	11/19/19 10:07	11/20/19 10:55
MW-10	A9K0658-11	Water	11/19/19 10:50	11/20/19 10:55
MW-4	A9K0658-12	Water	11/19/19 11:48	11/20/19 10:55
MW-3	A9K0658-13	Water	11/19/19 13:06	11/20/19 10:55
MW-2	A9K0658-14	Water	11/19/19 14:15	11/20/19 10:55

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Lisa Domenighini, Client Services Manager



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

	5	Number: [no				<u>Report ID:</u> A9K0658 - 12 04 19	1217
	ANALYTIC	AL SAMP	PLE RESULTS				
Diesel and/or Oil Hy	ydrocarbons b	y NWTPH	-Dx with Silica	Gel Colu	mn Cleanup		
Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
			Matrix: Wate	r	Batch	: 9111072	
ND ND		0.0755 0.151	mg/L mg/L	1	11/21/19 22:30 11/21/19 22:30	NWTPH-Dx/SGC NWTPH-Dx/SGC	
	Recover	ry: 65 %	Limits: 50-150 %	1	11/21/19 22:30	NWTPH-Dx/SGC	
			Matrix: Wate	er	Batch	: 9111072	
<b>0.771</b> ND		0.0762 0.152	mg/L mg/L	1 1	11/21/19 22:52 11/21/19 22:52	NWTPH-Dx/SGC NWTPH-Dx/SGC	F-18
	Recover	ry: 64 %	Limits: 50-150 %	1	11/21/19 22:52	NWTPH-Dx/SGC	
	Matrix: Water Batch:				: 9111072		
<b>0.696</b> ND		0.0762 0.152	mg/L mg/L	1 1	11/21/19 23:15 11/21/19 23:15	NWTPH-Dx/SGC NWTPH-Dx/SGC	F-18
	Recover	ry: 62 %	Limits: 50-150 %	1	11/21/19 23:15	NWTPH-Dx/SGC	
			Matrix: Wate	er	Batch	: 9111072	
ND ND	  Recover	0.0755 0.151 ry: 72 %	mg/L mg/L Limits: 50-150 %	1 1 <i>1</i>	11/21/19 21:25 11/21/19 21:25 <i>11/21/19 21:25</i>	NWTPH-Dx/SGC NWTPH-Dx/SGC <i>NWTPH-Dx/SGC</i>	
			Matrix: Wate	er	Batch	: 9111072	
ND ND	  Recover	0.0762 0.152 ry: 73 %	mg/L mg/L Limits: 50-150 %	1 1 1	11/21/19 21:46 11/21/19 21:46 <i>11/21/19 21:46</i>	NWTPH-Dx/SGC NWTPH-Dx/SGC NWTPH-Dx/SGC	
			Matrix: Wate	er	Batch	: 9111072	
ND ND	  Recover	0.0762 0.152 ry: 66 %	mg/L mg/L Limits: 50-150 %	1 1 1	11/21/19 22:08 11/21/19 22:08 <i>11/21/19 22:08</i>	NWTPH-Dx/SGC NWTPH-Dx/SGC <i>NWTPH-Dx/SGC</i>	
			Matrix: Wate	er	Batch	: 9111072	
ND ND	  Recover	0.0748 0.150	mg/L mg/L Limits: 50-150 %	1 1 1	11/21/19 22:30 11/21/19 22:30 11/21/19 22:30	NWTPH-Dx/SGC NWTPH-Dx/SGC NWTPH-Dx/SGC	
		0.0740					F-13, F-20
	Sample Result ND ND 0.771 ND 0.696 ND 0.696 ND ND ND ND ND ND ND ND ND ND ND	Project N         ANALYTIC         Diesel and/or Oil Hytrocarbons It         Sample       Detection         Result       Limit         Sample       Detection         Result       Limit         ND          ND <td>Project ManJer: Step         ANALYTICAL SAME         Diesel and/or Oil Hytrocarbons by WTPH         Diesel and/or Oil Hytrocarbons by WTPH         Sample       Detection       Reporting         Result       Limit       Limit         Sample       Detection       Reporting         ND        0.0755         ND        0.151         Recovery:       65 %         O.771        0.0762         ND        0.151         Recovery:       72 %         ND        0.0762         ND        0.152         Recovery:       73 %         ND        0.152         Recovery:       73 %         ND        0.152         Recovery:       66 %</td> <td>Sample Result         Detection Limit         Reporting Limit         Matrix: Wate           ND          0.0755         mg/L           ND          0.151         mg/L           ND          0.151         mg/L           Recovery:         65 %         Limits:         50-150 %           Matrix:         Wate         Matrix:         Wate           0.771          0.0762         mg/L           ND          0.152         mg/L           ND          0.0762         mg/L           Recovery:         64 %         Limits:         50-150 %           Matrix:         Wate         Matrix:         Wate           0.696          0.0762         mg/L           ND          0.152         mg/L           ND          0.151         mg/L           ND          0.0755         mg/L           ND          0.151         mg/L           ND          0.151         mg/L           ND          0.152         mg/L           ND        </td> <td>Project Manager: Stephanie Salisbury         ANALYTICAL SAMPLE RESULTS         Detection Reporting Result       Limit       Units       Colspan="6"&gt;Colspan="6"&gt;Colspan="6"         Sample Result       Detection       Reporting Limit       Limit       Units       Dilution         Sample Result       Detection       Reporting       Limits       Water       Dilution         ND        0.0755       mg/L       1         ND        0.0762       mg/L       1         ND        0.0762       mg/L       1         Matrix: Water         ND          ND          Matrix: Water         Matrix: Water         O.696        0.0762       mg/L       1         ND        0.0755       mg/L       1         ND        0.0762       mg/L       1         ND        0.0762       mg/L       1         ND        0.0762       mg/L       1         ND        0.0753       <t< td=""><td>Neroject Manager: Stephanie Salisbury         SANLYTICAL SAMPLE RESULTS         Diseel and/or Oil Hydrocarbons by WYTPH-Jy with Silica Cel Journou Date         Sample       Detection       Reporting       Date         Sample       Detection       Reporting       Date         Matrix: Water       Batch         ND        0.0755       mg/L       1       11/21/19 22:30         Matrix: Water       Batch         ND        0.0752       mg/L       1       11/21/19 22:30         ND        0.0762       mg/L       1       11/21/19 22:52         ND        0.0762       mg/L       1       11/21/19 22:52         ND        0.0762       mg/L       1       11/21/19 22:52         ND        0.0762       mg/L       1       11/21/19 21:55         ND</td><td>Project Manager:       Stephanie Salisbury       Auxore         Auxore         Auxore         Diesel and/or Oil Hydrocarbons by WUTPH-by Ket BESULTS         Sample       Detection       Reporting       Units       Date         Result       Limit       Limit       Units       Dilution       Analyzed       Method Ref.         Method Ref.       Method Ref.       Method Ref.       In1/11/19/19/23:0       NWTPH-DwSGC         ND        0.0755       mg/L       1       11/21/19/22:0       NWTPH-DwSGC         ND        0.0762       mg/L       1       11/21/19/22:0       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/22:0       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/22:0       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/21:5       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/21:5       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/21:5       NWTPH-DwSGC         0.771</td></t<></td>	Project ManJer: Step         ANALYTICAL SAME         Diesel and/or Oil Hytrocarbons by WTPH         Diesel and/or Oil Hytrocarbons by WTPH         Sample       Detection       Reporting         Result       Limit       Limit         Sample       Detection       Reporting         ND        0.0755         ND        0.151         Recovery:       65 %         O.771        0.0762         ND        0.151         Recovery:       72 %         ND        0.0762         ND        0.152         Recovery:       73 %         ND        0.152         Recovery:       73 %         ND        0.152         Recovery:       66 %	Sample Result         Detection Limit         Reporting Limit         Matrix: Wate           ND          0.0755         mg/L           ND          0.151         mg/L           ND          0.151         mg/L           Recovery:         65 %         Limits:         50-150 %           Matrix:         Wate         Matrix:         Wate           0.771          0.0762         mg/L           ND          0.152         mg/L           ND          0.0762         mg/L           Recovery:         64 %         Limits:         50-150 %           Matrix:         Wate         Matrix:         Wate           0.696          0.0762         mg/L           ND          0.152         mg/L           ND          0.151         mg/L           ND          0.0755         mg/L           ND          0.151         mg/L           ND          0.151         mg/L           ND          0.152         mg/L           ND	Project Manager: Stephanie Salisbury         ANALYTICAL SAMPLE RESULTS         Detection Reporting Result       Limit       Units       Colspan="6">Colspan="6">Colspan="6"         Sample Result       Detection       Reporting Limit       Limit       Units       Dilution         Sample Result       Detection       Reporting       Limits       Water       Dilution         ND        0.0755       mg/L       1         ND        0.0762       mg/L       1         ND        0.0762       mg/L       1         Matrix: Water         ND          ND          Matrix: Water         Matrix: Water         O.696        0.0762       mg/L       1         ND        0.0755       mg/L       1         ND        0.0762       mg/L       1         ND        0.0762       mg/L       1         ND        0.0762       mg/L       1         ND        0.0753 <t< td=""><td>Neroject Manager: Stephanie Salisbury         SANLYTICAL SAMPLE RESULTS         Diseel and/or Oil Hydrocarbons by WYTPH-Jy with Silica Cel Journou Date         Sample       Detection       Reporting       Date         Sample       Detection       Reporting       Date         Matrix: Water       Batch         ND        0.0755       mg/L       1       11/21/19 22:30         Matrix: Water       Batch         ND        0.0752       mg/L       1       11/21/19 22:30         ND        0.0762       mg/L       1       11/21/19 22:52         ND        0.0762       mg/L       1       11/21/19 22:52         ND        0.0762       mg/L       1       11/21/19 22:52         ND        0.0762       mg/L       1       11/21/19 21:55         ND</td><td>Project Manager:       Stephanie Salisbury       Auxore         Auxore         Auxore         Diesel and/or Oil Hydrocarbons by WUTPH-by Ket BESULTS         Sample       Detection       Reporting       Units       Date         Result       Limit       Limit       Units       Dilution       Analyzed       Method Ref.         Method Ref.       Method Ref.       Method Ref.       In1/11/19/19/23:0       NWTPH-DwSGC         ND        0.0755       mg/L       1       11/21/19/22:0       NWTPH-DwSGC         ND        0.0762       mg/L       1       11/21/19/22:0       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/22:0       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/22:0       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/21:5       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/21:5       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/21:5       NWTPH-DwSGC         0.771</td></t<>	Neroject Manager: Stephanie Salisbury         SANLYTICAL SAMPLE RESULTS         Diseel and/or Oil Hydrocarbons by WYTPH-Jy with Silica Cel Journou Date         Sample       Detection       Reporting       Date         Sample       Detection       Reporting       Date         Matrix: Water       Batch         ND        0.0755       mg/L       1       11/21/19 22:30         Matrix: Water       Batch         ND        0.0752       mg/L       1       11/21/19 22:30         ND        0.0762       mg/L       1       11/21/19 22:52         ND        0.0762       mg/L       1       11/21/19 22:52         ND        0.0762       mg/L       1       11/21/19 22:52         ND        0.0762       mg/L       1       11/21/19 21:55         ND	Project Manager:       Stephanie Salisbury       Auxore         Auxore         Auxore         Diesel and/or Oil Hydrocarbons by WUTPH-by Ket BESULTS         Sample       Detection       Reporting       Units       Date         Result       Limit       Limit       Units       Dilution       Analyzed       Method Ref.         Method Ref.       Method Ref.       Method Ref.       In1/11/19/19/23:0       NWTPH-DwSGC         ND        0.0755       mg/L       1       11/21/19/22:0       NWTPH-DwSGC         ND        0.0762       mg/L       1       11/21/19/22:0       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/22:0       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/22:0       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/21:5       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/21:5       NWTPH-DwSGC         0.771        0.0762       mg/L       1       11/21/19/21:5       NWTPH-DwSGC         0.771

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

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B		Project: Project Nur	mber: [no				<u>Report ID:</u>	
Portland, OR 97239		5	0	phanie Salisbury PLE RESULTS			A9K0658 - 12 04 19	1217
	Diesel and/or Oil Hy					mn Cleanup		
	Sample		Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-6 (A9K0658-08)				Matrix: Wate	ər	Batch	: 9111072	
Oil	ND		0.150	mg/L	1	11/21/19 22:52	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	61 %	Limits: 50-150 %	6 I	11/21/19 22:52	NWTPH-Dx/SGC	
MW-1 (A9K0658-09)			Matrix: Wate	ər	Batch	: 9111072		
Diesel	ND		0.0755	mg/L	1	11/21/19 23:15	NWTPH-Dx/SGC	
Oil	ND		0.151	mg/L	1	11/21/19 23:15	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	84 %	Limits: 50-150 %	6 I	11/21/19 23:15	NWTPH-Dx/SGC	
MW-11 (A9K0658-10)		Matrix: Wa		Matrix: Wate	ər	Batch	n: 9111116	
Diesel	0.239		0.0755	mg/L	1	11/22/19 22:28	NWTPH-Dx/SGC	F-18
Oil	ND		0.151	mg/L	1	11/22/19 22:28	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	61 %	Limits: 50-150 %	6 I	11/22/19 22:28	NWTPH-Dx/SGC	
MW-10 (A9K0658-11)				Matrix: Water		Batch: 9111116		
Diesel	ND		0.0762	mg/L	1	11/22/19 22:48	NWTPH-Dx/SGC	
Oil	ND		0.152	mg/L	1	11/22/19 22:48	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	61 %	Limits: 50-150 %	6 I	11/22/19 22:48	NWTPH-Dx/SGC	
MW-4 (A9K0658-12)				Matrix: Wate	ər	Batch	n: 9111116	
Diesel	ND		0.0784	mg/L	1	11/22/19 23:08	NWTPH-Dx/SGC	
Oil	ND		0.157	mg/L	1	11/22/19 23:08	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	63 %	Limits: 50-150 %	6 I	11/22/19 23:08	NWTPH-Dx/SGC	
MW-3 (A9K0658-13)		Matrix: Water		Batch	n: 9111116			
Diesel	ND		0.0769	mg/L	1	11/22/19 23:28	NWTPH-Dx/SGC	
Oil	ND		0.154	mg/L	1	11/22/19 23:28	NWTPH-Dx/SGC	
Surrogate: o-Terphenyl (Surr)		Recovery:	54 %	Limits: 50-150 %	6 I	11/22/19 23:28	NWTPH-Dx/SGC	
MW-2 (A9K0658-14)				Matrix: Wate	ər	Batch	n: 9111116	

Diesel ND 0.0762 1 11/22/19 23:48 NWTPH-Dx/SGC mg/L ----Oil ND 0.152 mg/L 11/22/19 23:48 NWTPH-Dx/SGC 1 ----Surrogate: o-Terphenyl (Surr) Recovery: 51 % Limits: 50-150 % 1 11/22/19 23:48 NWTPH-Dx/SGC

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Ausa A Zomenighini

Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: [none]	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9K0658 - 12 04 19 1217

### ANALYTICAL SAMPLE RESULTS

	Sample	Detection	Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-5D (A9K0658-01)				Matrix: Wate	ər	Batch	: 9111045	
Gasoline Range Organics	ND		0.100	mg/L	1	11/21/19 12:02	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery.	102 %	Limits: 50-150 %	5 I	11/21/19 12:02	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			98 %	50-150 %	6 1	11/21/19 12:02	NWTPH-Gx (MS)	
MW-5 (A9K0658-02)				Matrix: Wate	ər	Batch	: 9111045	
Gasoline Range Organics	23.5		2.00	mg/L	20	11/21/19 15:12	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recover	v: 98 %	Limits: 50-150 %	5 I	11/21/19 15:12	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			147 %	50-150 %	5 I	11/21/19 15:12	NWTPH-Gx (MS)	
MW-5 Dup (A9K0658-03)				Matrix: Wate	ər	Batch	: 9111046	
Gasoline Range Organics	20.0		5.00	mg/L	50	11/21/19 17:51	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery.	104 %	Limits: 50-150 %	5 I	11/21/19 17:51	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			102 %	50-150 %	5 I	11/21/19 17:51	NWTPH-Gx (MS)	
MW-8 (A9K0658-04)				Matrix: Water Batch: 9111045		: 9111045		
Gasoline Range Organics	ND		0.100	mg/L	1	11/21/19 12:29	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery.	104 %	Limits: 50-150 %	5 I	11/21/19 12:29	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			100 %	50-150 %	6 1	11/21/19 12:29	NWTPH-Gx (MS)	
MW-8D (A9K0658-05)				Matrix: Wate	ər	Batch	: 9111045	
Gasoline Range Organics	ND		0.100	mg/L	1	11/21/19 12:56	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery.	101 %	Limits: 50-150 %	5 I	11/21/19 12:56	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			95 %	50-150 %	5 I	11/21/19 12:56	NWTPH-Gx (MS)	
MW-9 (A9K0658-06)				Matrix: Wate	ər	Batch	: 9111045	
Gasoline Range Organics	ND		0.100	mg/L	1	11/21/19 13:23	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery.	103 %	Limits: 50-150 %	5 I	11/21/19 13:23	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			97 %	50-150 %	6 I	11/21/19 13:23	NWTPH-Gx (MS)	
				Matrix: Water Batch: 911104		: 9111046		
Gasoline Range Organics	ND		0.100	mg/L	1	11/21/19 15:08	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery.	109 %	Limits: 50-150 %	5 I	11/21/19 15:08	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			108 %	50-150 %	6 1	11/21/19 15:08	NWTPH-Gx (MS)	
MW-6 (A9K0658-08)				Matrix: Wate	ər	Batch	: 9111046	
Gasoline Range Organics	6.30		2.00	mg/L	20	11/21/19 18:18	NWTPH-Gx (MS)	

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

ANALYTICAL SAMPLE RESULTS									
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9K0658 - 12 04 19 1217							
5820 SW Kelly Ave Unit B	Project Number: [none]	<u>Report ID:</u>							
Cascadia Associates	Project: <u>Nustar Vannex</u>								

Gasol	ine Range Hy	drocarbons (B	enzene tl	hrough Naphtha	alene) by	NWTPH-Gx		
	Sample		Reporting			Date		
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes
MW-6 (A9K0658-08)				Matrix: Wate	er	Batch	1: 9111046	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	106 %	Limits: 50-150 %	1	11/21/19 18:18	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			103 %	50-150 %	1	11/21/19 18:18	NWTPH-Gx (MS)	
MW-1 (A9K0658-09)				Matrix: Wate	er	Batch	n: 9111046	
Gasoline Range Organics	ND		0.100	mg/L	1	11/21/19 15:35	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery.	110 %	Limits: 50-150 %	1	11/21/19 15:35	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			109 %	50-150 %	1	11/21/19 15:35	NWTPH-Gx (MS)	
MW-11 (A9K0658-10)		Matrix: Water		Batch	n: 9111046			
Gasoline Range Organics	45.0		2.00	mg/L	20	11/21/19 18:45	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	106 %	Limits: 50-150 %	1	11/21/19 18:45	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			101 %	50-150 %	1	11/21/19 18:45	NWTPH-Gx (MS)	
MW-10 (A9K0658-11)		Matrix: Water		r	Batch	n: 9111046		
Gasoline Range Organics	ND		0.100	mg/L	1	11/21/19 16:30	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery:	108 %	Limits: 50-150 %	1	11/21/19 16:30	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			109 %	50-150 %	1	11/21/19 16:30	NWTPH-Gx (MS)	
MW-4 (A9K0658-12)				Matrix: Wate	er	Batch	n: 9111046	
Gasoline Range Organics	ND		0.100	mg/L	1	11/21/19 16:57	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	: 111 %	Limits: 50-150 %	1	11/21/19 16:57	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			112 %	50-150 %	1	11/21/19 16:57	NWTPH-Gx (MS)	
MW-3 (A9K0658-13)				Matrix: Wate	er	Batch	n: 9111046	
Gasoline Range Organics	0.114		0.100	mg/L	1	11/21/19 17:24	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery.	110 %	Limits: 50-150 %	1	11/21/19 17:24	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			109 %	50-150 %	1	11/21/19 17:24	NWTPH-Gx (MS)	
MW-2 (A9K0658-14)				Matrix: Wate	er	Batch	n: 9111045	
Gasoline Range Organics	ND		0.100	mg/L	1	11/21/19 13:50	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery	v: 95 %	Limits: 50-150 %	1	11/21/19 13:50	NWTPH-Gx (MS)	
1,4-Difluorobenzene (Sur)			98 %	50-150 %	1	11/21/19 13:50	NWTPH-Gx (MS)	

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Lisa Domenighini, Client Services Manager



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

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239		Project	ject: <u>Nusta</u> t Number: <b>[none</b> ] Manager: <b>Steph</b>		У		<u>Report ID:</u> A9K0658 - 12 04 19	1217					
	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 (A9K0658-01)				Matrix: Water		Batch:	9111045	
Benzene	ND		0.200	ug/L	1	11/21/19 12:02	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	11/21/19 12:02	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	11/21/19 12:02	EPA 8260C	
Naphthalene	ND		2.00	ug/L	1	11/21/19 12:02	EPA 8260C	
Toluene	ND		1.00	ug/L	1	11/21/19 12:02	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	11/21/19 12:02	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recov	ery: 92 %	Limits: 80-120 %	1	11/21/19 12:02	EPA 8260C	
Toluene-d8 (Surr)			100 %	80-120 %	1	11/21/19 12:02	EPA 8260C	
4-Bromofluorobenzene (Surr)			98 %	80-120 %	1	11/21/19 12:02	EPA 8260C	
MW-5 (A9K0658-02)				Matrix: Water		Batch:	9111045	
Benzene	ND		4.00	ug/L	20	11/21/19 15:12	EPA 8260C	
Ethylbenzene	257		10.0	ug/L	20	11/21/19 15:12	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		20.0	ug/L	20	11/21/19 15:12	EPA 8260C	
Naphthalene	1620		40.0	ug/L	20	11/21/19 15:12	EPA 8260C	
Toluene	ND		20.0	ug/L	20	11/21/19 15:12	EPA 8260C	
Xylenes, total	1190		30.0	ug/L	20	11/21/19 15:12	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recov	ery: 91 %	Limits: 80-120 %	1	11/21/19 15:12	EPA 8260C	
Toluene-d8 (Surr)			102 %	80-120 %	1	11/21/19 15:12	EPA 8260C	

MW-5 Dup (A9K0658-03)				Matrix: Water		Batch:	9111046
Benzene	ND		10.0	ug/L	50	11/21/19 17:51	EPA 8260C
Ethylbenzene	284		25.0	ug/L	50	11/21/19 17:51	EPA 8260C
Methyl tert-butyl ether (MTBE)	ND		50.0	ug/L	50	11/21/19 17:51	EPA 8260C
Naphthalene	1510		100	ug/L	50	11/21/19 17:51	EPA 8260C
Toluene	ND		50.0	ug/L	50	11/21/19 17:51	EPA 8260C
Xylenes, total	1460		75.0	ug/L	50	11/21/19 17:51	EPA 8260C
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	: 102 %	Limits: 80-120 %	1	11/21/19 17:51	EPA 8260C
Toluene-d8 (Surr)			98 %	80-120 %	1	11/21/19 17:51	EPA 8260C
4-Bromofluorobenzene (Surr)			100 %	80-120 %	1	11/21/19 17:51	EPA 8260C
 MW-8 (A9K0658-04)				Matrix: Water		Batch: 9111045	
Benzene	ND		0.200	ug/L	1	11/21/19 12:29	EPA 8260C
Ethylbenzene	ND		0.500	ug/L	1	11/21/19 12:29	EPA 8260C
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	11/21/19 12:29	EPA 8260C

2.00

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Naphthalene

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ND

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

1

ug/L

11/21/19 12:29

EPA 8260C



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

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239	Project:     Nustar Vannex       it B     Project Number:     [none]       Project Manager:     Stephanie Salisbury									
		ANALYTI	CAL SAMI	PLE RESULTS						
	Select	ed Volatile C	rganic Com	pounds by EP/	A 8260C					
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes		
MW-8 (A9K0658-04)				Matrix: Wate	er	Batch:	9111045			
Toluene	ND		1.00	ug/L	1	11/21/19 12:29	EPA 8260C			
Xylenes, total	ND		1.50	ug/L	1	11/21/19 12:29	EPA 8260C			
Surrogate: 1,4-Difluorobenzene (Surr)		Reco	very: 93 %	Limits: 80-120 %	1	11/21/19 12:29	EPA 8260C			
Toluene-d8 (Surr)			99 %	80-120 %	1	11/21/19 12:29	EPA 8260C			
4-Bromofluorobenzene (Surr)			97 %	80-120 %	1	11/21/19 12:29	EPA 8260C			
				Matrix: Wate	er	Batch:	9111045			
Benzene	ND		0.200	ug/L	1	11/21/19 12:56	EPA 8260C			
Ethylbenzene	ND		0.500	ug/L	1	11/21/19 12:56	EPA 8260C			
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	11/21/19 12:56	EPA 8260C			
Naphthalene	ND		2.00	ug/L	1	11/21/19 12:56	EPA 8260C			
Toluene	ND		1.00	ug/L	1	11/21/19 12:56	EPA 8260C			
Xylenes, total	ND		1.50	ug/L	1	11/21/19 12:56	EPA 8260C			
Surrogate: 1,4-Difluorobenzene (Surr)		Reco	very: 91 %	Limits: 80-120 %	1	11/21/19 12:56	EPA 8260C			
Toluene-d8 (Surr)			100 %	80-120 %	1	11/21/19 12:56	EPA 8260C			
4-Bromofluorobenzene (Surr)			98 %	80-120 %	1	11/21/19 12:56	EPA 8260C			
				Matrix: Water		Batch: 9111045				
Benzene	ND		0.200	ug/L	1	11/21/19 13:23	EPA 8260C			
Ethylbenzene	ND		0.500	ug/L	1	11/21/19 13:23	EPA 8260C			
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	11/21/19 13:23	EPA 8260C			
Naphthalene	ND		2.00	ug/L	1	11/21/19 13:23	EPA 8260C			
Toluene	ND		1.00	ug/L	1	11/21/19 13:23	EPA 8260C			
Xylenes, total	ND		1.50	ug/L	1	11/21/19 13:23	EPA 8260C			
Surrogate: 1,4-Difluorobenzene (Surr)		Reco	very: 90 %	Limits: 80-120 %	1	11/21/19 13:23	EPA 8260C			
Toluene-d8 (Surr)			99 %	80-120 %	1	11/21/19 13:23	EPA 8260C			
4-Bromofluorobenzene (Surr)			96 %	80-120 %	1	11/21/19 13:23	EPA 8260C			
MW-7 (A9K0658-07)				Matrix: Wate	er	Batch:	9111046			
Benzene	ND		0.200	ug/L	1	11/21/19 15:08	EPA 8260C			
Ethylbenzene	ND		0.500	ug/L	1	11/21/19 15:08	EPA 8260C			
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	11/21/19 15:08	EPA 8260C			
Naphthalene	ND		2.00	ug/L	1	11/21/19 15:08	EPA 8260C			
Toluene	ND		1.00	ug/L	1	11/21/19 15:08	EPA 8260C			
Xylenes, total	ND		1.50	ug/L	1	11/21/19 15:08	EPA 8260C			
Surrogate: 1,4-Difluorobenzene (Surr) Toluene-d8 (Surr)		Recov	ery: 107 % 98 %	Limits: 80-120 % 80-120 %		11/21/19 15:08 11/21/19 15:08	EPA 8260C EPA 8260C			
Apex Laboratories					-	ples analyzed in acco must be reproduced ir	rdance with the chain o	f		

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

Cascadia Associates		Project	: Nu	star Vannex				
5820 SW Kelly Ave Unit B		5	umber: [no				<b>Report ID:</b>	
Portland, OR 97239		5	•	phanie Salisbury			9K0658 - 12 04 19	1217
				PLE RESULTS				
	Select			npounds by EPA	8260C			
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MW-7 (A9K0658-07)				Matrix: Wate	r	Batch:	9111046	
Surrogate: 4-Bromofluorobenzene (Surr)		Recovery:	101 %	Limits: 80-120 %	1	11/21/19 15:08	EPA 8260C	
		Matrix: Water B				Batch:	9111046	
Benzene	71.2		4.00	ug/L	20	11/21/19 18:18	EPA 8260C	
Ethylbenzene	709		10.0	ug/L	20	11/21/19 18:18	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		20.0	ug/L	20	11/21/19 18:18	EPA 8260C	
Naphthalene	163		40.0	ug/L	20	11/21/19 18:18	EPA 8260C	
Toluene	ND		20.0	ug/L	20	11/21/19 18:18	EPA 8260C	
Xylenes, total	127		30.0	ug/L	20	11/21/19 18:18	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	102 %	Limits: 80-120 %	1	11/21/19 18:18	EPA 8260C	
Toluene-d8 (Surr)			99 %	80-120 %	1	11/21/19 18:18	EPA 8260C	
4-Bromofluorobenzene (Surr)			99 %	80-120 %	1	11/21/19 18:18	EPA 8260C	
		Matrix: Water Bat				Batch:	9111046	
Benzene	ND		0.200	ug/L	1	11/21/19 15:35	EPA 8260C	
Ethylbenzene	ND		0.500	ug/L	1	11/21/19 15:35	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	11/21/19 15:35	EPA 8260C	
Naphthalene	ND		2.00	ug/L	1	11/21/19 15:35	EPA 8260C	
Toluene	ND		1.00	ug/L	1	11/21/19 15:35	EPA 8260C	
Xylenes, total	ND		1.50	ug/L	1	11/21/19 15:35	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	105 %	Limits: 80-120 %	1	11/21/19 15:35	EPA 8260C	
Toluene-d8 (Surr)			99 %	80-120 %	1	11/21/19 15:35	EPA 8260C	
4-Bromofluorobenzene (Surr)			101 %	80-120 %	1	11/21/19 15:35	EPA 8260C	
MW-11 (A9K0658-10)				Matrix: Wate	r	Batch:	9111046	
Benzene	52.6		4.00	ug/L	20	11/21/19 18:45	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND		20.0	ug/L	20	11/21/19 18:45	EPA 8260C	
Naphthalene	414		40.0	ug/L	20	11/21/19 18:45	EPA 8260C	
Toluene	159		20.0	ug/L	20	11/21/19 18:45	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	): <b>99</b> %	Limits: 80-120 %	1	11/21/19 18:45	EPA 8260C	
Toluene-d8 (Surr)			99 %	80-120 %	1	11/21/19 18:45	EPA 8260C	
4-Bromofluorobenzene (Surr)			102 %	80-120 %	1	11/21/19 18:45	EPA 8260C	
		Matrix: Water				Batch:	9111096	
Ethylbenzene	4330		100	ug/L	200	11/22/19 20:44	EPA 8260C	
Xylenes, total	7730		300	ug/L	200	11/22/19 20:44	EPA 8260C	
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery:	102 %	Limits: 80-120 %	1	11/22/19 20:44	EPA 8260C	

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

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland, OR 97239		<u>star Vannex</u> ne] phanie Salisbury			<u>Report ID:</u>						
Foruand, OK 97259		Project M	anager. Ste	phanie Sansbury		A	A9K0658 - 12 04 19 1217				
		ANALYTIC	AL SAMI	PLE RESULTS							
	Select	ed Volatile Org	janic Con	npounds by EPA	8260C						
Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes			
MW-11 (A9K0658-10RE1)				Matrix: Wate	r	Batch:	9111096				
Surrogate: Toluene-d8 (Surr) 4-Bromofluorobenzene (Surr)		Recover	ry: 99% 99%	Limits: 80-120 % 80-120 %	1 1	11/22/19 20:44 11/22/19 20:44	EPA 8260C EPA 8260C				
				Matrix: Wate	r	Batch:	9111046				
Benzene	ND		0.200	ug/L	1	11/21/19 16:30	EPA 8260C				
Ethylbenzene	ND		0.500	ug/L	1	11/21/19 16:30	EPA 8260C				
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	11/21/19 16:30	EPA 8260C				
Naphthalene	ND		2.00	ug/L 1		11/21/19 16:30	EPA 8260C				
Toluene	ND		1.00	ug/L 1		11/21/19 16:30	EPA 8260C				
Xylenes, total	ND		1.50	ug/L	1	11/21/19 16:30	EPA 8260C				
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	: 107 %	Limits: 80-120 %	1	11/21/19 16:30	EPA 8260C				
Toluene-d8 (Surr)			99 %	80-120 %	1	11/21/19 16:30	EPA 8260C				
4-Bromofluorobenzene (Surr)			100 %	80-120 %	1	11/21/19 16:30	EPA 8260C				
MW-4 (A9K0658-12)				Matrix: Wate	r	Batch:	9111046				
Benzene	ND		0.200	ug/L	1	11/21/19 16:57	EPA 8260C				
Ethylbenzene	ND		0.500	ug/L	1	11/21/19 16:57	EPA 8260C				
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	11/21/19 16:57	EPA 8260C				
Naphthalene	ND		2.00	ug/L	1	11/21/19 16:57	EPA 8260C				
Toluene	ND		1.00	ug/L 1		11/21/19 16:57	EPA 8260C				
Xylenes, total	ND		1.50	ug/L	1	11/21/19 16:57	EPA 8260C				
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	: 106 %	Limits: 80-120 %	1	11/21/19 16:57	EPA 8260C				
Toluene-d8 (Surr)			100 %	80-120 %	1	11/21/19 16:57	EPA 8260C				
4-Bromofluorobenzene (Surr)			101 %	80-120 %	1	11/21/19 16:57	EPA 8260C				
MW-3 (A9K0658-13)				Matrix: Wate	r	Batch:	9111046				
Benzene	ND		0.200	ug/L	1	11/21/19 17:24	EPA 8260C				
Ethylbenzene	6.61		0.500	ug/L	1	11/21/19 17:24	EPA 8260C				
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	11/21/19 17:24	EPA 8260C				
Naphthalene	ND		2.00	ug/L	1	11/21/19 17:24	EPA 8260C				
Toluene	ND		1.00	ug/L	1	11/21/19 17:24	EPA 8260C				
Xylenes, total	11.3		1.50	ug/L	1	11/21/19 17:24	EPA 8260C				
Surrogate: 1,4-Difluorobenzene (Surr)		Recovery	: 106 %	Limits: 80-120 %	1	11/21/19 17:24	EPA 8260C				
Toluene-d8 (Surr)			99 %	80-120 %	1	11/21/19 17:24	EPA 8260C				
4-Bromofluorobenzene (Surr)			101 %	80-120 %	1	11/21/19 17:24	EPA 8260C				
MW-2 (A9K0658-14)				Matrix: Wate	r	Batch:	9111045				

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

Project Number:	[none]	Damas t ID.
i rejeet i (amoer:	[none]	<u>Report ID:</u>
Project Manager:	Stephanie Salisbury	A9K0658 - 12 04 19 1217
	Project Manager:	Project Manager: Stephanie Salisbury

# ANALYTICAL SAMPLE RESULTS

	Selected Volatile Organic Compounds by EPA 8260C											
	Sample Detection Reporting Date											
Analyte	Result	Limit	Limit	Units	Dilution	Analyzed	Method Ref.	Notes				
MW-2 (A9K0658-14)			Matrix: V		ər	Batch:	Batch: 9111045					
Benzene	ND		0.200	ug/L	1	11/21/19 13:50	EPA 8260C					
Ethylbenzene	ND		0.500	ug/L	1	11/21/19 13:50	EPA 8260C					
Methyl tert-butyl ether (MTBE)	ND		1.00	ug/L	1	11/21/19 13:50	EPA 8260C					
Naphthalene	ND		2.00	ug/L	1	11/21/19 13:50	EPA 8260C					
Toluene	ND		1.00	ug/L	1	11/21/19 13:50	EPA 8260C					
Xylenes, total	ND		1.50	ug/L	1	11/21/19 13:50	EPA 8260C					
Surrogate: 1,4-Difluorobenzene (Surr)		Reco	very: 90 %	Limits: 80-120 %	5 1	11/21/19 13:50	EPA 8260C					
Toluene-d8 (Surr)			102 %	80-120 %	5 1	11/21/19 13:50	EPA 8260C					
4-Bromofluorobenzene (Surr)			103 %	80-120 %	5 1	11/21/19 13:50	EPA 8260C					

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: [none]	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9K0658 - 12 04 19 1217

## **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 9111072 - EPA 3510C	(Fuels/Acid	Ext.) w/Silic	a Gel				Wat	er				
Blank (9111072-BLK2)		Prepared	: 11/21/19 13:	16 Analyz	ed: 11/22/1	9 09:35						
NWTPH-Dx/SGC												
Diesel	ND		0.0727	mg/L	1							
Oil	ND		0.145	mg/L	1							
Surr: o-Terphenyl (Surr)		Reco	overy: 90 %	Limits: 50	-150 %	Dilt	ution: 1x					
LCS (9111072-BS1)		Prepared	: 11/21/19 13:	16 Analyz	ed: 11/21/1	9 21:46						
NWTPH-Dx/SGC												
Diesel	0.414		0.0800	mg/L	1	0.500		83	58 - 115%			
Surr: o-Terphenyl (Surr)		Rece	overy: 90 %	Limits: 50	-150 %	Dilt	ution: 1x					
LCS Dup (9111072-BSD1)		Prepared	: 11/21/19 13:	16 Analyz	ed: 11/21/1	9 22:08						
NWTPH-Dx/SGC		1										
Diesel	0.414		0.0800	mg/L	1	0.500		83	58 - 115%	0	20%	Q-19
Surr: o-Terphenyl (Surr)		Rece	overy: 90 %	Limits: 50	-150 %	Dilı	ution: 1x					Q-19
Batch 9111116 - EPA 3510C	(Fuels/Acid	Ext.) w/Silic	a Gel				Wat	er				
Blank (9111116-BLK1)		Prepared	: 11/22/19 12:	50 Analyz	ed: 11/22/1	9 21:28						
NWTPH-Dx/SGC												
Diesel	ND		0.0727	mg/L	1							
Oil	ND		0.145	mg/L	1							
Surr: o-Terphenyl (Surr)		Reco	overy: 88 %	Limits: 50	-150 %	Dilt	ution: 1x					
LCS (9111116-BS1)		Prepared	: 11/22/19 12:	50 Analyz	ed: 11/22/1	9 21:48						
NWTPH-Dx/SGC												
Diesel	0.435		0.0800	mg/L	1	0.500		87	58 - 115%			
Surr: o-Terphenyl (Surr)		Reco	overy: 93 %	Limits: 50	-150 %	Dilı	ution: 1x					
LCS Dup (9111116-BSD1)		Prepared	: 11/22/19 12:	50 Analyz	ed: 11/22/1	9 22:08						
NWTPH-Dx/SGC												
					1	0.500		0.2	50 1150/	-	200/	
Diesel	0.465		0.0800	mg/L	1	0.500		93	58 - 115%	7	20%	

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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: [none]	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9K0658 - 12 04 19 1217

## **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 9111045 - EPA 5030B							Wat	er				
Blank (9111045-BLK1)		Prepared	11/21/19 09:	00 Analy	zed: 11/21/1	9 11:35						
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	. 1							
Surr: 4-Bromofluorobenzene (Sur)		Recon	very: 102 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			98 %	5	0-150 %		"					
LCS (9111045-BS2)		Prepared	11/21/19 09:	00 Analy	zed: 11/21/1	9 11:08						
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	0.472		0.100	mg/L	, 1	0.500		94 8	30 - 120%			
Surr: 4-Bromofluorobenzene (Sur)		Recon	very: 102 %	Limits: 5	0-150 %	Dilı	tion: 1x					
1,4-Difluorobenzene (Sur)			117 %	5	0-150 %		"					
Duplicate (9111045-DUP1)		Prepared	11/21/19 11:	32 Analy	zed: 11/21/1	9 15:39						
QC Source Sample: MW-5 (A9K)	)658-02 <u>)</u>											
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	22.4		2.00	mg/L	. 20		23.5			5	30%	
Surr: 4-Bromofluorobenzene (Sur)		Reco	overy: 98 %	Limits: 5	0-150 %	Dilı	ution: 1x					
1,4-Difluorobenzene (Sur)			146 %	5	0-150 %		"					

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: [none]	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9K0658 - 12 04 19 1217

## **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 9111046 - EPA 5030B							Wat	er				
Blank (9111046-BLK1)		Prepared	11/21/19 09:	00 Analyz	ed: 11/21/19	9 11:20						
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	1							
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 108 %	Limits: 50	)-150 %	Dil	ution: 1x					
1,4-Difluorobenzene (Sur)			107 %	50	-150 %		"					
LCS (9111046-BS2)		Prepared	11/21/19 09:	00 Analyz	ed: 11/21/19	9 10:53						
NWTPH-Gx (MS)												
Gasoline Range Organics	0.493		0.100	mg/L	1	0.500		99	80 - 120%			
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 103 %	Limits: 50	0-150 %	Dil	ution: 1x					
1,4-Difluorobenzene (Sur)			102 %	50	-150 %		"					
Duplicate (9111046-DUP1)		Prepared	11/21/19 11:	23 Analyz	ed: 11/21/19	9 16:02						
QC Source Sample: MW-1 (A9K0	<u>658-09)</u>											
NWTPH-Gx (MS)												
Gasoline Range Organics	ND		0.100	mg/L	1		ND				30%	
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 109 %	Limits: 50	0-150 %	Dili	ution: 1x					
1,4-Difluorobenzene (Sur)			107 %	50	-150 %		"					
Duplicate (9111046-DUP2)		Prepared	11/21/19 11:	23 Analyz	ed: 11/21/19	9 19:12						
<u>QC Source Sample: MW-11 (A9K</u> <u>NWTPH-Gx (MS)</u>	<u>0658-10)</u>											
Gasoline Range Organics	47.3		2.00	mg/L	20		45.0			5	30%	
Surr: 4-Bromofluorobenzene (Sur)		Recov	very: 106 %	Limits: 50	0-150 %	Dil	ution: 1x					
1,4-Difluorobenzene (Sur)			101 %	50	-150 %		"					

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Ausa A Zomenighini

Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: [none]	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9K0658 - 12 04 19 1217

# **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Sele	cted Volatil	e Organi	c Compo	unds by E	EPA 8260	C				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Note
Batch 9111045 - EPA 5030B							Wat	er				
Blank (9111045-BLK1)		Prepared	: 11/21/19 09:	00 Analyz	ed: 11/21/1	9 11:35						
EPA 8260C												
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)		Rec	overy: 93 %	Limits: 80	0-120 %	Dil	ution: 1x					
Toluene-d8 (Surr)			99 %	80	)-120 %		"					
4-Bromofluorobenzene (Surr)			97 %	80	)-120 %		"					
LCS (9111045-BS1)		Prepared	: 11/21/19 09:	00 Analyz	ed: 11/21/1	9 10:41						
EPA 8260C		1		5								
Benzene	18.5		0.200	ug/L	1	20.0		92	80 - 120%			
Ethylbenzene	19.5		0.500	ug/L	1	20.0		98	80 - 120%			
Methyl tert-butyl ether (MTBE)	18.8		1.00	ug/L	1	20.0		94	80 - 120%			
Naphthalene	17.0		2.00	ug/L	1	20.0		85	80 - 120%			
Toluene	19.1		1.00	ug/L	1	20.0		96	80 - 120%			
Xylenes, total	56.6		1.50	ug/L	1	60.0		94	80 - 120%			
Surr: 1,4-Difluorobenzene (Surr)		Rec	overy: 90 %	Limits: 80	)-120 %	Dil	ution: 1x					
Toluene-d8 (Surr)			100 %	80	)-120 %		"					
4-Bromofluorobenzene (Surr)			96 %	80	)-120 %		"					
Duplicate (9111045-DUP1)		Prepared	: 11/21/19 11:	32 Analyz	ed: 11/21/1	9 15:39						
<u>QC Source Sample: MW-5 (A9K0</u> EPA 8260C	<u>658-02)</u>											
Benzene	ND		4.00	ug/L	20		ND				30%	
Ethylbenzene	246		10.0	ug/L	20		257			4	30%	
Methyl tert-butyl ether (MTBE)	ND		20.0	ug/L	20 20		ND				30%	
Naphthalene	1560		40.0	ug/L	20 20		1620			4	30%	
Toluene	ND		20.0	ug/L ug/L	20		ND				30%	
Xylenes, total	1150		30.0	ug/L	20 20		1190			3	30%	
Surr: 1,4-Difluorobenzene (Surr)	1150	Rac	overy: 93 %	Limits: 80			ution: 1x				5070	
Toluene-d8 (Surr)		Rec	103 %		)-120 %	Dil	unon: 1x "					

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Cascadia Associates	Project:	<u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number:	[none]	<u>Report ID:</u>
Portland, OR 97239	Project Manager:	Stephanie Salisbury	A9K0658 - 12 04 19 1217

# **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Sele	cted Volatil	e Organi	ic Compo	unds by E	PA 8260	C				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9111045 - EPA 5030B							Wat	er				
Duplicate (9111045-DUP1)		Prepared	11/21/19 11:	32 Analyz	zed: 11/21/19	9 15:39						
QC Source Sample: MW-5 (A9K0 Surr: 4-Bromofluorobenzene (Surr)	<u>658-02)</u>	Reco	very: 100 %	Limits: 8	0-120 %	Dili	ution: 1x					
Matrix Spike (9111045-MS1)		Prepared	11/21/19 11:	32 Analyz	zed: 11/21/19	9 14:17						
OC Source Sample: MW-2 (A9K0	<u>658-14)</u>											
EPA 8260C												
Benzene	19.4		0.200	ug/L	1	20.0	ND		9 - 120%			
Ethylbenzene	19.4		0.500	ug/L	1	20.0	ND		9 - 121%			
Methyl tert-butyl ether (MTBE)	19.2		1.00	ug/L	1	20.0	ND	96 7	1 - 124%			
Naphthalene	16.2		2.00	ug/L	1	20.0	ND	81 6	1 - 128%			
Toluene	19.4		1.00	ug/L	1	20.0	ND	97 8	0 - 121%			
Xylenes, total	56.5		1.50	ug/L	1	60.0	ND	94 7	9 - 121%			
Surr: 1,4-Difluorobenzene (Surr)		Reco	overy: 93 %	Limits: 8	0-120 %	Dili	ution: 1x					
Toluene-d8 (Surr)			96 %	80	0-120 %		"					
4-Bromofluorobenzene (Surr)			94 %	80	0-120 %		"					

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: [none]	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9K0658 - 12 04 19 1217

# **QUALITY CONTROL (QC) SAMPLE RESULTS**

<u> </u>			cted Volatil	- 3		· · · · · j -						
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9111046 - EPA 5030B							Wate	er				
Blank (9111046-BLK1)		Prepared	: 11/21/19 09:	00 Analyz	ed: 11/21/19	9 11:20						
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)		Reco	very: 106 %	Limits: 80	-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			98 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			103 %	80	-120 %		"					
LCS (9111046-BS1)		Prepared	: 11/21/19 09:0	0 Analyz	ed: 11/21/19	9 10:26						
EPA 8260C												
Benzene	20.0		0.200	ug/L	1	20.0		100 8	80 - 120%			
1,2-Dibromoethane (EDB)	21.0		0.500	ug/L	1	20.0		105 8	80 - 120%			
1,2-Dichloroethane (EDC)	20.8		0.500	ug/L	1	20.0		104 8	80 - 120%			
Ethylbenzene	19.8		0.500	ug/L	1	20.0		99 8	80 - 120%			
sopropylbenzene	20.7		1.00	ug/L	1	20.0		103 8	80 - 120%			
Methyl tert-butyl ether (MTBE)	22.2		1.00	ug/L	1	20.0		111 8	80 - 120%			
Naphthalene	19.4		2.00	ug/L	1	20.0		97 8	80 - 120%			
Toluene	18.6		1.00	ug/L	1	20.0		93 8	30 - 120%			
1,2,4-Trimethylbenzene	20.4		1.00	ug/L	1	20.0		102 8	80 - 120%			
1,3,5-Trimethylbenzene	20.9		1.00	ug/L	1	20.0		105 8	80 - 120%			
Xylenes, total	64.0		1.50	ug/L	1	60.0		107 8	80 - 120%			
Surr: 1,4-Difluorobenzene (Surr)		Reco	overy: 99 %	Limits: 80	-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			98 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			100 %	80	-120 %		"					

Duplicate (9111046-DUP1)

Prepared: 11/21/19 11:23 Analyzed: 11/21/19 16:02

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

Cascadia Associates	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: [none]	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9K0658 - 12 04 19 1217

# **QUALITY CONTROL (QC) SAMPLE RESULTS**

		3616	cted Volatil	e Organi	c compo		.FA 02000					
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9111046 - EPA 5030B							Wate	er				
Duplicate (9111046-DUP1)		Prepared	: 11/21/19 11::	23 Analyz	ed: 11/21/19	9 16:02						
QC Source Sample: MW-1 (A9K0	<u> (658-09)</u>											
EPA 8260C												
Benzene	ND		0.200	ug/L	1		ND				30%	
1,2-Dibromoethane (EDB)	ND		0.500	ug/L	1		ND				30%	
1,2-Dichloroethane (EDC)	ND		0.500	ug/L	1		ND				30%	
Ethylbenzene	ND		0.500	ug/L	1		ND				30%	
Isopropylbenzene	ND		1.00	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%	
1,2,4-Trimethylbenzene	ND		1.00	ug/L	1		ND				30%	
1,3,5-Trimethylbenzene	ND		1.00	ug/L	1		ND				30%	
Xylenes, total	ND		1.50	ug/L	1		ND				30%	
Surr: 1,4-Difluorobenzene (Surr)		Reco	very: 107 %	Limits: 80	)-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			97 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			101 %	80	-120 %		"					
Duplicate (9111046-DUP2)		Prepared	: 11/21/19 11::	23 Analyz	ed: 11/21/19	9 19:12						
QC Source Sample: MW-11 (A9K	(0658-10)											
EPA 8260C												
Benzene	56.4		4.00	ug/L	20		52.6			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%	
Ethylbenzene	4260		10.0	ug/L	20		4050			5	30%	Е
Isopropylbenzene	89.8		20.0	ug/L	20		83.0			8	30%	
Methyl tert-butyl ether (MTBE)	ND		20.0	ug/L	20		ND				30%	
Naphthalene	424		40.0	ug/L	20		414			2	30%	
Toluene	167		20.0	ug/L	20		159			5	30%	
,2,4-Trimethylbenzene	1520		20.0	ug/L	20		1460			4	30%	
1,3,5-Trimethylbenzene	202		20.0	ug/L	20		193			5	30%	
Xylenes, total	7640		30.0	ug/L	20		7270			5		Е
Surr: 1,4-Difluorobenzene (Surr)		Rec	overy: 99 %	Limits: 80	)-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)		1000	99 %		-120 %	200	"					

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

<u>Cascadia Associates</u>	Project:	Nustar Vannex	
5820 SW Kelly Ave Unit B	Project Number:	[none]	<u>Report ID:</u>
Portland, OR 97239	Project Manager:	Stephanie Salisbury	A9K0658 - 12 04 19 1217

# **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Sele	cted Volatil	e Organ	ic Compo	unds by E	PA 8260	C				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9111046 - EPA	5030B						Wat	er				
Duplicate (9111046-DU	J <b>P2</b> )	Prepared	: 11/21/19 11::	23 Analy	zed: 11/21/19	9 19:12						
QC Source Sample: M Surr: 4-Bromofluorobenz	· · ·	Reco	very: 101 %	Limits: 8	80-120 %	Dilı	ution: 1x					

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Lisa Domenighini, Client Services Manager



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

Cascadia Associates	Project: <u>Nustar Vannex</u>	<u>(</u>
5820 SW Kelly Ave Unit B	Project Number: [none]	<u>Report ID:</u>
Portland, OR 97239	Project Manager: Stephanie Salis	sbury A9K0658 - 12 04 19 1217

# **QUALITY CONTROL (QC) SAMPLE RESULTS**

		Sele	cted Volatil	e Organi	c Compo	unds by E	PA 8260	C				
Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 9111096 - EPA 5030B							Wat	er				
Blank (9111096-BLK1)		Prepared	: 11/22/19 09:	00 Analyz	ed: 11/22/19	9 11:17						
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)		Reco	very: 105 %	Limits: 80	-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			99 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			101 %	80	-120 %		"					
LCS (9111096-BS1)		Prepared	: 11/22/19 09:	00 Analyz	ed: 11/22/19	9 10:23						
EPA 8260C												
Benzene	21.0		0.200	ug/L	1	20.0		105 8	80 - 120%			
1,2-Dibromoethane (EDB)	21.7		0.500	ug/L	1	20.0		108 8	80 - 120%			
1,2-Dichloroethane (EDC)	21.4		0.500	ug/L	1	20.0		107 8	80 - 120%			
Ethylbenzene	21.1		0.500	ug/L	1	20.0		105 8	80 - 120%			
Isopropylbenzene	22.2		1.00	ug/L	1	20.0		111 8	80 - 120%			
Methyl tert-butyl ether (MTBE)	22.8		1.00	ug/L	1	20.0		114 8	80 - 120%			
Naphthalene	20.6		2.00	ug/L	1	20.0		103 8	80 - 120%			
Toluene	19.9		1.00	ug/L	1	20.0		100 8	80 - 120%			
1,2,4-Trimethylbenzene	22.0		1.00	ug/L	1	20.0		110 8	80 - 120%			
1,3,5-Trimethylbenzene	22.4		1.00	ug/L	1	20.0		112 8	80 - 120%			
Xylenes, total	68.5		1.50	ug/L	1	60.0		114 8	80 - 120%			
Surr: 1,4-Difluorobenzene (Surr)		Rec	overy: 97 %	Limits: 80	-120 %	Dilı	ution: 1x					
Toluene-d8 (Surr)			99 %	80	-120 %		"					
4-Bromofluorobenzene (Surr)			99 %	80	-120 %		"					

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Lisa Domenighini, Client Services Manager



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:	[none]	<u>Report ID:</u>
Portland, OR 97239	Project Manager:	Stephanie Salisbury	A9K0658 - 12 04 19 1217

# SAMPLE PREPARATION INFORMATION

Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Silica Gel Column Cleanup							
Prep: EPA 3510C (Fuels/Acid Ext.) w/Silica Gel Sample Default RL Prep							
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 9111072							
A9K0658-01	Water	NWTPH-Dx/SGC	11/18/19 09:45	11/21/19 13:16			0.94
A9K0658-02	Water	NWTPH-Dx/SGC	11/18/19 10:27	11/21/19 13:16			0.95
A9K0658-03	Water	NWTPH-Dx/SGC	11/18/19 10:27	11/21/19 13:16			0.95
A9K0658-04	Water	NWTPH-Dx/SGC	11/18/19 12:14	11/21/19 13:16			0.94
A9K0658-05	Water	NWTPH-Dx/SGC	11/18/19 13:11	11/21/19 13:16			0.95
A9K0658-06	Water	NWTPH-Dx/SGC	11/18/19 13:52	11/21/19 13:16			0.95
A9K0658-07	Water	NWTPH-Dx/SGC	11/18/19 14:34	11/21/19 13:16			0.94
A9K0658-08	Water	NWTPH-Dx/SGC	11/19/19 07:49	11/21/19 13:16			0.94
A9K0658-09	Water	NWTPH-Dx/SGC	11/19/19 09:18	11/21/19 13:16			0.94
Batch: 9111116							
A9K0658-10	Water	NWTPH-Dx/SGC	11/19/19 10:07	11/22/19 12:50			0.94
A9K0658-11	Water	NWTPH-Dx/SGC	11/19/19 10:50	11/22/19 12:50			0.95
A9K0658-12	Water	NWTPH-Dx/SGC	11/19/19 11:48	11/22/19 12:50			0.98
A9K0658-13	Water	NWTPH-Dx/SGC	11/19/19 13:06	11/22/19 12:50			0.96
A9K0658-14	Water	NWTPH-Dx/SGC	11/19/19 14:15	11/22/19 12:50			0.95

Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx							
Prep: EPA 5030B					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 9111045							
A9K0658-01	Water	NWTPH-Gx (MS)	11/18/19 09:45	11/21/19 11:32	5mL/5mL	5mL/5mL	1.00
A9K0658-02	Water	NWTPH-Gx (MS)	11/18/19 10:27	11/21/19 11:32	5mL/5mL	5mL/5mL	1.00
A9K0658-04	Water	NWTPH-Gx (MS)	11/18/19 12:14	11/21/19 11:32	5mL/5mL	5mL/5mL	1.00
A9K0658-05	Water	NWTPH-Gx (MS)	11/18/19 13:11	11/21/19 11:32	5mL/5mL	5mL/5mL	1.00
A9K0658-06	Water	NWTPH-Gx (MS)	11/18/19 13:52	11/21/19 11:32	5mL/5mL	5mL/5mL	1.00
A9K0658-14	Water	NWTPH-Gx (MS)	11/19/19 14:15	11/21/19 11:32	5mL/5mL	5mL/5mL	1.00
Batch: 9111046							
A9K0658-03	Water	NWTPH-Gx (MS)	11/18/19 10:27	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00
A9K0658-07	Water	NWTPH-Gx (MS)	11/18/19 14:34	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00
A9K0658-08	Water	NWTPH-Gx (MS)	11/19/19 07:49	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00
A9K0658-09	Water	NWTPH-Gx (MS)	11/19/19 09:18	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00
A9K0658-10	Water	NWTPH-Gx (MS)	11/19/19 10:07	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00
A9K0658-11	Water	NWTPH-Gx (MS)	11/19/19 10:50	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00
A9K0658-12	Water	NWTPH-Gx (MS)	11/19/19 11:48	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00

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

<u>Cascadia Associates</u> 5820 SW Kelly Ave Unit Portland, OR 97239	B		Project: <u>Nustar</u> roject Number: [none] oject Manager: Stephan	<u>Vannex</u> nie Salisbury		<u>Report ID</u> A9K0658 - 12 04 19	-	
	SAMPLE PREPARATION INFORMATION							
	Gas	oline Range Hydrocart	oons (Benzene throu	ugh Naphthalene) by	y NWTPH-Gx			
Prep: EPA 5030B					Sample	Default	RL Prep	
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor	
A9K0658-13	Water	NWTPH-Gx (MS)	11/19/19 13:06	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00	
		Selected Vola	tile Organic Compo	unds by EPA 8260C	;			
Prep: EPA 5030B					Sample	Default	RL Prep	
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor	
Batch: 9111045			1	1				
A9K0658-01	Water	EPA 8260C	11/18/19 09:45	11/21/19 11:32	5mL/5mL	5mL/5mL	1.00	
A9K0658-02	Water	EPA 8260C	11/18/19 10:27	11/21/19 11:32	5mL/5mL	5mL/5mL	1.00	
A9K0658-04	Water	EPA 8260C	11/18/19 12:14	11/21/19 11:32	5mL/5mL	5mL/5mL	1.00	
A9K0658-05	Water	EPA 8260C	11/18/19 13:11	11/21/19 11:32	5mL/5mL	5mL/5mL	1.00	
A9K0658-06	Water	EPA 8260C	11/18/19 13:52	11/21/19 11:32	5mL/5mL	5mL/5mL	1.00	
A9K0658-14	Water	EPA 8260C	11/19/19 14:15	11/21/19 11:32	5mL/5mL	5mL/5mL	1.00	
Batch: 9111046								
A9K0658-03	Water	EPA 8260C	11/18/19 10:27	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00	
A9K0658-07	Water	EPA 8260C	11/18/19 14:34	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00	
A9K0658-08	Water	EPA 8260C	11/19/19 07:49	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00	
A9K0658-09	Water	EPA 8260C	11/19/19 09:18	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00	
A9K0658-10	Water	EPA 8260C	11/19/19 10:07	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00	
A9K0658-11	Water	EPA 8260C	11/19/19 10:50	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00	
A9K0658-12	Water	EPA 8260C	11/19/19 11:48	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00	
A9K0658-13	Water	EPA 8260C	11/19/19 13:06	11/21/19 11:23	5mL/5mL	5mL/5mL	1.00	
Batch: 9111096 A9K0658-10RE1	Water	EPA 8260C	11/19/19 10:07	11/22/19 11:23	5mL/5mL	5mL/5mL	1.00	

Apex Laboratories

Assa A Zomenighini

Lisa Domenighini, Client Services Manager



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

<u>Report ID:</u> A9K0658 - 12 04 19 1217

5820 SW Kelly Ave Unit BProject Number: [none]Portland, OR 97239Project Manager: Stephanie Salisbury	Cascadia Associates	Project: <u>Nustar Vannex</u>
Portland, OR 97239 Project Manager: Stephanie Salisbury	5820 SW Kelly Ave Unit B	Project Number: [none]
	Portland, OR 97239	Project Manager: Stephanie Salisbury

# **QUALIFIER DEFINITIONS**

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

### Apex Laboratories

- E Estimated Value. The result is above the calibration range of the instrument.
- 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.
- Q-19 Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.

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Ausa A Zomenichini

Lisa Domenighini, Client Services Manager



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<u>(</u>	Cascadia Associates
5	5820 SW Kelly Ave Unit B
1	Portland, OR 97239

Project: Nustar Vannex

Project Number: [none] Project Manager: Stephanie Salisbury <u>Report ID:</u> A9K0658 - 12 04 19 1217

# **REPORTING NOTES AND CONVENTIONS:**

### Abbreviations:

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.

- <u>" dry"</u> 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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6700 S.W. Sandburg Street Tigard, OR 97223 503-718-2323 <u>EPA ID: OR01039</u>

### <u>Cascadia Associates</u> 5820 SW Kelly Ave Unit B Portland. OR 97239

Project: Nustar Vannex

Project Number: [none] Project Manager: Stephanie Salisbury <u>Report ID:</u> A9K0658 - 12 04 19 1217

# **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

Ausa A Zomenichini

Lisa Domenighini, Client Services Manager



Apex Laboratories, LLC

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

5820 SW Kelly Ave Unit BProject Number: [none]Portland, OR 97239Project Manager: Stephanie Salisbury	<u>Report ID:</u>						
Portland, OR 97239 Project Manager: Stephanie Salisbury							
	A9K0658 - 12 04 19 1217						
LABORATORY ACCREDITATION INFORMATION							
TNI Certification ID: OR100062 (Primary Accreditation) - EPA ID: OR01039	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' OR Scope of Certification, with the <u>exception</u> of any analyte(s) listed below:	RELAP						
Apex Laboratories							
Matrix Analysis TNI_ID Analyte TN	I_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.

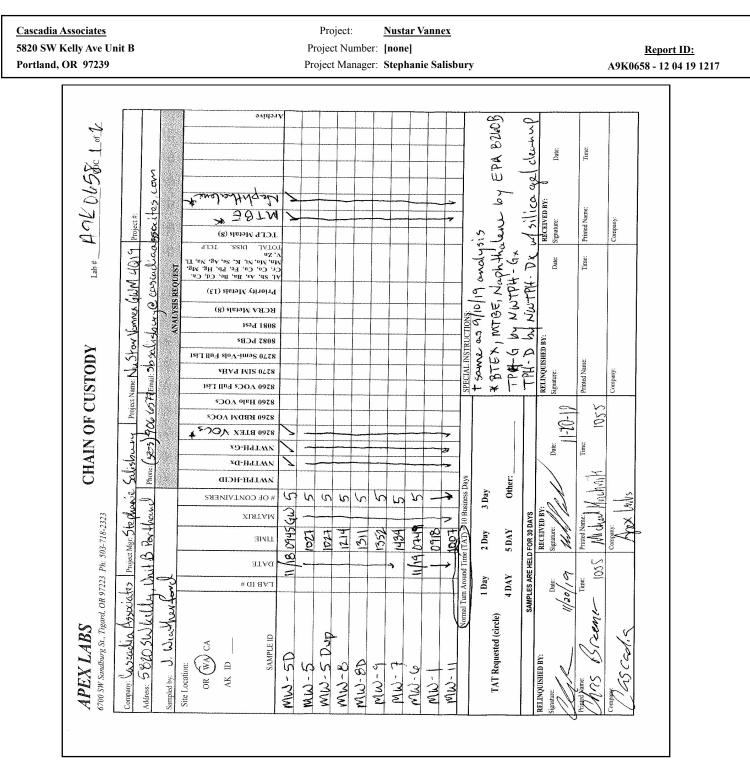
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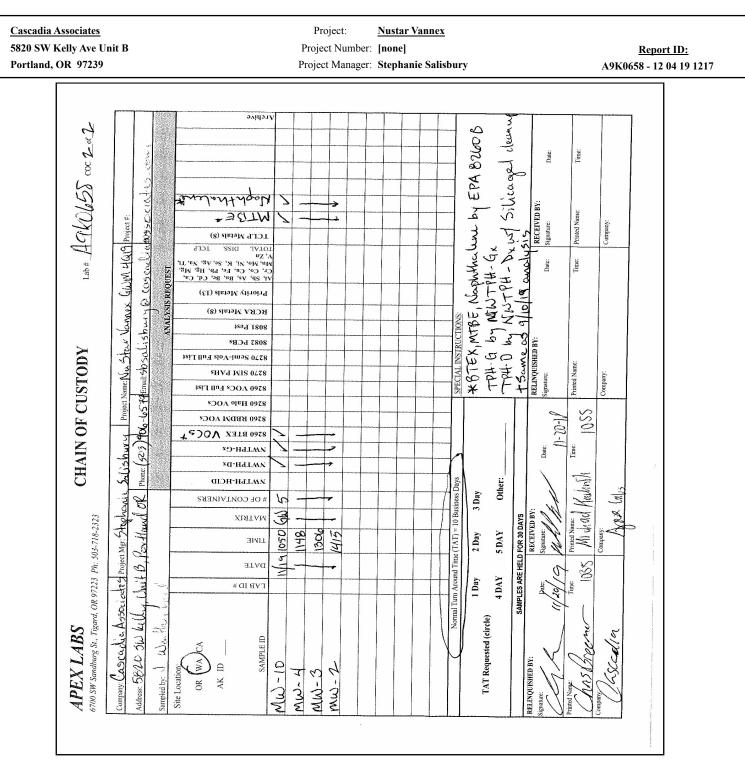
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The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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<u>Cascadia Associates</u>	Project: <u>Nustar Vannex</u>	
5820 SW Kelly Ave Unit B	Project Number: [none]	<b>Report ID:</b>
Portland, OR 97239	Project Manager: Stephanie Salisbury	A9K0658 - 12 04 19 1217
APEX         Client: $(AS(A,G A, AS(A, Project/Project #: M)Star Vanvex         Delivery Info:       Date/time received:       [1-D-]9 @ [M]         Date/time received:       [1-D-]9 @ [M]         Delivered by: Apex       ClientESS$	LABS COOLER RECEIPT FORM         Element WO#: A9_ $AAA$ Element WO#: A9_ $AAA$ 6WM         6WM         FedEx UPS Swift Senvoy SDS_Other         Custody seals? Yes No_X         Cooler #3 Cooler #4 Cooler #5 Cooler #6         Cooler #2       Cooler #3       Cooler #4       Cooler #5       Cooler #6         Custody seals?       Yes	DL_55       her       Cooler #7          Yes/No/NA
COC/container discrepancies form initiate Containers/volumes received appropriate f	d? Yes No NA or analysis? Yes X No Comments:	
Do VOA vials have visible headspace? Comments Water samples: pH checked: Yes <u>No</u> Comments:	NApH appropriate? YesNoNA	
Additional information:		
Labeled by: Witness:	Cooler Inspected by: See Project Contact I	Form: Y

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