Final 2013 Remedial Investigation Report
NuStar Terminals Services, Inc.
Vancouver Terminal
Vancouver, Washington

Prepared for:
NuStar Terminals Services, Inc.

August 14, 2013
1126-14

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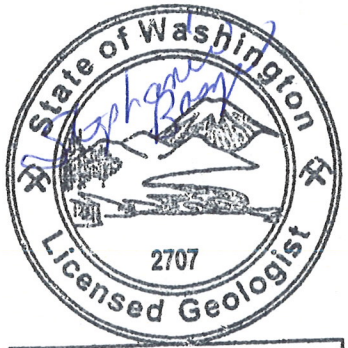

Stephanie Bosze Salisbury, R.G.
Associate Geologist

Amanda Spencer
Principal Hydrogeologist

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1,1-DCA	1,1-Dichloroethane
1,2-DCA	1,2-Dichloroethane
1,1-DCE	1,1-Dichloroethene
1,1,1-TCA	1,1,1-Trichloroethane
1,2-DCA	1,2-Dichloroethane
Amended AO	Amended Agreed Order
Ash Creek	Ash Creek Associates, a Division of Apex Companies, LLC
AST	Aboveground Storage Tank
bgs	Below Ground Surface
BRA	Baseline Risk Assessment
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
cis-1,2-DCE	cis-1,2-Dichloroethene
COI	Chemical of Interest
COPC	Chemical of Potential Concern
Ecology	Washington State Dept. of Ecology
ELCR	Excess Lifetime Cancer Risk
EPA	U.S. Environmental Protection Agency
EPC	Exposure Point Concentration
ft/day	Feet per Day
ft^2/min	Square Feet per Minute
FS	Feasibility Study
gpm	Gallon per Minute
HVOCs	Halogenated Volatile Organic Compounds
IA	Interim Action
IH	Heavy Industrial Zoning
Kaneb	Kaneb Pipeline Partners L.P.
MC	Methylene Chloride
µg/L	Microgram per Liter
mg/kg	Milligram per Kilogram
mph	Mile per Hour
MRLs	Method Reporting Limits
MSL	Mean Sea Level
MTCA	Model Toxics Control Act
NAPL	Non-Aqueous Phase Liquid
NPDES	National Pollution Discharge Elimination System
NuStar	NuStar Terminals Services, Inc.
ORNL	Oak Ridge National Laboratory
PAHs	Polycyclic Aromatic Hydrocarbons
PCE	Tetrachloroethene
PID	Photoionization Detector
Port	Port of Vancouver
ppmv	Parts per Million by Volume
RA	Risk Assessment
RAIS	Risk Assessment Information System
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SMS	Sediment Management Standards
SQuiRTs	Screening Quick Reference Tables
TGA	Troutdale Gravel Aquifer
TL	Tax Lot
TCE	Trichloroethene
TCA	Trichloroethane
TPH	Total Petroleum Hydrocarbons
trans-1,2-DCE	trans-1,2-Dichloroethene
SVE	Soil Vapor Extraction
USA	Unconsolidated Sedimentary Aquifer
VMC	Vancouver Municipal Code
VOC	Volatile Organic Compound
WAC	Washington Administrative Code

Executive Summary

A Remedial Investigation (RI) was completed for the NuStar Terminals Services, Inc. (NuStar) Main Terminal at the Port of Vancouver Terminal No. 2, located at 2565 NW Harborside Drive in Vancouver, Washington. Work at the facility has been conducted with oversight from the Washington State Department of Ecology (Ecology). The RI was conducted pursuant to an amendment to Agreed Order No. 07-TC-S DE3938 (Amended AO) between Washington State Department of Ecology (Ecology) and NuStar. Agreed Order No. 07-TC-S DE3938 between NuStar and Ecology was amended on May 23, 2011.

The purpose of the RI was to generate data of sufficient quality to evaluate the potential for unacceptable risk, support and evaluate interim action (IA), and initiate the Feasibility Study (FS) for the final remedy.

As used in this report, the Property refers to the NuStar leasehold area as of 2006. The Site is defined consistent with the Model Toxics Control Act (MTCA) to include the area where a hazardous substance from a release at the Property has "come to be located."

NuStar Energy L.P. leases the Property from the Port of Vancouver. The Property is roughly rectangular with nominal dimensions of 600 by 1,300 feet. The total area of the Property is approximately 17 acres. The Property is on the north shore of the Columbia River. Land on all other sides is industrial property also owned by the Port of Vancouver. There are five buildings and three tank farms at the facility, including warehouses (Nos. 9, 13, 14, 15, and 17), a loading dock, two tank truck loading/unloading racks, a rail tank car loading/unloading area, marine vessel dock and piping, and an office. The ground surface is nearly flat at an elevation typically between 32 and 34 feet above mean sea level (MSL). The majority of product piping at the Property is above ground, although some buried pipeline is present beneath the eastern portion of the property.

The NuStar Vancouver Terminal has operated as a bulk storage terminal since 1960; the Property was undeveloped prior to its development as a bulk storage facility. The terminal formerly handled chlorinated solvents, including tetrachloroethene (PCE), methylene chloride (MC), and 1,1,1-trichloroethane (1,1,1-TCA); however, handling and storage of chlorinated solvents was terminated in 1994 (SECOR, 1997b). Currently, the terminal handles sodium hydroxide, jet fuel, calcium chloride, and methanol.

A land and water use evaluation was conducted as a part of this RI. The Property is an industrial Property as defined by MTCA in Washington Administrative Code (WAC) 173-340-200. The Unconsolidated Sedimentary Aquifer (USA) and Troutdale Gravel Aquifer (TGA) located beneath the Site are productive aquifers used within the region for municipal and industrial water supply. Production wells nearest the Site are the Fabricated Products well 1,800 feet to the northwest, the Port of Vancouver groundwater extraction well 2,800 feet to the northeast, the Westside Wastewater Reclamation Facility well located 2,000 feet to the east, and the Great Western Malting well and Port of Vancouver well fields located 3,500 feet to the

southeast. Major water users are the Port of Vancouver, Great Western Malting, City of Vancouver, Westside Wastewater Reclamation Facility, and Clark Public Utilities (Parametrix, 2008). Groundwater at the NuStar facility is not currently beneficially used for any purpose.

The RI for the Site included chemical analysis of up to 202 soil samples, 57 river sediment samples, and 45 rounds of groundwater sampling and analysis for halogenated volatile organic compounds (HVOCs), collected over a period of 19 years. These data are of sufficient quality for use in risk assessment, FS, and cleanup level determination. A screening of the chemical data was completed to identify chemicals of potential concern (COPCs; soil and groundwater) at the Site, which are listed below.

- cis-1,2-Dichloroethene (cis-1,2-DCE)
- 1,1-Dichloroethene (1,1-DCE)
- PCE
- Trichloroethene (TCE)
- Vinyl Chloride
- 1,1-Dichloroethane (1,1-DCA)
- 1,2-Dichloroehtane (1,2-DCA)
- Chloroethane
- 1,1,1-TCA

A *Baseline Risk Assessment Report* was initially submitted to Ecology on September 4, 2008. An update to the baseline risk assessment is included in this report.

For the purpose of assessing extent, fate, and transport of COPCs, a subset of the COPCs was identified based on consideration of relative risk. Three COPCs (PCE, TCE, and vinyl chloride) account for greater than 95 percent of potential risk. Cis-1,2-DCE is a daughter product of TCE and will break down into vinyl chloride. These four compounds represent the primary COPCs. Vinyl chloride is not widely detected across the Site; therefore, PCE, TCE, and cis-1,2-DCE were used as the indicator compounds for determining extent.

COPCs in Shallow Zone groundwater are limited to the Property boundary to the north and east and are within 200 feet of the Property to the west. The river defines the extent of COPCs to the south in the Shallow Zone. Shallow Zone groundwater potentiometric maps for the Property, COPC distribution in the Shallow Zone beneath the Property, and river sediment analytical data collectively suggest that there is net discharge from the Shallow Zone groundwater to the river.

The extent of HVOCs in Intermediate Zone groundwater is defined by the analytical data to the west, north, and east, and by the river to the south. A separate off-Property source of HVOCs has historically been present in groundwater beneath the former Carborundum ponds. This off-Property source makes it difficult to determine the extent of HVOCs in the Intermediate Zone that are due to migration from the Property. Furthermore, the Port of Vancouver Swan and Cadet sites are located to the northeast of the Carborundum ponds area. HVOCs from the source areas at these facilities have migrated to Intermediate Zone groundwater. Intermediate groundwater from beneath the Swan and Cadet sites may have mixed with

HVOCs in Intermediate groundwater beneath the Carborundum ponds area. Intermediate Zone groundwater flow is variable and is strongly correlated with changes in river stage. At distances further away from the river, groundwater gradients are typically flat to very small in magnitude (towards the northeast), with a stagnation zone often present to the northeast of the Property.

Three interim actions have been conducted at the Site, including soil and groundwater interim actions implemented both in 2008 and 2011. For both the 2008 and 2011 interim actions, the remedial technology for groundwater involved the injection of a bioremediation substrate for enhancing the reductive dechlorination of VOCs. For both the 2008 and 2011 interim actions, the remedial technology for soil was soil vapor extraction (SVE).

SVE was initiated at the site in 2008 and in 2011 was expanded to include approximately twice as many extraction well locations as the 2008 system. SVE is ongoing at the site. From startup in 2008 through December 2012, the total mass removal by SVE at the Facility to date was approximately 4,200 pounds.

The groundwater interim action included 38 enhanced bioremediation injections in 2008 and 155 injections in 2011. Groundwater monitoring in the source area indicate that concentrations of VOCs have decreased significantly in response to the interim actions. Concentrations of PCE and TCE have decreased by over 98 percent in three of the four interim action area wells since prior to the 2008 interim actions. The reduced VOC mass in the Shallow Zone has rapidly limited the migration of VOCs to Intermediate Zone groundwater. Source area PCE and TCE concentrations in the Intermediate Zone have decreased by one and two orders of magnitude, respectively, in response to the groundwater interim actions targeted at the Shallow Zone.

The extent of the Shallow Zone and Intermediate zone groundwater plumes at the Site have decreased rapidly since the 2008 interim action and continue to decrease in response to the 2011 soil and groundwater interim actions.

1.0 Introduction

A remedial investigation (RI) was completed for the NuStar Terminals Services, Inc. (NuStar) bulk storage terminal at the Port of Vancouver Terminal No. 2, located at 2565 NW Harborside Drive in Vancouver, Washington. A Property location map is provided as Figure 1. The RI was conducted in accordance with the protocols in the Model Toxics Control Act (MTCA) in Washington Administrative Code (WAC) 173-340. Work was performed pursuant to an amendment to Agreed Order No. 07-TC-S DE3938 (Amended AO) between Washington State Department of Ecology (Ecology) and NuStar.

An RI report was submitted to Ecology on September 5, 2008 (Ash Creek, 2008a). A Baseline Risk assessment report (BRA) was submitted to Ecology concurrently with the RI (Ash Creek, 2008b). Ecology responded with comments on both documents in separate letters on July 30, 2009. Ecology found the BRA report satisfactory and complete and requested responses to comments on the RI Report. On October 1, 2009, NuStar submitted comment responses to Ecology along with the Revised Remedial Investigation Report (Revised RI Report; Ash Creek, 2009a). Although Ecology concurred with the responses to its comments, it determined that additional investigation was needed to complete the RI.

In order to meet the requirements of the 2008 Agreed Order, a Draft Feasibility Study (FS) was submitted to Ecology on January 14, 2010 (Ash Creek, 2010). The Draft FS included an evaluation of remedial alternatives and proposed a final cleanup remedy for the Facility. Ecology delayed approval of the Draft FS until further activities were completed to finalize the remedial investigation for the Facility.

Ecology submitted letters to NuStar on August 25, 2010 and February 3, 2011 outlining the additional investigations to be conducted at the facility and surrounding area to complete the RI. These additional investigations included:

- An evaluation of Deep Zone groundwater;
- Groundwater investigation of an area to the northwest of the terminal property; and
- Investigation of sediments in the Columbia River.

The results of these investigations were reported to Ecology in separate documents and are summarized in this updated RI Report, referred to herein as the "Draft 2013 RI Report" to avoid confusion with the previous submitted versions.

In a June 12, 2010 letter, Ecology requested that NuStar install transducers in Ecology-approved Site monitoring wells to be utilized to evaluate regional groundwater flow. Data from transducers installed by NuStar were compiled with transducer data from the Port of Vancouver, and were used to evaluate regional groundwater flow over a one-year time period. The results of the regional groundwater flow evaluation are summarized in this report. Because of inconsistencies between the Vancouver Lowlands Groundwater Flow

Model (prepared by the Port of Vancouver) and groundwater flow patterns observed during the one-year transducer study, NuStar hired a groundwater modeling firm (Aspect Consulting, LLC.; "Aspect") to refine the regional groundwater flow model so that it would be a more useful tool for simulating conditions at the NuStar property. Because the completion of model refinements is not required by Ecology for completion of the RI, they are not discussed further in this report. Because the Vancouver Lowlands Groundwater Flow Model (Vancouver Lowland Groundwater Model) has already been approved by Ecology, and it provides a highly conservative evaluation of groundwater fate and transport, it is NuStar's intention to utilize the Vancouver Lowlands Groundwater model for evaluation of cleanup goals and remediation technologies in the FS.

In 2008, NuStar implemented an approved interim action at the Terminal which included installation of a soil vapor extraction (SVE) system and the injection of oil in the shallow groundwater zone. The Draft FS recommended expanding the interim action as the final remedy. In August 2010, Ecology and NuStar agreed that it would be beneficial to the cleanup effort if NuStar implemented the final cleanup action proposed in the Draft FS as an additional interim action, rather than waiting until the RI/FS process was completed for the Facility. Ash Creek Associates (Ash Creek) submitted a *2011 Interim Action Work Plan* (IA Work Plan) to Ecology on November 30, 2010, summarizing the effectiveness of the 2008 interim action and detailing the proposed additional 2011 interim action (Ash Creek, 2011). Ecology approved the IA Work Plan in an email on March 30, 2011. The expanded (2011) interim action was implemented from July through October 2011. The Draft 2013 RI includes the results of confirmation sampling from the interim action implemented in 2008 as well as approximately one year of groundwater monitoring data that has been collected since implementing the 2011 interim action.

1.1 Objective

The objective of this Draft 2013 RI was to collect data necessary to adequately characterize the Site for the purpose of developing and evaluating cleanup action alternatives, if necessary. The results of the RI were used to assess site risk and prepare a BRA (Ash Creek, 2008g). Ecology approved the BRA on July 30, 2009. Since completion of the BRA in 2008, new information is available that relevant to the BRA. Updates to the BRA are included in Section 5 of this report and will be used to complete a revised FS.

1.2 Report Organization

Site investigation activities at the Property and/or surrounding area were conducted by several parties in multiple phases between 1980 and 2012. The activities and results for each investigation event have been documented in corresponding reports. These reports are incorporated into the RI by reference and are included in full as appendices, where appropriate. This RI Report compiles a comprehensive summary of the information included in previous reports and discusses the results and findings of the investigations. This RI Report is organized as follows:

- Background. Section 2 presents Property background and operations. The information in Section 2 is drawn from other reports, which are referenced where appropriate.
- RI Investigation Results. The results of previous investigations conducted from 1980 to 2012 are summarized in Section 3.
- Analysis of Chemical Fate and Extent. In Section 4, the results of RI investigations are discussed with respect to chemicals of potential concern (COPCs) and the fate and extent of the chemicals.
- Updated BRA. In Section 5, the 2008 baseline risk assessment has been updated to incorporate new information, including analytical data, revised human health toxicity criteria, an additional medium (river sediments), and revised regulatory standards.
- Summary and Conclusions. Section 6 discusses the comprehensive conclusions from the RI.

1.3 Definition of Property, Site, and Facility

As used in this report, the Property refers to the NuStar 2006 leasehold area. The 2006 leasehold boundary is shown on Figure 2. Changes in business lines have led to revisions in the NuStar leasehold. The 2006 leasehold boundary was selected as representative of the Property throughout much of the terminal operational period. Features in this report may be referred to as "off-Property" or "on-Property" when describing physical location relative to the 2006 leasehold boundary.

The Site is defined consistent with MTCA and the AO to include the area where a hazardous substance from a release at the Property has "come to be located." Therefore, the boundaries of the Site are determined by the results of the RI and are discussed in Section 4.2. The AO states that the Site constitutes a Facility under RCW 70.105D.020(4). Consistent with MTCA, the term "Facility" is used interchangeably with the term "Site" in this Draft 2013 RI Report. However, it should be noted that supporting documents provided in appendices use the terms "site" and "facility" in terms inconsistent with the AO. The reader is cautioned to understand these terms within the context of the document being reviewed.

2.0 Background

2.1 Property Description and History

Location. The Property is located at the Port of Vancouver Terminal No. 2 in Vancouver, Washington (as shown on Figure 1). The Property address is 2565 NW Harborside Drive, Port of Vancouver, Vancouver, Washington 98660 (Latitude: N45º 38.26'; Longitude: W122º 42.20'). The Property is owned by the Port of Vancouver (Port) and is leased by NuStar.

Physical Features. The Property is roughly rectangular with nominal dimensions of 600 by 1,300 feet. The total area of the Property is approximately 17 acres. The Property is on the north shore of the Columbia River. Land on all other sides is industrial Property also owned by the Port. The Property is located on Clark County Tax Lot (TL) Nos.: 151979-000, 502010-002, 502010-000, and a portion of 502020-000, as well as a portion of the Washington Department of Natural Resources tideland area managed by the Port.

The Property includes five buildings (Warehouses 9, 13, 14, 15, and 17), a loading dock, three aboveground storage tank (AST) farms, two tank truck loading/unloading racks, a rail tank car loading/unloading area, marine vessel dock and piping, and an office. The ground surface is nearly flat at an elevation typically between 32 and 34 feet above mean sea level (MSL). The majority of product piping is above ground except for the buried pipeline that extends from the marine vessel dock to the north to the NuStar Vancouver Annex terminal located approximately 1.7 miles to the north/northeast of the Property.

The Property includes extensive underground utilities. All utilities are within about 12 feet of the ground surface, above the groundwater table.

The ground surface coverage consists of the following (with approximate aerial extent):

- Buildings (35 percent);
- Paved areas (45 percent);
- Tanks (5 percent); and
- Gravel/bare ground (15 percent).

Property History. Historical aerial photographs were reviewed to identify the developmental history of the Property. Copies of the aerial photographs are included in Appendix A. The following summarizes the Property development as observed on the aerial photographs.

- 1935, 1939, 1940 – The Property was located within the Columbia River flood plain. The top of bank for the river was located near the location of the northern Property line.
- 1948, 1956, 1959 – Filling is evident in each of these photographs. There is no development on the Property. By the 1959 photograph, the top of bank was extended nearly to the current location.
- 1961 – Warehouse 9 was present. Several ASTs that still exist were present. These included part of the tank farm immediately east of Warehouse 9 and three of the larger ASTs farther to the east. Filling is evident in the photograph on the west portion of the Property.
- 1966 – Warehouse 13 was the only addition since 1961.
- 1967 – Warehouse 15 and two ASTs (adjacent to the three easterly ASTs observed in the 1961 photograph) were the primary additions since 1966.

- 1971 – Between 1967 and 1971, a vertical bulkhead was constructed from Warehouse 13 eastward, extending the shoreline to its current location. Warehouse 9 was expanded southward to its current extent.
- 1974 – Warehouse 17 and two ASTs (further expanding the easterly tank farm) were the primary additions since 1971.
- 1980, 1983 – ASTs were added between 1974 and 1983. These were in the same area as prior ASTs, east of Warehouse 9.
- 1990, 1998 – Warehouse 14 was added between 1983 and 1990.
- 2002 – The AST farm east of Warehouse 14 was added between 1998 and 2002.

2.2 Facility Operations

In general, the Property was developed to receive, store, and handle bulk fuel and chemicals. Typically, these chemicals were not owned by the terminal operator. Rather, the terminal operator entered into agreements as a wholesale distributor to handle chemicals for owners. The terminal was owned/operated by GATX from the early 1960s through 1998 (GATX has since been acquired by Kinder Morgan). The terminal was acquired in 1998 by ST Services, a subsidiary of Kaneb Pipeline Partners L.P. (Kaneb). Kaneb was acquired in 2005 by Valero L.P. Valero L.P. changed its name to NuStar Energy L.P. in 2007.

Although a variety of products have been handled at the Property over the years, the historical sampling has identified chlorinated solvents as the chemicals of interest. Historical company records identified the following with respect to chlorinated solvent handling at the Property.

- Tetrachloroethene (PCE), trichloroethene (TCE), methylene chloride (MC), and 1,1,1-trichloroethane (1,1,1-TCA) were handled for several companies beginning prior to 1976, but the start date is uncertain. The records suggest that handling of chlorinated solvents may have ended as early as 1990, but the end date is uncertain.
- Direct loading (direct transfer from rail tank cars to tank trucks) was the initial method used for transfer of chlorinated solvents. Direct loading occurred near Warehouse 13. Direct loading ended in 1982. Interviews with long-time employees support the records review.
- Indirect transfer (transfer from rail to ASTs, transfer from ASTs to tank trucks) began in 1981 and continued throughout the remainder of chlorinated solvent handling. Indirect transfer occurred in and around the AST farms located east of Warehouse 9 (rail car loading racks to the north, truck loading rack to the south).

Currently, sodium hydroxide is received via ship and transported out by rail and truck. Jet A fuel is received via ship and transported out via truck and barge. Calcium chloride is received via rail and transported out via truck. Methanol is received via rail and transported out via truck and rail.

Potential Source Areas. The operational history identified three historical handling areas of chlorinated solvents: the direct loading area near Warehouse 13; the historical AST/rail car loading area to the northeast of Warehouse 9; and the tank truck loading area located to the southeast of Warehouse 9. Figure 3 shows the locations of the historical chlorinated solvent handling areas.

Additionally, recent maintenance work in a buried pipeline vault revealed a small isolated area with potential jet fuel impacts. The potential jet fuel source area is shown on Figure 3.

2.3 Regulatory Framework

Investigation of the Site has been conducted under two AOs. The first AO (No. 98-TC-5338), issued in August 1998, was between ST Services and Ecology and required performance of an RI, FS, and interim actions (IA). The second AO (No. 07-TC-S DE3938), rescinding the first, was signed in November 2007 between NuStar and Ecology. The RI (Ash Creek, 2008a), Revised RI (Ash Creek, 2009a), and Draft FS (Ash Creek, 2010a) were submitted as requirements under the 2007 Agreed Order. An Amendment to the 2007 Agreed Order (Amended AO) was signed on May 23, 2011, and includes the following requirements:

- Submit a 2011 Interim Action Work Plan
- Submit Draft Interim Action Evaluation Report
- Submit Final Interim Action Evaluation Report
- Submit Revised Draft (2013) Remedial Investigation Report;
- Submit Final Revised (2013) Remedial Investigation Report
- Submit Draft FS Report; and
- Submit Final FS Report.

This Draft 2013 RI Report is being submitted as a requirement under the Amended AO.

2.4 Site Setting

2.4.1 Geology

Regional Geology. The regional geology is summarized below based on SECOR (2001) and AMEC (2005). The vicinity of the Site is dominated by two primary units: the Unconsolidated Sedimentary Aquifer (USA) and the Troutdale Formation.

The USA is the upper unit. The thickness of this unit varies in the region, observed to be as little as 125 feet thick and up to 200 feet thick within the areas investigated at, and near, the Port of Vancouver. The USA

consists of alluvial deposits of the Columbia River and the catastrophic Missoula Floods. The upper portion of the USA contains unconsolidated silt and sand. The lower portion generally consists of sand or sand and gravel.

The Troutdale Formation underlies the USA and can be in excess of 1,000 feet thick. The base of the USA is typically identified by the transition to an underlying conglomerate or consolidated/unconsolidated silty sandy gravel of the Pleistocene Troutdale Formation. There is an unconformity in the Troutdale Formation, representing exposure and a period of erosion prior to the deposition of unconsolidated sediments through catastrophic flooding events. These catastrophic floods were caused by periodic failures of ice dams, releasing large volumes of lake waters and sediments from Idaho and Montana during the Pleistocene Age. The resulting Pleistocene flood deposits are made up of cemented sandy gravels and semi-consolidated sands, silts, and clays.

Local Geology. The vicinity of the Site is dominated by two primary units: the USA, and the Troutdale Formation. Figures 4 and 5 present geologic cross-sections through the Site. The upper part of the USA that underlies the Facility consists of fine to coarse sand with variable layers of silt or silty sand. The upper sandy zone extends from the ground surface to a depth of up to 50 feet beneath the western and central portions of the Facility and extending south to the Columbia River. Within the upper USA, a silt layer is present on the north and east parts of the Facility. At the northern Facility boundary, the silt is encountered at depths as shallow as 9 to 10 feet below the ground surface (bgs) and extends to depths of approximately 40 feet bgs. This layer is continuous along the north, west, and east of the Facility, forming a low-permeability ridge at the Facility boundary. The upper contact of the silt appears to coincide with the historical riverbank identified on the 1935 through 1940 aerial photographs (Appendix A), with the silt ridge corresponding to a natural levee that commonly forms along low-gradient rivers. The sand lying above the silt corresponds to the fill observed being placed in aerial photographs from 1948 through 1961 (Appendix A).

A silty gravel layer underlies the sandy/silty layers of the upper USA beneath the Facility. The silty gravel grades into the coarse sand and/or gravel of the lower portion of the USA. The depth to the top of the silty gravel varies from 39 (north) to 50 (south) feet bgs beneath the Facility. North of the northern Facility boundary (i.e., north of the silt ridge), the shallow geology is predominantly silt. The silty gravel is not observed and a sand layer is found between the silt and underlying sand and gravel.

During a Facility investigation in August 2011, the Troutdale Formation was encountered at a depth of approximately 210 feet bgs in the source area (between warehouses 13 and 15) at the Facility. The Troutdale formation beneath the Facility consists of unconsolidated sandy to silty gravels with zones of cemented gravels (conglomerate). The Troutdale Formation was identified, in part, by the presence of green, micaceous silty sand, quartzite pebbles, and cemented gravels with occasional weathering rinds.

The identification of the Troutdale Formation was consistent with regional references describing the Troutdale Formation (McFarland and Morgan, 1996).

2.4.2 Hydrogeology

This section presents the understanding of the regional and local hydrogeology.

Regional Hydrogeology. The regional aquifers follow the regional geology discussed above. The regional hydrogeology summarized below is based on SECOR (2001) and AMEC (2005).

The USA is unconfined and receives recharge directly from the land surface and/or surface water features. It is a productive aquifer with high well yields (several thousand gallons per minute [gpm] without significant drawdown). Based on numerous studies conducted in the Port area, the following aquifer terminology has been adopted:

- Shallow Zone – The Shallow Zone corresponds to first encountered groundwater, generally the upper 20 to 30 feet of the saturated zone. At the Facility, depth to first encountered groundwater is general 21 to 33 feet below grade (elevation of 5 to 12 feet). The bottom of the Shallow Zone is about elevation -10 to -20 feet, or a depth of about 40 to 50 feet.
- Intermediate Zone – The Intermediate Zone generally corresponds to the middle of the USA. This zone is most directly influenced by pumping wells in the USA. The Intermediate Zone lies between approximate elevations -15 and -100 feet. At the Facility, the Intermediate Zone is between depths of about 55 and 130 feet.
- Deep Zone – The Deep Zone includes the Troutdale Formation and, in some areas, the lower part of the USA. It generally corresponds to portions of the aquifers that are less influenced by groundwater pumping and more by regional influences.

Local Hydrogeology. Figures 4 and 5 show interpretations of the hydrogeologic units at the Site. Beneath most of the Property, the Shallow Zone lies within the sand layer overlying the silty gravel. Along the northern Property boundary and continuing to the north, the Shallow Zone lies entirely within the silt layer. As a result, the silt layer forms a low-permeability zone that greatly impedes hydrogeologic communication between the Shallow and Intermediate Zones on the Property, and effectively isolates the Shallow Zone on-Property from the Shallow Zone off-Property. The presence of silt in the Shallow Zone, particularly at the lower contact of the groundwater zone, results in a Shallow Zone that has an overall lower permeability than the Intermediate Zone. Off-Property to the north, the sand layer beneath the silt layer is hydrogeologically connected to the underlying sand and gravel, so is therefore effectively part of the Intermediate Zone.

A groundwater divide is present in the central portion of the Property within the Shallow Zone, generally corresponding to the southern edge of the "silt ridge" at the Property. Groundwater south of the

groundwater divide is more sensitive to tidal variations. Shallow groundwater to the north of the divide appears to be less tidally influenced and generally flows away from the river. The presence of the silt ridge, coupled with the groundwater divide, effectively isolates the Shallow Zone groundwater at the Property from the influences of pumping from the Shallow or Intermediate Zones north and east of the Site. Furthermore, given that the geologic source of the silt ridge is the former natural river bank, this feature is continuous well beyond the Property boundaries to the east and west. Figure 6 shows the Shallow Zone groundwater elevation contours from the December 2012 groundwater monitoring event. During this event, a north-south trending groundwater divide was present at the site, which was not generally consistent with historical groundwater levels in the Shallow Zone. Historical potentiometric maps, depicting a fairly consistent northwest/southeast trending groundwater divide in Shallow Zone groundwater, are provided in Appendix B.

In 1999, an aquifer test was conducted to evaluate hydraulic properties of the Shallow Zone on the Property (SECOR, 1999a). The analysis of data collected during aquifer pumping in the central area of the Property resulted in an estimated Shallow Zone aquifer transmissivity of 0.82 square feet per minute (ft^2/min) to 6.4 ft^2/min and an aquifer storativity of 0.002 to 0.005.

The lower reaches of the Columbia River – where the Site is located – are subject to tidal variations as well as seasonal and stage variations due to precipitation and regulation of river flow by dams.

Figure 7 shows the Intermediate Zone groundwater elevation contours from the December 2012 groundwater monitoring event. During this event, groundwater flow was southerly towards the Columbia River. Groundwater flow in the Intermediate Zone at the Facility is variable and has recently been evaluated within a regional context (2011 Groundwater Flow Evaluation Report; Ash Creek, 2012a). The report on this evaluation is contained in Appendix C. Several factors influence groundwater flow in the Intermediate Zone in the vicinity of the Facility, including pumping from municipal supply wells and industrial production wells as well as changes in Columbia River water levels. As further discussed in Section 3.15.2, a regional groundwater flow evaluation was conducted during 2011 using transducers placed in a total of 25 Intermediate Zone monitoring wells at the NuStar and Port (Swan and Cadet) sites. The results of this approximately year-long groundwater flow evaluation indicated that changes in groundwater flow direction and magnitude were strongly correlated with changes in Columbia River stage. The river influence on groundwater gradient is significant near the river and rapidly decreases with distance from the river. During 2011, the annualized groundwater gradient from well MW-24i at the NuStar facility to Port well MW-33 was 0.000095 ft/ft. At each well, the annualized gradient was determined by first averaging the groundwater elevation measurements recorded by the transducer (measured every 15 minutes) from January 9, 2011 through January 9, 2012. Ash Creek noted a few short time periods (typically less than one hour) in which transducers were removed from a monitoring well for the purpose of sampling groundwater at the well during quarterly groundwater monitoring events. Data were also missing for a few of the Port wells (CM-MW-19i through CM-MW-21i) for periods of up to 6 months due to technical difficulties associated with the transducers. The year-averaged data were then plotted on regional groundwater elevation contour

maps to determine annualized gradients across the project area. A detailed description of the methodology used to determine annualized gradients is provided in the 2011 Groundwater Flow Evaluation Report (Ash Creek, 2012a). As shown on Figure 8, the 2011 annualized groundwater gradient further from the river (as measured between Port wells MW-32i and MW-33i) was essentially flat with a gradient of 0.000018 ft/ft to the northeast (Ash Creek, 2012a; Appendix C).

Estimates of regional hydraulic conductivity in the Intermediate Zone have been somewhat variable and range between 200 and 1,900 feet/day as listed below.

- Swanson and Leschuk (1991) – 1,000 ft/day
- McFarland and Morgan (1996) – Median hydraulic conductivity in the USA of 200 ft/day
- Port of Vancouver step-rate pump test on extraction well EW-1 (POV, 2011) – range between 950 and 1,200 ft/day
- Port of Vancouver distance-drawdown test (POV, 2011) – 950 and 1,900 feet/day

In 2009, the Port installed a groundwater extraction well to treat and contain the Intermediate Zone groundwater plume originating from the former Swan Manufacturing and Cadet Facilities (shown on Figure 8). The location of the extraction well (EW-1) is shown on Figure D-1 in Appendix D. Drawdown data from extraction at well EW-1 was evaluated using the Theim equation (1906) to estimate hydraulic conductivity in the Intermediate Zone for comparison with regional hydraulic conductitivity estimates obtained from the above listed references. Groundwater pumping rates were obtained from the Port's Interim Action Summary Report (Port, 2011) and groundwater elevation data for observation wells MW-05i and CM-M-20i were obtained from the Port's transducer dataset. The hydraulic conductivity was estimated by dividing the transmissivity by the screen length for extraction well EW-1. Groundwater level data from six 3-day averaged time periods (in June 2009, September 2009, December 2009, March 2010, June 2010, and October 2011) were used to assess the transmissivity. The data sets that were evaluated yielded a hydraulic conductivity range of 1,800 to 2,200 feet per day (ft/day), which was within the range of other published hydraulic conductivities for the region.

During a Facility investigation in August 2011, the Troutdale Formation was encountered at a depth of approximately 210 feet bgs in the source area (between Warehouses 13 and 15) at the Facility. The Deep Zone is notably less permeable than the Intermediate Zone (Ash Creek, 2010b).

2.4.3 Surface Water and Surface Water Drainage

The Columbia River bounds the Site to the southwest. The Site is situated on the Columbia River flood plain. As described in Section 2.1, the majority of the Property is covered with an impermeable surface (e.g., buildings, asphalt, concrete). Surface water in the terminal area is directed to a permitted storm water system that is maintained by the Port.

2.4.4 Aquatic and Terrestrial Habitat

The Columbia River is located along the southwest boundary of the Property. Aquatic organisms, including anadromous and resident fish species, some of which are threatened or endangered, use parts of the river during various stages in their life cycles. As discussed in Section 2.1, the Property and surrounding area are covered with impermeable surfaces and provide no terrestrial habitat.

2.4.5 Climate

The Site area is characterized by mild wet winters and moderately warm, dry summers. Precipitation, temperature, and wind data for the Site area are summarized below (U.S. Climate Normals, 1971-2000).

Precipitation:

Total Annual	39.4 inches (chiefly rain)
Wettest Months	November through February (greater than 4 inches per month)
Driest Months	July and August (less than 1 inch per month)

Temperature:

Mean Annual	51.8 degrees Fahrenheit (°F)
Warmest Month	August (Average Maximum 79.1°F)
Coldest Month	January (Average Maximum 44.7°F)
Lowest Recorded	-10°F (December 1985)
Highest Recorded	105°F (June 1976)

Wind:

Minimum Monthly Mean (October): 4.0 miles per hour (mph)
Maximum Monthly Mean (December/January): 5.6 mph
Average Annual: 5.0 mph
Direction: Generally from the west-northwest, but east winds are common during winter months.

2.5 Land Use

The Site is an industrial Property as defined by MTCA (WAC 173-340-200). This conclusion is based on the following:

- The Site is located within the City of Vancouver that has conducted land use planning under the State Growth Management Act (Vancouver Municipal Code [VMC] 20.110.010.A).

- The City of Vancouver zoning map defines the Site and surrounding area as IH: Heavy Industrial. The nearest non-industrial zoning is a residential area located about 1,900 feet northeast of the Property. According to VMC 20.440.020, IH zoning "…has been carefully located to minimize impacts on established residential, commercial and light industrial areas."
- The Property is a bulk storage facility located within a marine terminal.

Documentation supporting the land use evaluation is presented in Appendix D.

2.6 Beneficial Water Use

2.6.1 Groundwater

The Intermediate Zone located beneath the Site is a productive aquifer used within the region for municipal and industrial water supply. Nearby production wells are the Fabricated Products well 1,800 feet to the northwest of the Property, the Westside Wastewater Reclamation Facility well located 2,000 feet to the east of the Property, and the Great Western Malting wells located 3,000 to 3,500 feet southeast of the Property. A map showing the locations of these wells is included in Appendix D. Major water users in the area are the Port of Vancouver, Great Western Malting, City of Vancouver, Westside Wastewater Reclamation Facility, and Clark Public Utilities (Parametrix, 2008). Additionally, while the Port of Vancouver's pump and treat extraction well does not specifically constitute a beneficial water use, pumping from the well does influence Intermediate Zone groundwater flow patterns and should be noted.

In 2006, the U.S. Environmental Protection Agency (EPA) designated the Troutdale aquifer beneath Clark County as a Sole Source Aquifer. This designation also includes the USA hydrogeological unit located beneath the site. In the designation, published in the Federal Register on September 6, 2006 (Vol. 71, No. 172), the EPA indicated that 99.4 percent of the population used the aquifer as their source of drinking water. Further, the EPA indicated that it was not economically feasible to replace groundwater with surface water

Groundwater at the NuStar facility is not currently used for any purpose. Groundwater from the Shallow Zone on the Property has a southerly gradient on much of the Property (Appendix B). As discussed in Section 2.4.2, groundwater in the Intermediate Zone has a variable gradient that is strongly correlated with Columbia River stage, with an annualized groundwater gradient that is nearly flat (see Figure 9). Absent the elevated river stage, groundwater within the Intermediate Zone is expected to discharge to the Columbia River.

2.6.2 Surface Water

There are no surface waters on the Site. The Columbia River is located adjacent to the Site, to the south.

The Columbia River must be protected for designated uses as defined under WAC 173-201 A-602. The river serves as an active channel for large commercial ships. Throughout its course, the river is used by many communities (not Vancouver) as a source of drinking water. However, within at least several miles of the Site, the river is not used for drinking water purposes and is not likely to be used within the foreseeable future. Along the course of the river, water is also used for stock, agriculture, and industrial water supplies.

Anadromous and resident fish species use parts of the river during various stages in their life cycles, including spawning, rearing, and migration. The Columbia River is also used for fishing for sport and consumption, recreational boating, general recreation, and aesthetic value. A number of local American Indian tribes have fishing rights on the Columbia River.

3.0 Summary of Site Investigations

Since 1980, numerous investigations have been conducted by various parties. These investigations identified the presence of chlorinated solvents and associated breakdown products, primarily PCE, TCE, and cis-1,2-dichloroethene (cis-1,2-DCE) in Site soil, groundwater, river sediments, and soil vapor. A comprehensive summary of historical data is included in Tables 1 through 6 (soil data in Tables 1 and 2; groundwater monitoring well data in Tables 3 and 4; depth-discrete groundwater data in Table 5; and Columbia River sediment data in Table 6). A summary of the previous investigations is outlined in the subsections below. In addition, a comprehensive table showing the construction of monitoring wells at the Site is included in Appendix E.

3.1 Summary of Site Investigations 1980-1992

This summary of site investigations conducted between 1980 and 1992 was obtained from the 2001 *Final Remedial Investigation Report* (SECOR, 2001); a copy of the 2001 SECOR RI Report is included in Appendix F.

3.1.1 Ecology Inspections and Investigations

Ecology conducted an inspection of the terminal on April 18, 1980. On November 27, 1984, Ecology conducted a potential hazardous waste preliminary site assessment at the terminal. Based on the assessments, no further action was recommended, and it was recommended that the Site be removed from the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS).

An Ecology inspection was conducted on November 14, 1986, and a small discharge of antifreeze was observed in the outfall pipe located south of the terminal. The impacted area was estimated to be approximately 10 by 15 feet. At that time a sample of sediment was collected. The source of the discharge

was determined to be the ethylene glycol warehouse area. The terminal operator (GATX) removed the drainage and installed a pump to remove additional source material.

On April 23 and 24, 1991, Ecology conducted a limited site investigation in response to the release of antifreeze into the Columbia River. The investigation included collecting three surface soil samples and two sediment samples (one upstream and one downstream from a National Pollutant Discharge Elimination System [NPDES] permitted outfall) and installing one monitoring well (EW-1; see Figure 2). The well was drilled to a depth of 32 feet bgs just south of the chlorinated solvent and ethylene glycol tanks, and the truck loading/unloading area (Figure 2). Volatile organic compounds (VOCs) were not detected in the two sediment samples but were detected at low concentrations in the surface soil samples in the tank area. The sample from the well boring (approximately 20 to 30 feet bgs) contained detectable concentrations of chlorinated compounds.

3.1.2 Additional Site Investigation Activities, November 1993 (Installation of MW-1 through MW-6)

As requested by Ecology, GATX completed additional investigations at the Property in November 1993 that included the installation of six 2-inch monitoring wells (MW-1 through MW-6) to depths ranging from approximately 35 to 40 feet bgs. There were no detectable hydrocarbons or chlorinated solvents in soils that exceeded the MTCA Method A cleanup levels. Groundwater samples collected from four of the six monitoring wells contained detectable concentrations of chlorinated compounds. Soil and groundwater results are included in Tables 1 and 3, respectively.

3.1.3 Groundwater Sampling Event (September 1995)

Monitoring wells MW-1 through MW-6 and EW-1 were sampled by SECOR on September 1, 1995. Halogenated volatile organic compounds (HVOCs) were identified in each groundwater sample above laboratory method reporting limits (MRLs). HVOCs detected included PCE, TCE, cis-1,2-DCE, vinyl chloride, 1,1,1-TCA, chloroethane, 1,2-dichloroethane (1,2-DCA), and 1,1-dichloroethane (1,1-DCA). Groundwater data are included in Table 3.

3.2 Site Characterization Activities (1996)

SECOR conducted several site characterization activities in 1996. Summaries of these investigations are presented in the subsections below.

3.2.1 Soil Gas Survey (September 1996)

On September 17, 1996, SECOR conducted a passive soil gas survey at the Site using GORE-SORBER passive soil gas samplers. The purpose of the soil gas survey was to evaluate the extent of HVOCs and identify the potential presence of additional sources of contaminants at the Site.

Thirty-five soil gas samplers were placed in various locations across the Property. Four indicator compounds were used in the survey including PCE, TCE, trans-1,2-dichloroethene (trans-1,2-DCE) and mp-Xylene. A detailed description of the GORE-SORBER survey is presented in the *1996 Site Characterization Activity Summary Report* (SECOR, 1997a), which is provided in Appendix G.

The soil vapor data did not provide a direct measure of the soil gas concentrations. Rather, they provided an indication of the relative concentration of chemicals in soil vapor. The data indicated that relatively higher concentrations of PCE and TCE were present in soil gas in the historical solvent-handling areas (see Figure 3). These results were used to determine locations for subsequent soil and groundwater sampling (see Section 3.7).

3.2.2 Groundwater Monitoring and Sampling (September 1996)

On September 24, 1996, SECOR monitored and sampled monitoring wells MW-1 through MW-7 and EW-1. HVOCs were detected above laboratory MRLs in monitoring wells MW-1 through MW-5 and EW-1. Laboratory analytical reports are provided in the *1996 Site Characterization Activity Summary Report* (SECOR, 1997a; Appendix G) and data are tabulated in Table 3.

3.2.3 Soil Boring/Additional Monitoring Well Installation (November 1996)

Monitoring wells MW-7 through MW-13 were installed by SECOR from November 4 to 6, 1996. These seven borings were installed for the purpose of assessing and characterizing soil and groundwater conditions in the north and west sections of the Property and delineating the extent of dissolved HVOCs in groundwater beneath the western portion of the Property (SECOR, 1997a). The wells were installed to depths of approximately 40 feet bgs. To assess the vertical distribution of HVOCs in groundwater, depth-discrete groundwater samples were collected from the borings at MW-7 and MW-12. The samples were collected at 20-foot intervals to a depth of 80 feet bgs. Well boring logs and laboratory analytical results of soil and depth-discrete groundwater sampling are provided in the *1996 Site Characterization Activity Summary Report* (SECOR, 1997a; Appendix G). The soil, monitoring well groundwater, and depth-discrete analytical data are presented in Tables 1, 3, and 5, respectively.

3.2.4 Continuous Aquifer Monitoring (December 1996)

In order to evaluate the effect of Columbia River tidal fluctuations on water table elevation, gradient, and groundwater flow direction beneath the Property, SECOR placed pressure transducers in monitoring wells EW-1, MW-2, MW-7, MW-8, and MW-12, and monitored groundwater level fluctuations for approximately three days. A maximum elevation change of approximately 2.8 feet was observed in EW-1 and MW-12, thetwo wells closest to the sea wall and the Columbia River. Depending on the time in which the water level measurements were collected, groundwater flow direction varied from north-northwest to the south. A detailed description of the aquifer monitoring event is provided in the *1996 Site Characterization Activity Summary Report* (SECOR, 1997a; Appendix G).

3.2.5 Groundwater Monitoring and Sampling (December 1996)

On December 2, 1996, SECOR monitored and sampled monitoring wells MW-1 through MW-13 and EW-1. Laboratory analytical reports are provided in the *1996 Site Characterization Activity Summary Report* (SECOR, 1997a; Appendix G) and data are tabulated in Table 3.

3.3 Site Characterization Activities (1997)

3.3.1 Soil Boring/Additional Monitoring Well Installation (October 1997)

On October 30 and 31, 1997, SECOR installed boring/monitoring wells MW-14 through MW-17 at and near the Property. The four borings/wells were installed at a depth of approximately 40 feet bgs to further characterize and assess soil and groundwater conditions in the western portion of the Property and to delineate the extent of dissolved HVOC concentrations in groundwater to the west of the Property. Of the 32 soil samples that were submitted for laboratory analysis, only one (MW-16 at 25 feet bgs) contained HVOCs above MRLs. Well boring logs and soil laboratory analytical reports are provided in the *1997 Site Characterization and Assessment Activities Summary Report* (SECOR, 1997b; Appendix H). Soil analytical results are presented in Tables 1 and 2, and groundwater analytical results are presented in Table 3.

3.3.2 Surface Soil Sampling (November 1997)

On November 12, 1997, SECOR collected three surface soil samples at the Property—two from soil beneath the manifolds near the tank farm and one southwest of Warehouse 17. The purpose of collecting the surface soil samples was to evaluate soil conditions beneath the transfer manifolds associated with the tank farm. The purpose of collecting a surface soil sample near Warehouse 17 was to assess soil conditions in the area where fertilizer handling was conducted in the past. Surface soil samples were analyzed for HVOCs by EPA Method 8021A and total petroleum hydrocarbons (TPH) by EPA Method 418.1. The sample collected near the warehouse was analyzed for total nitrogen by EPA Method 351.3, total metals by EPA 6000/7000 Series, and pH by EPA Method 9045B. Analytical results indicated

the presence of PCE in soil samples collected near the tank farm/manifold area. Surface soil laboratory analytical reports are provided in the *1997 Site Characterization and Assessment Activities Summary Report* (SECOR, 1997b; Appendix H), and analytical results are summarized in Table 1.

3.3.3 Groundwater Monitoring and Sampling (November 1997)

On November 12 and 13, 1997, SECOR monitored and sampled monitoring wells MW-1 through MW-17 and EW-1. Laboratory analytical reports are presented in the *1997 Site Characterization and Assessment Activities Summary Report* (SECOR, 1997b; Appendix H), and analytical results are summarized in Table 3.

3.4 Interim Remedial Action (2000 through 2005)

Pursuant to the 1998 AO, in 2000, SECOR completed an IA pilot study and installed an interim remedial action system at the Property. Detailed work scopes, procedures, and methods for these activities were presented in the *Final Interim Action Pilot Study Work Plan (*SECOR, 1999a), SECOR's *Response to Ecology's Comments Letter* (1999b), and the *Final Interim Action Work Plan* (SECOR, 2000a). The purpose of the pilot study was to collect site-specific data to be used to design and implement an IA. The primary objective of the IA was to reduce contaminant concentrations within the areas of greatest impact and to complete cleanup of hazardous substances in these areas. As part of the pilot study, *in situ* chemical oxidation pilot test wells IW, MP-1 through MP-4, and EX were installed between Warehouses 13 and 15, the area where previous investigations had indicated the higher relative concentrations of HVOCs in groundwater. Chemical oxidation testing consisted of installing test wells, performing hydrologic tests, adding oxidation chemicals to groundwater, extracting treated groundwater, and monitoring of on-Property HVOC concentrations. SVE and air sparge pilot test wells S-1, S-2, V-1, and TMP-1 through TMP3 were installed west of Warehouse 15. The results of the pilot study were presented in the *Interim Action Pilot Study* report (SECOR, 2000b; Appendix I).

The IA consisted of a line of injection wells IN-1 through IN-9 near the railroad tracks and a line of extraction wells EX-3 through EX-5 installed near the Columbia River. The system was designed to treat shallow groundwater (less than 45 feet deep) with PCE concentrations in exceedance of 1,000 micrograms per liter (µg/L). The IA system pumped groundwater from extraction wells, treated the pumped water with potassium permanganate, and then filtered and pumped the water into a series of injection wells. A detailed description of the installation of the remedial system is provided in the *Final Remedial Investigation Report* (SECOR, 2001; Appendix F). Interim remedial action was initiated in 2000 and continued through 2005. It included SVE, groundwater pumping, and chemical treatment and re-injection of treated groundwater. The IA apparently removed mass at the Property based on the drop in concentration of HVOCs in well MW-7, but data indicate that mass still remained after the system was terminated (e.g., see Table 3 for MW-7).

3.5 Additional Monitoring Well Installations (2000)

Multi-level groundwater monitoring wells MGMS-1 through MGMS-3 were installed and screened in the Shallow Zone with sample ports at 40 to 43 feet bgs and Intermediate Zone with sample ports at 60, 101 to 110, and 132 feet bgs to evaluate the vertical extent of HVOCs in groundwater and to provide additional information on aquifer characteristics at the Property. SECOR installed intermediate well MW-18i to the north of the Facility in order to further define the vertical and lateral extent of HVOCs at the Property. A detailed description of well installation activities is provided in the *Final Remedial Investigation Report* (SECOR, 2001; Appendix F). The analytical results are summarized in Tables 3 and 5.

3.6 Subsurface Investigations (2005)

SECOR conducted a limited subsurface investigation at the Property from March 23 to 25, 2005. During the investigation, 13 direct-push borings ST-SB-1 through ST-SB-13 were advanced to a depth of approximately 40 to 45 feet bgs along the north Property boundary in order to further characterize and delineate the extent of HVOCs in groundwater. Discrete groundwater samples were collected from the base of each boring (ranging from 39 to 49 feet bgs) corresponding to the top of Intermediate Zone groundwater and were analyzed for HVOCs using EPA Method 8260B. The *Limited Subsurface Investigation* report (SECOR, 2005) is provided in Appendix J, and the depth-discrete groundwater data are summarized in Table 5 and on Figures J-1 through J-3 contained in Appendix J.

In addition, Parametrix conducted a subsurface investigation in 2005 in the vicinity of the former Carborundum ponds north of the Facility on behalf of the Port of Vancouver. The investigation included the installation of 30 direct-push borings and the collection of grab groundwater samples from these installations in Intermediate Zone groundwater directly below the boundary between the Shallow and Intermediate zones. The analytical results from this investigation have been included on Figures J-1 through J-3 and illustrate the extent of HVOCs in the upper portion of the Intermediate Zone in 2005. As can be seen from the VOC concentration distribution on the figures, an apparent separate off-Facility source of HVOCs is present beneath the footprint of the former Carborundum ponds.

It should be noted that in the 2008 RI report, it was interpreted that the SECOR and Port of Vancouver direct-push investigation data were representative of Shallow Zone groundwater as depicted in figures prepared by Parametrix (2005). However, based on discussions held in a meeting on October 4, 2012 with representatives of the Port of Vancouver and the Department of Ecology, it was agreed that the base of the Shallow Zone corresponded to the base of the silty units north of the Facility, as represented on geologic cross-section A-A' shown on Figure 4. This interpretation identifies the 2005 direct-push investigation data collected by SECOR and Parametrix to be representative of the upper portion of the Intermediate Zone.

3.7 Property Investigations (April to June 2006)

Ash Creek completed a comprehensive investigation at the Property from April to June 2006 to: (1) assess the results of the previous interim cleanup actions; (2) collect sufficient data to determine whether further IA was needed and, if so, evaluate and select the appropriate action(s); and (3) provide additional data for an FS for the final action at the Site. The investigation activities included the completion of 49 push-probe explorations across the Property. Soil and/or grab-groundwater samples were collected from these explorations for laboratory analysis. A total of 71 soil samples and 126 groundwater samples were submitted to the analytical laboratory to analyze for the presence of HVOCs.

Results of these investigations are provided in detail in the *Site Investigation Data Summary Report* (Ash Creek, 2006a; Appendix K). Soil analytical results are summarized in Tables 1 and 2. Depth-discrete groundwater sample analytical results are summarized in Table 5.

3.8 Groundwater Investigation (2007)

Ash Creek conducted a groundwater investigation to support the development of the *RI Work Plan* pursuant to the November 7, 2007 AO. A groundwater investigation was completed between May and July 2007, including the installation of 14 borings for depth-discrete groundwater sampling. Eight of these borings were installed at or to the west of the Property, and six were installed along the north and east Property boundaries. The borings were installed to depths between 55 and 85 feet bgs, where drilling conditions allowed, and groundwater samples were collected at 10-foot intervals from 35 feet bgs to the bottom depth of the borings. Analytical results and laboratory data are provided in the *Groundwater Investigation Results Report* (Ash Creek, 2008a; Appendix L) and are summarized in Table 5.

3.9 Interim Action (2008)

An IA was implemented to address the release area at the Property while the RI, BRA, and FS were being completed. An analysis of IA alternatives was completed to select the appropriate action (Ash Creek, 2006b). The objective of the IA is to reduce threats to human health and the environment from chemicals within the source area. Based on the results of the IA analysis, an enhanced bioremediation and SVE IA was selected and described in detail in a design report (Ash Creek, 2007). Ecology accepted the design report on January 10, 2008, contingent upon a response to comments. Ash Creek submitted a comment response letter to Ecology on May 7, 2008 (Ash Creek, 2008d). The IA was initiated in April 2008 and consisted of consisted of installation of temporary injection points, injection of a bioremediation substrate, installation of SVE wells and associated trenching/pipe installation, installation and startup of the SVE system, and routine operations, maintenance and monitoring of the SVE system. The bio-injection substrate, CAP18-ME, was derived from food-grade vegetable oil components (tricylglycerols and esterified fatty acids), and provided a carbon source for the anaerobic reductive dechlorination treatment pathway. The bioremediation substrate was injected into Shallow Zone groundwater at 38 locations within the source

area, as shown on Figure 9. The SVE system consisted of 18 soil vapor extraction wells, organized in four branches as shown on Figure 10. The SVE system operated nearly continuously (with the exception of minor shutdowns for maintenance or monitoring purposes) until the system was expanded in August 2011.

3.10 2008 Groundwater Investigation and Well Installation

In 2008, investigative activities were conducted at the Property in accordance with the *RI Work Plan* (Ash Creek, 2008b; Appendix M) to address data gaps identified by previous work. The specific data gaps that were addressed were as follows:

- The depth of dissolved-phase HVOCs west of the Property. An Intermediate Zone monitoring well was installed to allow continued monitoring of groundwater in that area of the Site.
- Additional Intermediate Zone monitoring wells along the northern Property boundary.

Depth-discrete groundwater sampling and installation of monitoring wells was performed to address the identified data gaps. The scope of work performed is detailed in the *RI Work Plan* (Ash Creek, 2008b; Appendix M). A total of six monitoring wells were installed at five locations (MW-19i, MW-20i, MW-21i-40, MW-21i-105, MW-22i, and MW-23i). Following the installation and development of these monitoring wells, groundwater was sampled for HVOCs as part of the quarterly groundwater monitoring and sampling event. In addition, samples to evaluate reductive dechlorination were collected from monitoring wells MW-7 and MW-8 in the Shallow Zone; MW-21i-40 and MW-23i in the upper Intermediate Zone; and MW-18i and MW-21i-105 in the lower Intermediate Zone. A summary of this investigation was submitted to Ecology on August 8, 2008 in an appendix to the RI report (Ash Creek, 2008b) and is also included in Appendix N.

3.11 Soil and Groundwater Interim Action Confirmation Sampling (2010)

Ash Creek conducted soil and groundwater sampling in the 2008 IA area in September 2010 to assess the progress of the actions. Sampling was focused within IA zones of influence, particularly in those areas where soil and groundwater concentrations were the most elevated during the pre-IA (2006) site investigation. Four borings (CB-1 through CB-4) were completed using a direct-push rig to a depth of 50 feet bgs. Borings CB-1, CB-2 and CB-4 were located within close proximity to historical borings AGP-28, AGP-29 and AGP-22, respectively, as shown on Figure 11. Soil and groundwater samples were collected from these borings at similar depths to soil and groundwater samples collected during the 2006 site investigation, and are summarized in Tables 1 and 5, respectively. The locations of the soil borings are shown on Figure 3. Boring CB-3 was selected to evaluate the physical "center" of the 2008 IA area and was not located in a previously sampled area. Soil samples were selected for analysis if they exhibited elevated photoionization detector (PID) readings during field screening or if they were collected from the same approximate location and depth as samples from the 2006 investigations. Groundwater samples were collected from borings CB-1 through CB-4 at depths of 35 and 45 feet bgs. Additionally, groundwater samples were collected from monitoring wells MW-9, MGMS2-40, and CB-3 (at 45 feet bgs) to evaluate

conditions for bioremediation. The results of the soil and groundwater sampling activities were submitted to Ecology as an appendix to the *2011 Interim Action Work Plan* (Ash Creek, 2011a; Appendix M).

The overall performance of the 2008 soil interim action was based on multiple lines of evidence, including PID measurements of vadose zone soils samples, concentration changes in vadose zone soil samples, and total mass removed by the SVE system (Ash Creek, 2011a). The results of the investigation indicated that while there were isolated pockets of high concentrations of VOCs, potentially indicative of residual non-aqueous phase liquid (NAPL) isolated in silt layers, the majority of soil mass in the source area experienced a decrease in PCE and TCE concentrations by 90 and 98 percent, respectively between 2006 and 2010.

3.12 Interim Action (2011)

Results of the 2010 confirmation sampling site investigation supported the success of the 2008 IA and provided the data needed to develop a work scope for continued interim action. As discussed in Section 1.0, NuStar submitted a *Draft FS* to Ecology on January 14, 2010 (Ash Creek, 2010). The FS included an evaluation of remedial alternatives and proposed a final cleanup remedy for the Facility. After review of the remedial alternatives, the FS summarized that additional bioremediation injections and an expansion of the 2008 SVE system would be an appropriate and protective final cleanup action for the Facility. Ecology delayed approval of the FS until further activities were completed to finalize the RI for the Facility. In August 2010, Ecology and NuStar agreed that it would be beneficial to the cleanup effort if NuStar implemented the proposed final cleanup action as an additional interim action, rather than waiting until the RI and FS were completed for the Facility. The *2011 Interim Action Work Plan* (IA Work Plan) was submitted to Ecology on November 30, 2010 detailing the proposed additional 2011 interim action (Ash Creek, 2011a; Appendix O). Ecology approved the IA Work Plan in an email on March 30, 2011 and the expanded (2011) interim action was implemented from July through October 2011. Approximately five months after the interim action was implemented, the *2011 Interim Action Evaluation Report* was submitted to Ecology, summarizing the expansion of the SVE system and startup activities, the enhanced bioremediation injections, and groundwater and SVE effluent monitoring results during the first five months of operation (Ash Creek, 2012b; Appendix P).

3.12.1 Enhanced Bioremediation Injections

The 2011 enhanced bioremediation application included the injection of an emulsified oil substrate at 155 injection points. The oil injections were completed from July 21 through August 31, 2011 in general accordance with the *2011 Interim Action Work Plan* (Ash Creek, 2011a). The selected bio-injection substrate was the EOS® electron donor, manufactured by EOS Remediation, Inc., of Raleigh, North Carolina. The sodium lactate in the solution stimulates microbial growth and rapidly produces anaerobic conditions in the subsurface. The bio-injection substrate was injected in the saturated zone over the depth

range corresponding to the Shallow Zone at the Facility. The layout of the 2011 enhanced bioremediation injections is provided in the 2011 Interim Action Evaluation Report (Ash Creek, 2011b) and is shown on Figure 9.

3.12.2 SVE System Expansion

The 2011 SVE system expansion, including installation of 34 additional SVE wells, trenching of pipe, connection to blower and treatment system, and plumbing and electrical control work, occurred from August 2 through October 6, 2011. Due to the logistics associated with installing SVE piping across (or underneath) Property railroad tracks, the expanded network was divided into two separate SVE systems with separate blowers, which are referred to as the "North" and "South" Systems. The North and South SVE systems began operations on October 10, 2011 and October 6, 2011, respectively. The 2011 SVE layout is detailed in the *2011 Interim Action Evaluation Report* (Ash Creek, 2012b) and is shown on Figure 10.

3.13 Northwest Area Investigation (2011)

At the request of Ecology, NuStar conducted an off-Property groundwater investigation to the northeast of the Facility from August 8 to 11, 2011. The investigation was conducted in accordance with the *Northwest Area Investigation Work Plan* (Ash Creek, 2011b; Appendix Q) and the *Addendum to the Northwest Area Investigation Work Plan* (Ash Creek, 2011c). Previous investigations had indicated that there was an off-Property source area located to the northwest of the facility. The hydrogeology and chemical distribution of VOCs at and near the northwest area supported that this off-Property source was not impacted by or otherwise associated with operations at the NuStar terminal (Ash Creek, 2010c).

Four boreholes (A through D) were installed during the investigation. Depth-discrete groundwater samples were collected from each borehole in Shallow Zone groundwater (temporary well screen between 32 and 35 feet bgs) and from Intermediate Zone groundwater (temporary well screen between 41 and 44 feet bgs). An additional groundwater sample was taken from borehole C at a depth of 52 to 55 feet bgs to compare to historical results from boring AGP-55 collected at that same location. The locations of the boreholes are shown on Figure 3 and the depth-discrete groundwater analytical results are provided in Table 5. On August 18, 2011, a monitoring well (MW-25i) was installed in borehole A with a screened interval in Intermediate Zone groundwater (50 to 60 feet bgs). On August 25, 2011, a monitoring well (MW-26) was installed in borehole D with a screened interval in Shallow Zone groundwater (27 to 42 feet bgs). Monitoring wells MW-25i and MW-26 were initially sampled on September 16, 2011, during the quarterly groundwater monitoring event at the Facility, and have been subsequently incorporated into the quarterly monitoring program. The location of wells MW-25i and MW-26 are shown on Figure 2. The investigation results were submitted to Ecology in the *Northwest Area Groundwater Investigation – Data Transmittal Letter* (Ash Creek, 2011d; Appendix R).

3.14 Deep Zone Groundwater Investigation (2011)

At the request of Ecology, NuStar submitted a *Revised Deep Zone Groundwater Investigation Work Plan* to Ecology on April 28, 2011, proposing the installation of a monitoring well in the Troutdale Formation for the purpose of vertically delineating dissolved-phase VOCs at the Facility (Work Plan; Ash Creek, 2011e; Appendix S). Ecology approved the Work Plan in a letter dated May 5, 2011.

The Deep Zone groundwater investigation was conducted from August 18 through September 1, 2011, in general accordance with the Work Plan (Ash Creek, 2011e). Depth-discrete groundwater samples were collected from a borehole at approximately 20-foot intervals from 90 feet to 210 feet bgs. Per consultation and approval from Ecology on August 29, 2011, monitoring well MW-24d was installed in the borehole with a screened interval from 210 to 230 feet bgs, in the upper portion of the Troutdale Formation. Monitoring well MW-24d was initially sampled on September 14, 2011 during the quarterly groundwater monitoring event at the Facility and is currently being sampled as part of the quarterly groundwater monitoring program. The location of monitoring well MW-24d is shown on the attached Facility Plan (Figure 2) and a soil boring and well construction log for well MW-24d is included in Appendix V. The deep groundwater investigation results were submitted to Ecology in the *Deep Zone Groundwater Investigation – Data Transmittal Letter* Ash Creek, 2011f; Appendix T).

3.15 Regional Groundwater Flow Evaluation (2010 – 2011)

A groundwater flow evaluation was conducted to determine the direction of groundwater flow in Intermediate Zone groundwater in the vicinity of the NuStar site. The evaluation was conducted in two phases as discussed in the sections below.

3.15.1 Summer 2010 Transducer Study

In June 2010, Ash Creek conducted an evaluation of regional Intermediate Zone groundwater flow using a combination of manually collected water levels and automated (via transducer) water levels. The original objective of the evaluation was to determine whether manually collected groundwater elevation data from NuStar could accurately be combined with transducer data from the Port to develop accurate representations of regional groundwater flow. During the 2010 study, transducers were installed in eight Intermediate Zone wells at the NuStar Facility and data were collected over approximately a 5-day period. The Port maintains a network of transducers in eighteen monitoring wells (17 in the Intermediate Zone; one in the Deep Zone) in order to monitor groundwater conditions in the general vicinity of the former SMC and Cadet Facilities. The NuStar and Port transducer data were combined to prepare regional groundwater potentiometric maps.

The results indicated that there was very little difference between regional groundwater flow maps that utilized solely transducer data with those that utilized a combination of manual and transducer data. The

results also indicated an area of flat gradient between the northern boundary of the NuStar Facility and the Port's monitoring well MW-33i (near the Port's interim-action air stripping area), with the predominant groundwater flow in the Intermediate Zone toward the Columbia River beneath the NuStar Facility. A regional map including the relative locations of the NuStar, SMC, and Cadet Facilities, as well as the location of the regional monitoring wells with transducers, is shown on Figure 8. The Summer 2010 Transducer Study was summarized in the Transducer Installation Work Plan that was submitted to Ecology on September 7, 2010 (Ash Creek, 2010d; Appendix U)..

3.15.2 2011 Annual Transducer Study

On September 17, 2010, a *Transducer Installation Work Plan* (Ash Creek, 2010d; Appendix U) was submitted to Ecology that proposed the installation of transducers in five monitoring wells at the Facility. Pressure transducers were installed in five Intermediate Zone groundwater monitoring wells at the NuStar Facility, including MW-19i, MW-21i-40, MW-22i, MW-23i and MW-24i, and recording of water level data was initiated on January 6, 2011. Data were collected and evaluated through January 6, 2012. The 2011 transducer data were combined with transducer data provided by the Port in order to evaluate groundwater gradient and groundwater flow on a regional basis. Additionally, groundwater elevation data for the region were correlated with 2011 river stage events (i.e., gradual and steep increases and decreases in river stage as well as periods of constant river stage), and 2011 river stage data were compared to historical river stage data. The methodology used to collect and evaluate the transducer data are summarized in the *Groundwater Flow Evaluation Report* that was submitted to Ecology on March 30, 2012 (Ash Creek, 2012a; Appendix C).

The conclusions from the groundwater gradient and river evaluations are summarized as follows:

- The annualized gradient from well MW-24i at the NuStar Facility to Port well MW-33i was 0.000095 ft/ft. However, to the northeast of the NuStar Facility there was a stagnation zone located between Port wells MW-32i and MW-33i with an annualized gradient of 0.000018 ft/ft in 2011.
- The river influence on groundwater gradient is significant near the river and rapidly decreases with distance from the river.
- A comparison of river stage events and average river elevations in 2011 to previous years supports that 2011 was not a typical year and that both the average river elevation and magnitude of river stage fluctuations were significantly larger than during typical years. Both the magnitude of river fluctuations and the overall height of the river elevation strongly influence hydraulic gradients in the Intermediate Zone, with the higher magnitude fluctuations and higher average river stage increasing the net landward gradient. In spite of this, the annualized net gradient of 2011 was extremely small and the area north of the Facility was essentially a stagnation zone. Therefore,

during more typical river stage years, the net gradient would be expected to be even flatter with little to no flow across the stagnation area.

3.16 Sediment Investigations (2011 – 2012)

In a letter dated August 25, 2010, Ecology requested that NuStar conduct a sediment impact study of Columbia River sediments adjacent to the Facility before the RI would be considered complete. An initial sediment investigation was conducted from November 7 through 8, 2011. The results of the first sediment investigation indicated that river sediments adjacent to the Facility were impacted with respect to VOCs. Two additional sediment investigations were conducted in July 2012 and in November 2012 to delineate the extent of VOC impacts to river sediments. The sediment sample locations are shown on Figure 12 and the sediment analytical data is summarized in Table 6. Sediment coring logs are provided in Appendix V. A summary of the three investigations is provided in the subsections below.

3.16.1 November 2011 Sediment Investigation

On October 12, 2010, Ash Creek submitted a *Sediment Sampling Work Plan* to Ecology proposing the collection of seven sediment cores in the Columbia River directly downgradient from the primary upland source area (Ash Creek, 2010e; Appendix W). On April 12, 2011, Ecology submitted a letter to NuStar with comments on the *Sediment Sampling Work Plan*. Comment responses and a *Revised Sediment Sampling Work Plan* were submitted to Ecology on May 12, 2011 (Ash Creek, 2011g; Appendix X). Ecology approved the revised work plan in a letter dated June 14, 2011.

The initial sediment sampling event was conducted from November 6 through 7, 2011 in accordance with the *Revised Sediment Sampling Work Plan* (Ash Creek, 2011b) and the appended Sampling and Analysis Plan (SAP). Sediment cores were collected using a vessel-mounted Vibracore from locations 1 through 4, 6 and 7; locations are shown on Figure 12. Sediment cores were advanced to refusal, which was typically 3 to 7 feet bgs. Analytical results from the sediment sampling event were submitted to Ecology in the *Sediment Investigation Results* letter on December 30, 2011 (Ash Creek, 2011h; Appendix Y).

3.16.2 July 2012 Sediment Investigation

The results of the November 2011 sediment investigation indicated that river sediments adjacent to the NuStar facility were impacted with respect to chlorinated VOCs. Ecology requested that NuStar prepare a work plan for additional sediment sampling to further delineate the extent of VOC impacts to river sediments. Pursuant to the 2012 *Additional Sediment Sampling Work Plan* (2012 Work Plan; Ash Creek, 2012c; Appendix Z), approved by Ecology in a July 2, 2012 email, a second sediment investigation was conducted from July 23 through 27, 2012. Sample cores were collected from locations A through G, as shown on Figure 12. The July 2012 investigation delineated the extent of VOCs in sediment along the NuStar property boundary to the south (towards center of the river channel) and to the southeast. Upon

receipt of the analytical data from the July 2012 sediment investigation, Ecology requested additional investigation to delineate sediment impacts in the river to the west of the NuStar Facility property boundary.

1,4-Dioxane has historically been used in industry as a solvent stabilizer, particularly for 1,1,1-TCA, which has been detected at the NuStar site. In addition to the analysis of HVOCs, Ecology requested that the sediment sample anticipated to have the highest HVOC impacts should also be analyzed for 1,4-dioxane. 1,4-Dioxane was analyzed from the sediment samples collected at Location C (Figure 12). The HVOC results for the Location C surface sample confirmed that this was, in fact, one of the most impacted sediment samples at the Site. 1-4-Dioxane was not detected in the Location C samples, indicating that any 1,4-dioxane that might have existed in groundwater beneath the upland areas of the NuStar Site had not migrated to river sediments.

3.16.3 November 2012 Sediment Investigation

In response to Ecology's September 11, 2012 email requesting additional sediment investigation to the west of the NuStar property boundary, NuStar submitted an *Addendum to the 2012 Work Plan* (Ash Creek, 2012d; Appendix Z). Pursuant to an Addendum to the 2012 Work Plan, an additional sediment investigation was conducted from November 12 through 16, 2012. Sample cores were collected from locations 8 through 12 using a vessel-mounted Vibracore unit as shown on Figure 12. Surface grab samples were also collected from locations 13 through 15 using a Van Veen grab sampler (Figure 12). Sediment cores were advanced to refusal, which ranged between 1 and 7.5 feet bgs.

Per the work plan (Ash Creek, 2012b), samples from locations 8 and 9 were initially submitted to the laboratory for analysis of HVOCs by EPA Method 8260. The analytical results were then compared to screening levels provided in the 2012 Work Plan (Ash Creek, 2012c). One or more VOCs were detected in the sediment samples; however, all concentrations were below the proposed screening levels. Per the 2012 Work Plan (Ash Creek, 2012c), if samples from Row I, locations 8 and 9, were below screening levels, then no other sample analysis was required. Results from locations 8 and 9 were below screening levels. Upon receipt of the sediment analytical results for locations 8 and 9, Ecology requested that samples from location 12 (in Row II) be analyzed, although they were not required per the work plan. NuStar agreed to analyze the additional samples collected from location 12. VOCs were not detected in the samples from location 12 and the sample investigation was deemed complete by Ecology in a December 17, 2012 email.

3.17 Vault Area Investigation (2011 – 2012)

On October 24, 2011, a subsurface vault was accessed at the terminal to facilitate the removal of two pipe valves associated with a 12-inch pipeline used to transport jet fuel (JP-8) from the Columbia River wharf to the NuStar Vancouver Annex Facility. The Annex facility is located approximately 1.75 miles to the north/northeast of the Terminal. The vault location is shown on Figure 3. In order to access the pipe valves,

the concrete base of the vault was removed, exposing the underlying soil. After removal of the concrete base, a construction worker noted a hydrocarbon odor and observed potentially hydrocarbon-impacted soil. A soil sample was collected and screened for VOCs using a PID. The PID measurement indicated a VOC concentration of approximately 200 parts per million vapor (ppmv). Soil and concrete materials were further excavated from the base of the vault and stored in drums. Approximately 3 feet of soil (the maximum extent feasible) were removed from underneath the pipe valves, resulting in a total excavation depth of approximately 14.5 feet bgs (equivalent to ten 55-gallon drums). A PID measurement from a soil sample collected at the base of the excavation indicated a total VOC concentration of approximately 2 ppmv. Groundwater was not encountered during the excavation activities, as depth to groundwater at the terminal varies seasonally and typically ranges from 22 to 32 feet bgs (Ash Creek, 2012e).

On November 1, 2011, a soil sample was collected from the base of the excavation and was analyzed for VOCs, total petroleum hydrocarbons – diesel range and heavy oil range by Method NWTPH-Dx (TPH-Dx), and polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270. After the construction maintenance was completed, the excavated portion of the vault was backfilled with clean soil and was re-paved with concrete.

The investigation results were summarized in the *Vault Excavation – Analytical Results Letter* (Ash Creek, 2012f; Appendix AA) that was submitted to Ecology on December 8, 2011. Soil analytical data are summarized in Tables 7 and 8. The TPH identified in soil during the investigation was that of a weathered (aged) jet fuel. The results of the soil investigation indicated that the jet fuel release was historical and not ongoing and that the limited residual impacted soil was effectively isolated from site groundwater. Because residual impacts of soil remained below the vault, with TPH-Dx concentrations exceeding the MTCA Method A Screening Levels, NuStar agreed to conduct additional investigation in the vicinity of the vault.

The original proposed scope of work for the additional investigation included the advancement of at least one soil boring in the vicinity of the vault to delineate the extent of soil impacts and for determining if the historical release resulted in any widespread impacts to groundwater. Due to an extensive network of buried and overhead utilities as well as two underground pipelines, there was no suitable boring location(s) within 75 feet of the vault. Consequently, in order to meet Ecology's request for additional investigation and demonstrate that residual soil impacts remaining below the vault had not migrated to groundwater, NuStar agreed to collect and analyze groundwater samples from the three monitoring wells located nearest the vault (MW-2, MW-6, and EW-1; Figure 2). On July 24, 2012, groundwater samples were collected from monitoring wells MW-2, MW-6 and EW-1 and were submitted for analysis of TPH-Dx and PAHs. A second groundwater monitoring event was conducted on September 13, 2012 to confirm the results of the July 24, 2012 sampling event. The groundwater investigation results were summarized in the *Vault-Area – Additional Investigation Results Letter* (Ash Creek, 2012g; Appendix AB) that was submitted to Ecology on October 25, 2012. Groundwater analytical results for the sampling event are summarized in Table 9. PAHs

and light diesel-range hydrocarbons, indicative of jet fuel, were not detected in the three groundwater samples collected in the vicinity of the vault.

3.18 Routine Groundwater Monitoring (1999 to 2012)

In general, groundwater has been monitored in on-Property wells on a quarterly schedule since 1999. As wells were installed during site investigations, they were typically incorporated into the monitoring program during the next quarterly event, although not every well was sampled during each quarterly event. In addition, several Port of Vancouver wells have been monitored (some by others) on a routine basis (MW-E, MW-F, MW-G, MW-30i, MW-31i, MW-32s, and MW-32i). A summary of historical sampling dates and analytical results is provided in Table 3.

Groundwater monitoring results have been reported in several semi-annual groundwater monitoring reports and are listed in the reference section of this RI Report. Due to the volume of the reports, groundwater monitoring reports are not included as appendices in this report. The most recent comprehensive groundwater monitoring report was prepared in August 2012 (Ash Creek, 2012e). The results of groundwater monitoring are included in Table 3.

4.0 Analysis of Chemical Fate and Extent

The purpose of the RI was to identify the hazardous substances that have been released to the environment as a result of historical site activities; to determine the nature, extent, and magnitude of hazardous substances in affected media; and to determine the direction and rate of migration of hazardous substances. A comprehensive review of historical investigations and relevant soil, soil vapor, sediment, and groundwater data for the Site were presented in Section 3, and relevant documents have been included in appendices.

4.1 Soil

Soil data are listed in Tables 1 and 2. The data were reviewed to identify:

1) source areas (e.g., areas where the chemical concentrations in vadose zone soil are such that their presence cannot be explained by the volatilization and adsorption from HVOCs in underlying groundwater);
2) chemicals of interest (COI);
3) COPCs;
4) the extent of COPCs and COI in site soil; and
5) whether the data are sufficient to complete the RA and the FS of remedial options.

Source Area. Known or potential source areas were targeted for soil sampling during previous investigations. Based on a review of historical site use information, three potential source areas were present at the Property (Ash Creek, 2006a). These three areas are shown on Figure 3. Targeted sampling was performed in and around these three areas, and the results demonstrated that the primary source area at the Property is the historical direct load area near the northwest corner of Warehouse 13 (Figure 3). The other potential source areas were assessed, and soil sampling has verified that these other areas are not source areas as defined above (Ash Creek, 2006a; Appendix K).

COI and COPC. VOCs detected at least once in vadose zone soil are considered COI and consist of:

- cis-1,2-DCE;
- 1,1-DCE;
- PCE;
- 1,1,1-TCA;
- TCE;
- Trans-1,2 DCE; and
- Vinyl Chloride.

Figure 13 shows an evaluation of the extent of COI in soil. The figure represents soil concentrations evaluated during a 2006 soil investigation, which was conducted prior to the 2008 and 2011 groundwater and vadose zone interim actions. To be conservative, these data were used to identify the COPCs at the Property. The maximum detected concentration for each COI was compared to MTCA Method B cleanup levels. COPCs were identified based on frequency of detection and relative risk (i.e., comparison of maximum concentration to screening level and comparison of magnitude of exceedance of screening level relative to other COI). Table 10 presents the results of that screening. Only PCE and TCE exceeded the screening level. Because it was identified as a COPC in groundwater, cis-1,2-DCE was also retained as a COPC in soil.

Nature and Extent. Prior to implementation of the 2008 and 2011 interim actions, the highest molar VOC concentrations were present near location AGP-22 in the former direct load area and locations AGP-28/AGP-29 along the railroad tracks in the former direct load area, as shown on Figure 13. The HVOCs in the vadose zone soil are predominantly PCE, with lesser concentrations of TCE and 1,2-cis-DCE (Figure 14). As shown on Figure 15, the extent of HVOCs (i.e., COI and COPCs) in soil is defined by chemical analytical results or the river and is confined to the Property. Therefore, soil at the Site is sufficiently characterized for the purposes of evaluating site risks and cleanup alternatives. Additionally, quality assurance reviews were completed for the soil chemical data (Ash Creek, 2006a) and the data were found to be suitable for risk assessment and feasibility study of cleanup alternatives.

NAPL has not been observed in the vadose zone during historical investigations at the Facility. As discussed in Section 3.11, a soil investigation was conducted in 2010 to evaluate the overall performance of the 2008 soil interim action. The results of the investigation indicated that the bulk of the VOCs had been removed from the coarse soils, which is the predominant soil type of the vadose zone, but isolated pockets of high concentrations of VOCs, potentially indicative of limited residual NAPL, remained in isolated silt layers within the vadose zone of the source area (Ash Creek, 2011a). At the time of the 2010 soil investigation, 1,900 pounds of VOC mass had been removed from the source area by SVE. The 2010 investigation supported that the majority of the VOC mass had been removed within the SVE operational area. SVE has been ongoing since the 2010 investigation, and the SVE system was expanded in 2011 to cover a larger area of influence. Since the 2010 soil confirmation event, SVE has removed an additional 2,300 pounds of VOC mass from the source area.

4.2 Groundwater

Groundwater data are listed in Tables 3, 4, and 5. The data were evaluated to identify COI and COPCs; the extent of COPCs in Shallow and Intermediate Groundwater Zones; and concentration trends.

COI and COPCs. VOCs detected one or more times in groundwater were considered to be COI and are listed in Tables 3 and 5. The maximum detected concentration for each COI was compared to the MTCA Method B cleanup levels and ecological effects-based concentrations. COI that exceeded the screening levels were then evaluated for frequency and magnitude of detection (as done for soil) to assess whether the chemical may present a potential concern.

Table 10 shows the results of the comparison of the COI in groundwater to screening levels. COI that exceeded screening levels consisted of:

- 1,1-DCA
- 1,2-DCA
- cis-1,2-DCE
- trans-1,2-DCE
- 1,1-Dichloroethene (1,1-DCE)
- PCE
- TCE
- Vinyl Chloride
- Chloroethane
- 1,1,1-TCA
- Benzene
- Bromoform
- Chloroform
- Dibromochloromethane
- 1,2-Dibromoethane
- 1,2-Dichloropropane
- cis-1,3-Dichloropropene

Of these COI, many are limited in extent, are infrequently detected, or are detected at low concentrations relative to the other COI, as follows:

- Benzene has not been detected in monitoring well samples. It has only been detected in grab samples from borings and at low concentrations relative to other COPCs (Table 5).
- Bromoform, dibromochloromethane, 1,2-dibromoethane, and cis-1,3-dichloropropene have been infrequently detected (from 1 to 13 times out of nearly 900 events), and none have been detected since 1999.
- Chloroform, chloroethane, trans-1,2-DCE, and 1,2-dichloropropane were detected at low concentrations relative to their screening levels and as compared to other COI (Table 1).

Based on this evaluation, benzene, bromoform, chloroethane, dibromochloromethane, 1,2-dibromoethane, cis-1,3-dichloropropene, trans-1,2-DCE, and 1,2-dichloropropane are not considered COPCs. The COPCs in groundwater are:

cis-1,2-DCE	1,1-DCA
1,1-DCE	1,2-DCA
PCE	Chloroethane
TCE	1,1,1-TCA
Vinyl Chloride	

Nature and Extent. Consistent with WAC-173-340-708(2), a further evaluation was conducted to identify "indicator COPCs" to assist in defining the extent of the Site. The indicator COPCs were identified by evaluating the relative risk of each of the COPCs as represented by the ratio of the maximum detected concentration to the Method B cleanup level. The relative risk ratios are listed in Table 10. As can be seen from Table 10, PCE, TCE, and vinyl chloride account for greater than 95.9 percent of potential risk relative to the other COPCs in groundwater (based on human health screening). Although cis-1,2-DCE is not a risk driver, it is the daughter product of TCE and breaks down to form vinyl chloride. Therefore, these four COPCs represent the primary COPCs. Vinyl chloride is detected within or near the source area at the Property but is not detected widely outside the source area or within the Intermediate Zone groundwater. The other primary compounds are more widely detected and better represent the extent of groundwater containing HVOCs originating from the Property. Therefore, PCE, TCE, and cis-1,2-DCE were used as the indicator compounds for assessing extent.

Shallow Zone Groundwater: Figures 16 through 18 show isocontours of PCE, TCE, and cis-1,2-DCE in Shallow Zone groundwater, respectively for March 2008 and end of 2012. As can be seen from the figures, the HVOCs have been and continue to be generally confined to the Property in the Shallow Zone. There is an off-Property source of HVOCs beneath the former Carborundum ponds and another off-Property source to the northwest of the Facility. Neither is associated with operations at the Property; however, both are attenuating naturally, based on the comparison of concentrations and extent between 2008 and 2012 data.

As can also be seen by the figures, there has been a significant reduction in Shallow Zone VOC concentrations since implementation of the 2008 and 2011 groundwater interim actions.

Figure AB-17 contained in Appendix AC shows concentration depth profiles across the Property using depth-discrete groundwater data from the 2006/2007 groundwater investigations. With the exception of AGP-29, located in the source area, the total molar chloroethene concentrations increase with depth to about 45 feet bgs. The concentrations then drop significantly between 45 and 55 feet bgs to consistently low levels at depths of 55 feet and greater. The drop in concentration corresponds to the occurrence of the silty gravel unit at depths between 45 and 50 feet bgs across the Property (see the geologic cross-section shown on Figure 4). Water samples collected below the contact with the silty gravel unit (i.e., within the Intermediate Zone groundwater) had chloroethene concentrations generally one to two orders of magnitude lower than the Shallow Zone groundwater concentrations.

Appendix AD contains concentration trend plots for COPCs on both a mass and molar basis. Plots are included for the indicator COPCs (i.e., PCE, TCE, vinyl chloride, and cis-1,2-DCE). As can be seen on the trend plots for Shallow Zone wells, VOC concentrations are decreasing in the wells with just one exception, well MGMS1-43. For well MGMS1-43, the overall concentration trend for PCE and TCE is flat, but concentrations have been steadily decreasing since the 2008 interim action was implemented. Steeply decreasing trends are observed in wells within the source area. The average concentration in the source area, as defined by wells MW-7, MW-9, MW-12, MGMS1-40, and MGMS2-40, has decreased significantly between the pre-interim action monitoring event (March 2008; Appendix AB) and the most recent interim action monitoring event (December 2012; Figures 16 through 18). The average source area concentration of PCE decreased from 6,033 µg/L in March 2008 to 65.8 µg/L in December 2012. The average source concentrations of TCE and cis-1,2-DCE decreased from 824 µg/L and 2027 µg/L in March 2008 to 102 µg/l and 1270 µg/L in December 2012, respectively. Total molar trend plots for source area wells (MGMS2-40, EX, MP-1, and MW-7) show strong decreasing trends since implementation of the interim actions, further supporting the success of the interim actions within the source. The use of total molar concentrations allows an assessment of changes in the total number of related contaminant molecules as the reductive dechlorination process transitions from the relatively heavy PCE to the progressively lighter TCE, DCE, and vinyl chloride. Total molar ethene concentrations have decreased in wells MW-7 and MP-1. The isolated instances of increases in COPC concentrations are likely related to the result of degradation of previously unavailable contamination, such as from VOCs sorbed onto soil, which may have been mobilized during the oil injection process.

The extent of detectable concentrations of COPCs in Shallow Zone groundwater is limited to the Property boundary on the north/northeast and is generally within about 100 feet of the Property on the east and southeast sides of the Property. The extent to the west is about 200 feet from the Property boundary and is limited to an isolated area surrounding monitoring wells MW-26 and MW-14.

Intermediate Zone Groundwater: As discussed above, HVOC concentrations are one to two orders of magnitude less in the Intermediate Zone groundwater relative to Shallow Zone groundwater due to the presence of the silty gravel layer beneath the Shallow Zone in the central and southern portions of the Property and the silt ridge at the northern Property boundary. Figures 19, 20, and 21 show the current extent of PCE, TCE, and cis-1,2,-DCE, respectively, in Intermediate Zone groundwater. As shown on the figures, current maximum concentrations of PCE, TCE, and cis-1,2-DCE in the Intermediate Zone monitoring wells at the Property are 74, 53, and 120 µg/L, respectively. Figures 22, 23, and 24 show 2008 isocontours of PCE, TCE, and cis-1,2,-DCE, respectively, in Intermediate Zone groundwater. Maximum concentrations of PCE, TCE, and cis-1,2-DCE in the Intermediate Zone in 2008 were 126, 136, and 166 µg/L, respectively. Comparison of Figures 19 through 21 with Figures 22 through 24, illustrate the reductions in Intermediate Zone VOCs since the submittal of the Draft RI report in 2008.

Long-term monitoring demonstrates that the extent of COPCs is stable or attenuating. With significant reductions in Shallow Zone VOCs in response to the 2008 and 2011 groundwater interim actions, the mass of VOCs present in shallow groundwater available to migrate to Intermediate groundwater has been reduced, as reflected by the consistently decreasing Intermediate Zone CPOC concentration trends. The concentration trend plots (Appendix AD) show that overall COPC trends are downward in most wells. Exceptions are the Intermediate Zone MGMS2 well ports (-60-, -110- and -132-foot depths). VOC concentrations in groundwater from the three MGMS2 Intermediate Zone ports exhibit flat PCE and TCE concentration trends; however, the trends have been decreasing since the 2011 interim action. The 2011 interim action was expanded (relative to the 2008 interim action) to include treatment of groundwater in the vicinity of MGMS-2. With the significant reduction in Shallow Zone COPC mass, concentrations of COPCs in Intermediate Zone groundwater are expected to continue to decrease, resulting in overall decreasing concentrations trends for the MGMS2 Intermediate Zone sampling ports.

While the data support that the source of impacts to the intermediate zone groundwater beneath the NuStar leasehold is the "contaminant-containing" shallow zone, there are other shallow groundwater sources that could also be evaluated as potential sources to intermediate zone groundwater. These include the source areas at the Swan, Cadet, Former Carborundum ponds, and the off-site area to the immediate northwest of the NuStar leasehold boundary. Given the predominant north/northeast groundwater flow direction in the shallow zone to the north of the groundwater divide at the NuStar facility, it is highly unlikely that intermediate zone groundwater impacts at the NuStar Facility are sourced from the Swan or Cadet source areas. For the same reason, it is also unlikely that the shallow groundwater in the Carborundum ponds areas is acting as a source to intermediate zone groundwater beneath the NuStar facility. While it is possible that there has been commingling between the shallow plume in the Carborundum ponds area and the shallow plume at the NuStar facility, it is also unlikely that intermediate zone groundwater impacts from the NuStar facility are sourced from the Carborundum ponds source area. Intermediate Zone groundwater beneath the source area to the northwest of the NuStar facility has been analyzed for HVOCS and the

results have consistently been non-detect. Therefore, it is also unlikely that the northwest source area is acting as a source to intermediate zone groundwater beneath the NuStar leasehold.

Deep Zone Groundwater: Monitoring well MW-24d is screened in the Deep Zone (i.e., Troutdale Formation) and directly below the primary source area at the Site. Groundwater samples collected at that location within the Troutdale Formation do not indicate detectable concentrations of HVOCs.

This is consistent with data from multi-port (MGMS) wells near the Warehouse 13 source area. Data from these wells indicate that PCE and TCE decrease significantly with depth. For example, the concentrations of PCE and TCE have been shown to decrease by two orders of magnitude between the shallow (40 feet bgs) and deepest (132 feet bgs) groundwater at the Site. Based on these strong decreases in concentration with depth, the fact that the Intermediate Zone is more conductive than the Troutdale Formation (i.e., groundwater will move laterally through the Intermediate Zone rather than vertically into the Troutdale Formation), and direct evidence that there are no detectable concentrations in the Troutdale below the source area, it is highly unlikely that there are any impacts to Deep Zone groundwater at the Property (Ash Creek, 2011f; Appendix T). There is no rationale to support that there are impacts to the Troutdale beneath the NuStar facility, even in the areas that have not been directly sampled.

NAPL: NAPL has not been observed in groundwater during historical investigations at the Site. The majority of the monitoring wells within and around the source area are screened to the depth of the top of the silty gravel layer that separates the Shallow and Intermediate groundwater zones beneath the NuStar facility. If NAPL were present in groundwater at the Facility, it would likely be present at the top of the silty gravel layer separating the Shallow and Intermediate Zone groundwater. Monitoring wells MW-5, MW-7, and MW-9 located west, within, and east of the source area, respectively, are all screened to a depth of 40 feet below grade, the approximate depth to the silty layer in this area. The depth to the silty layer increases towards the river, and this is reflected in the screened depths of wells EX and MW-19, which are screened to depths of 44 feet and 45 feet below grade, respectively. Well EX is located within the source area and monitoring well MW-19 is located directly downgradient of the source area. NAPL was not observed during either the installation or up to 19 years of routine monitoring at wells MW-5, MW-7, MW-9, EX, and MW-19, indicating that NAPL is not likely present in groundwater in the source area. Furthermore, there is a two-order-of-magnitude decrease in VOC concentrations between groundwater in the Shallow Zone and the Intermediate Zone, which supports that there is very little likelihood that NAPL is present in the silty gravel.

4.3 Vault Area

Source Area. As discussed in Section 3.1.7, jet fuel impacts were observed in an isolated area of soil beneath a vault that houses a pipeline and associated pipeline valves. Soil and groundwater investigation in

the vicinity of the vault indicate that a historical jet fuel release was isolated to a small area beneath and in the immediate vicinity of the vault. The vault area source is shown on Figure 3.

COI and COPC. After visually impacted soil was removed from the base of the vault, one soil sample was collected from the recently excavated vault floor and was analyzed for VOCs, PAHs, and TPH-Dx. Chemicals detected at least once in vadose zone soil in the vault area are considered COI and consist of:

- Acenaphthene
- Acenaphthylene;
- Anthracene;
- Benzo(a)anthracene;
- Benzo(b)fluoranthene;
- Benzo(k)fluoranthene;
- Benzo(b)fluoranthene
- Benzo(a)pyrene;
- Benzo(g,h,i)perylene;
- Chrysene;
- Dibenz(a,h)anthracene;
- Fluoranthene;
- Fluorene;
- Indeno(1,2,3-c,d)pyrene;
- Naphthalene;
- Phenanthrene;
- Pyrene;
- 2-Methylnapthalene;
- Dibenzofuran; and
- TPH-Dx.

As discussed in previous document submittals to Ecology (Ash Creek, 2010a), the Terminal is an industrial property, as defined by the MTCA. To evaluate potential human health risks associated with residual petroleum hydrocarbons in soil beneath the vault, the detected concentrations of chemicals of concern were compared to MTCA Method A cleanup levels for Industrial Land Use. The Total Toxicity Equivalent Concentration (TTEC) for the carcinogenic PAHs was less than the corresponding Method A cleanup level (2.0 milligrams per kilogram [mg/kg] for the reference chemical, benzo(a)pyrene). TPH-Dx concentrations, however, exceed the Method A screening level of 2,000 mg/kg. Therefore, TPH-Dx has been retained as a COPC associated with the vault source area.

Nature and Extent. As discussed in Section 3.1.7, the network of buried and above ground utilities and pipelines prohibited additional soil sampling in the vicinity of the vault. Based on visual inspection at the base of the vault and groundwater data from the surrounding area, the extent of the soil impacts does not likely extend past the footprint of the vault. Furthermore, the laboratory TPH-Dx chromatogram and high molecular weight-biased PAH concentrations were indicative of a weathered jet fuel. The lack of jet-fuel-range hydrocarbons in vault-area groundwater samples further supports that the jet fuel soil impacts were both aged and isolated and had not resulted in widespread impacts to groundwater. Based on these findings, the estimated extent of TPH-Dx impacted soil is the footprint of the vault, as shown on Figure 3.

TPH-Dx concentrations exceed the Method A screening level of 2,000 mg/kg. However, the cleanup levels for Industrial Land Use assume the potential for frequent direct contact by on-site workers. Realistically, the potential for direct contact exposure with impacted soils is very low, as the soils are located approximately 15 feet below ground surface and can only be accessed when performing subsurface work below the vault. Therefore, the slight exceedance of the TPHd concentration above Method A levels will not present an unacceptable health risk to site workers. Because the historical jet fuel release is limited to a small isolated portion of the Property, there is no soil direct contact risk for site workers, and groundwater is not impacted with respect to jet fuel, these isolated impacts are not considered a source area and have not been retained for further risk evaluation.

4.4 Sediments

Sediment data are summarized in Table 6. Sediment investigation data were reviewed to identify source information (i.e., verify that VOC concentrations in sediment could adequately be explained by migration of impacted groundwater to sediments), select COI and COPCs, evaluate the extent of COPCs, and confirm whether or not the data are sufficient to update the RA and prepare the FS of remediation options.

Source Information. Figure 12 shows the approximate extent of VOC impacts to river sediments. Sediment data are presented for the uppermost samples collected (typically the mudline and first subsurface sample) as this definition of "sediment" is consistent with the Draft Sediment Management Standards (SMS) Rule Proposed Amendments (Ecology, 2012) and is representative of the portion of the river channel where "humans or biota may be exposed". The magnitude and distribution of sediment impacts suggests that river sediments were directly impacted from the migration of upland impacted groundwater. As evaluated in the risk assessment (Ash Creek, 2008b) and in the updated risk assessment (Section 5), VOC exposure point concentrations (EPCs) in upland groundwater concentrations were used to estimate potential impacts to river sediments using the three phase partitioning model in WAC 173-340-747(4) and (5). The modeled impacts to sediments from groundwater were consistent with the sediment data collected during investigations in 2011 and 2012.

COI and COPC. VOCs detected one or more times in sediment were considered to be COI and are listed in Table 6. The maximum detected concentration was compared to ecological effects-based screening level concentrations (Table 6 and discussed in Section 5.4).

COI that exceeded screening levels consisted of:

1,1-DCA	PCE
cis-1,2-DCE	TCE
1,1-Dichloroethene (1,1-DCE)	Vinyl Chloride

Because each of the sediment COI were included in the list of COPCs for groundwater, and the sediments are understood to be directly and solely impacted by groundwater, the full list of COI were retained as COPCs in sediments. Using the same rationale as for soil and groundwater (Sections 4.1 and 4.2, respectively), four indicator compounds were used to evaluate the extent of sediment impacts, and include: PCE, TCE, cis-1-2 DCE, and vinyl chloride.

Nature and Extent. As shown on Figure 12, the extent of COPC impacts above risk-based screening levels is limited to a rectangular area extending approximately 800 feet along the southern Property boundary and approximately 150 feet riverward from the Property boundary. Locations denoted as Shallow Zone sediment sampling locations were collected at depths where Shallow Zone groundwater intersects river sediments and locations denoted as Intermediate Zone sediment sampling locations were collected from depths where Intermediate Zone groundwater intersects river sediments. Similar to the one to two order magnitude decrease in groundwater concentrations between the Shallow and Intermediate Zone groundwater, impacts to sediments in contact with Intermediate Zone groundwater are generally a half to one order of magnitude less than in sediments in contact with Shallow Zone groundwater (for example, PCE concentrations at locations "C" and "7" and locations "2" and "6").

The most impacted sediments (locations "C" and "3") are located directly downgradient from the primary source area at the Facility. The extent of sediment impacts to the west/northwest and east/southeast are also well delineated and generally correlate with the northwest-southeast boundaries of the Shallow Zone groundwater plume at the Site.

A cross-section perpendicular to the shoreline and bisecting monitoring wells MW-7, MW-12 and MGMS2 is provided on Figure 25. Site lithologic units are extended to the shoreline and are assumed to be consistent with the geology along the southern (riverward) leasehold boundary. Sediment logs for sample locations "3" and "7" are extrapolated onto the cross section to visualize the sampling locations relative to Shallow and Intermediate Zone groundwater, respectively. The Shallow Zone sediment concentrations are consistent with the existing site conceptual model that shallow groundwater beneath the NuStar terminal flows towards the river. The lower concentrations of HVOCs in sediments in contact with Intermediate Zone groundwater (relative to sediments in contact with Shallow Zone groundwater) cannot be attributed solely to lower groundwater concentrations in Intermediate Zone groundwater. The conceptual site model for impacts to sediments is rather complex and must take into account Intermediate Zone groundwater flow direction as well as the relative starting concentrations in the Intermediate Zone relative to the Shallow Zone. As summarized in the Groundwater Flow Evaluation Report (Ash Creek, 2012a), Intermediate Zone groundwater flow is bi-directional in response to changes in Columbia River stage. At times, Intermediate Zone groundwater flow is towards the river and at those times groundwater flow has the potential to impact river sediments. Because of the reduced concentrations and limited riverward groundwater flow, it is anticipated that sediment impacts adjacent to the Intermediate Zone would be less than the impacts on sediments adjacent to the shallow zone.

Surface sediment samples collected from Locations 6 and 7 are inconsistent with the proposed conceptual model. PCE concentrations at these two locations are elevated above 1 mg/kg and are higher than other sediment samples taken from sediments in contact with Intermediate Zone groundwater. It is possible that these samples were actually collected from the transition zone between Shallow and Intermediate groundwater, and were not collected from a location that was solely in contact with Shallow Zone groundwater. The precision of the sample location is based on several assumptions, most importantly that the Shallow/Intermediate Zone contact extends from the boring location closest to the shoreline (AGP-12/AGP-40) to the shoreline at a uniform depth-to-contact. If there is variability in the depth to Shallow/Intermediate Zone contact, than samples intended to be taken from the Intermediate Zone may actually be sampled from the lower portions of the Shallow Zone. Furthermore, there are inherent difficulties in physically collecting a sediment sample from a desired depth. In order to locate a desired sediment surface elevation, the sampling vessel is positioned using river bathymetry maps. The sediment surface elevation is confirmed by adding the river surface elevation (based on tide tables) to the depth to mudline. The river surface elevation fluctuates in response to tides as well as vessel wake, etc. All of these factors limit the precision of a sample's vertical position. However, despite these precision limitations, the majority of the sediment data that were collected fit within the existing conceptual model for the Site.

5.0 Baseline Risk Assessment Update

Since completion of the baseline risk assessment (BRA) in 2008 (Ash Creek, 2008b), new information is available that are relevant to the results of the BRA. The new information includes the following.

- In 2011, EPA updated human health toxicity criteria for TCE;
- In 2012, EPA updated human health toxicity criteria for PCE;
- Since 2008, interim cleanup actions have reduced soil and groundwater concentrations of chemicals of concern;
- Sediment sampling has been completed providing directly measured concentrations of chemicals in sediment; and
- Ecology is in the process of revising its Sediment Management Standards.

The following sections summarize the results of the BRA and update the conclusions of the BRA based on this new information.

5.1 Summary Results of 2008 Baseline Risk Assessment

The final BRA was submitted to Ecology in September 2008 (Ash Creek, 2008b). Ecology found the BRA to be complete and satisfactory (Ecology, 2009). The following summarizes the results of the BRA.

Human Health

- Non-carcinogenic risk above acceptable levels resulted from cis-DCE. Unacceptable risk resulted from vapor intrusion from soil and groundwater. These risks were confined to the Property and are being mitigated by the ongoing interim actions. Future baseline risk also resulted from the drinking water pathway. Water is not currently used for drinking water in the area impacted by cis-DCE.
- Carcinogenic risk above acceptable levels resulted from PCE, TCE, vinyl chloride, and 1,2-DCA. Greater than 99 percent of the risk resulted from PCE and TCE. The potential for unacceptable risk resulted from inhalation of vapors (both indoor and outdoor on the Property; indoor only off the Property) from soil and groundwater. The potential for unacceptable off-Property risk resulted from groundwater only and was limited to a very small area that is currently a paved outdoor area. On-Property risks are being mitigated by the ongoing interim actions. Future baseline risk also resulted from the drinking water pathway (based both on concentrations in groundwater and potential leaching from soil). Water is not currently used for drinking water in the area impacted by chemicals of concern.
- Based on limited potential for exposure, human health risks from surface water and sediment were considered to be negligible.

Ecological

- The Site is within an industrial area, is generally covered with buildings and pavement, and has little or no habitat. The Site therefore meets the requirements of WAC 173-340-7491(1) and a terrestrial ecological risk evaluation was not required.
- At the time of the BRA, there was no sediment or surface water data available. Potential risks were identified based on soil and groundwater data and the use of analytical models to predict sediment and surface water concentrations at the biologically active zone (assumed to be within the upper foot of sediment). 1,1-DCA; cis-DCE; PCE; and TCE were estimated to potentially exceed effects-based concentrations in surface water or sediment at the groundwater/surface water interface.

5.2 Updated TCE and PCE Toxicity Criteria

The revisions to the TCE and PCE toxicity criteria result in increases in the corresponding human health cleanup levels as calculated for the BRA. Table 11 lists the toxicity criteria and calculated cleanup levels from the BRA together with the revised values. For direct contact and ingestion pathways, PCE cleanup levels increased by a factor of 260 and TCE cleanup levels increase by a factor of 8.7. For inhalation

pathways, cleanup levels increased by factors of 23 and 28 for PCE and TCE, respectively. Based solely on the revisions to cleanup levels, the following summarizes the changes to baseline risks.

- The BRA identified the potential for unacceptable risk for the outdoor air pathway. Following revisions to the toxicity criteria, the outdoor air pathway is acceptable.
- For individual chemicals, excess lifetime cancer risks (ELCR) for pathways with unacceptable risk decreased by the same factors as the changes in toxicity criteria listed above. For pathways with multiple chemicals, risk reductions vary, summarized as follows.
    - Vapor Intrusion – Except for groundwater vapor intrusion on the Property, ELCR decreased by a factor of 25, consistent with the changes in cleanup levels for PCE and TCE. The presence of vinyl chloride (that did not have a change in cleanup level) in groundwater on the Property resulted in the groundwater vapor intrusion ELCR decreasing by a factor of only 13.
    - Drinking Water – Drinking water ELCR are dominated by vinyl chloride and/or TCE, so ELCR for the drinking water pathway decreased by a factor of 10 to 20.
    - Leaching to Groundwater – This pathway was dominated by PCE, so the ELCR decreased by a factor of 230.

5.3 Effect of Interim Actions on Risk Levels

EPCs for the BRA were calculated based on data collected up until 2008. Since 2008, interim actions were implemented to address soil and groundwater within the source area. These actions have reduced concentrations of chemicals of concern and therefore, current risks have been reduced relative to the BRA. The following sections describe impacts that concentration reductions have on risk estimates from the BRA.

Soil. For soil, the BRA evaluated baseline risks resulting from the presence of cis-DCE, TCE, and PCE. In 2010, four soil borings were completed within the interim action area to assess reduction in soil concentrations at that time. Conceptually, a one-to-one comparison of historical data with the 2010 data would provide an estimate of the concentration reduction. This approach is complicated in practice by small-scale spatial variability in chemical concentrations in soil. Therefore, the following is a semi-quantitative assessment of the impact of the SVE system on baseline risks from soil.

- Non-carcinogens (cis-DCE) – cis-DCE was infrequently detected so the BRA EPC for the reasonable maximum exposure defaulted to the maximum detected value. The maximum detected concentration was in a sample collected from IN-2 that is outside of the SVE influence area. Therefore, the EPC (and corresponding non-carcinogenic baseline risk) under the assumptions of the BRA would be unchanged by the interim action.
- Carcinogens (TCE and PCE) – Three soil borings from 2010 were co-located with borings completed prior to the SVE interim action for a total of five co-located samples. Table 12 lists the TCE and PCE data from these samples. Variation between the two data sets will result from

primarily two factors: random variation (increase or decrease) associated with samples being not precisely co-located and decreases associated with operation of the SVE system. From this, it can be predicted that concentrations may increase or decrease, but there should be more decreasing results. Additionally, as the number of samples increases, the probability of at least one sample set being co-located increases. This implies that the lowest calculated decrease in concentration for a co-located pair is a conservative predictor of the typical concentration decrease resulting from operation of the SVE system. Comparison of the results in Table 12 shows that four of the five samples exhibit a decrease in concentrations. The concentration decreases range from 85 percent to nearly 100 percent. Therefore, as of 2010, EPCs in the SVE area had decreased by a factor of seven or more. Because the exposure area used in the BRA was larger than the source area treated with SVE, overall risk reductions compared to the BRA would be somewhat less than a factor of seven because concentrations outside of the SVE area would not be expected to have decreased as much as within the treated area.

Groundwater. For groundwater, baseline risks were estimated using data from the three-year period from 2005 to 2008. Due both to natural long-term downward trends and the groundwater interim action, groundwater concentrations have decreased significantly since 2008. Using the methods for calculating EPCs consistent with the BRA (Ash Creek, 2008), EPCs were updated based on the more recent data. Calculations are presented in Appendix AE. The data sets were updated to include wells installed since 2008, and only data from the last three years (2010 through 2012) were used. Tables AE-1 through AE-4 in Appendix AE list the data used in the calculation. Output from the statistical analysis of the data is included in Appendix AE. Groundwater EPCs from the BRA and the updated calculations are listed in Table 13 for the chemicals and pathways with the potential for unacceptable risk as identified in the BRA.

For individual chemicals, risks change in direct proportion to changes in EPCs. The following summarizes the changes in risk corresponding to pathways with unacceptable risk in the BRA.

- Non-carcinogens (cis-DCE) – EPCs of cis-DCE decreased by a factor of 9 in shallow groundwater and a factor of 2 in shallow/intermediate groundwater combined.
- Carcinogens (1,2-DCA, PCE, TCE, and vinyl chloride) – EPCs for chemicals of concern decreased by factors of 1.1 to 28 in groundwater. The largest groundwater decrease was for 1,2-DCA, and as a result, 1,2-DCA would no longer result in unacceptable risk. Groundwater EPCs for PCE, TCE, and vinyl chloride decreased by factors of 1.1 to 9. Relative to the BRA, corresponding risk reductions are in the range of three or less.

5.4 Sediment/Surface Water Ecological Risks

Requirements for cleanup of sediments are defined by the SMS under WAC-173-204. Ecology is currently revising the SMS, and the final draft was posted for public review and comment in August 2012. The SMS

revisions are scheduled for adoption in 2013. The draft revisions include the addition of quality standards for freshwater sediments, but the revisions do not include quality standards for chlorinated solvents. Therefore, screening levels for sediments were assessed from published effects-based concentrations for aquatic organisms, as compiled in the Risk Assessment Information System (RAIS) of the Oak Ridge National Laboratory (ORNL) and the Dutch target and intervention screening levels for organics in sediments, as summarized in the NOAA Screening Quick Reference Tables (SQuiRTs). See the work plan for the second round of sediment sampling (Ash Creek, 2012c) for the compilation of published effects-based concentrations and selection of screening levels.

Surface sediment data from Table 6 are compared to the screening levels in Table 14. The following chemicals were detected at least once above the "no effects" sediment screening levels: 1,1-DCA; cis-DCE; PCE; TCE; and vinyl chloride. 1,1-DCA and vinyl chloride exceeded the "no effects" screening level in only one sample, each by a factor of four. PCE, TCE, and cis-DCE exceeded the "no effects" screening level in three to eight samples by factors of 14 to 26. Although these results appear to differ somewhat from the BRA, there is actually good agreement. The BRA was based on reasonable maximum exposure average concentrations in groundwater along the shoreline. The screening discussed above is based on the maximum detected concentration in sediment. Additionally, the screening levels for cis-DCE and vinyl chloride used in Table 14 are lower than were used in the BRA. If the BRA used the maximum shoreline groundwater concentrations and the same screening levels, the list of chemicals exceeding the "no effects" screening levels would be the same as resulted from the sediment sampling.

Using measured sediment concentrations and the partitioning equations from WAC 173-340-747(4), 1,1-DCA, cis-DCE, PCE, and TCE are predicted to exceed effects-based concentrations in surface water at the groundwater/surface water interface. This is consistent with the BRA.

5.5 Summary Updates to Baseline Risk Assessment

The following summarizes updates to the BRA based on the new information since completion of the BRA.

Human Health

- Non-carcinogenic risk resulting from cis-DCE vapors would decrease by factors of 3 to 9 relative to the BRA. Future baseline risk resulting from the drinking water pathway would decrease by a factor of 2 relative to the BRA.
- Outdoor air would no longer be a pathway of concern.
- The BRA identified PCE, TCE, vinyl chloride, and 1,2-DCA as chemicals of concern. Based on current data, 1,2-DCA is no longer a chemical of concern. In the updated estimates, PCE and TCE still account for the vast majority of the risk (over 95 percent of overall risk), but for groundwater pathways (vapor intrusion and drinking water), vinyl

chloride would account for 70 to 90 percent of the risk. Except for leaching to groundwater, which decreased by a factor of 700, specific pathway and overall risks decreased by factors in the range of 10 to 100 relative to the BRA.

Ecological

- Estimates of potential ecological risk using sediment data were generally consistent with the BRA estimates. Measured sediment concentrations were generally higher than predicted in the BRA, but most of the difference resulted from use of average groundwater concentrations in the predictive model.

6.0 Summary and Conclusions

The RI for the Site included chemical analysis of up to 202 soil samples, 57 river sediment samples, and 45 rounds of groundwater sampling and analysis for HVOCs, collected over a period of 19 years. These data are of sufficient quality for use in BRA, FS, and cleanup level determination. A screening of the chemical data was completed to identify COPCs (soil and groundwater) at the Site, which are listed below.

cis-1,2-DCE	1,1-DCA
1,1-DCE	1,2-DCA
PCE	Chloroethane
TCE	1,1,1-TCA
Vinyl Chloride	

A groundwater divide is present in the Shallow Zone. The groundwater divide and silt ridge at the northern Property boundary have limited migration within the Shallow Zone, effectively isolating HVOCs in Shallow Zone groundwater to the Property and slightly west of the Property. The silty gravel layer underlying the Shallow Zone beneath the Property has limited vertical migration, as evidenced by the one-to-two-order-of-magnitude decrease in concentrations in the Intermediate Zone groundwater beneath the Property relative to the Shallow Zone.

A BRA was completed in 2008 and updated for this report. The updated BRA concluded that the potentially complete exposure pathways that may pose unacceptable risk are limited to indoor air at the Property in the source area, Columbia River sediments adjacent to the source area at the Property, and use of Intermediate Zone groundwater for domestic purposes (e.g., drinking water).

Several interim actions have been conducted at the Property, including two rounds of enhanced bioremediation injections, the first in 2008 and the second in 2011, and installation of a comprehensive SVE system for vadose zone soil. The 2008 and 2011 interim actions focused on soil and Shallow Zone

groundwater in the source area to address the potentially complete exposure pathways identified in the risk evaluation of the Property. As identified above, the HVOCs in Shallow Zone groundwater are limited to the Property and just west of the Property due to the presence of a groundwater divide and silt ridge at the northern Property boundary. Intermediate Zone HVOC concentrations have been limited due to the presence of a silty layer at the base of the Shallow Zone.

The interim actions have further limited the extent and dramatically decreased the mass of VOCs in soil and Shallow Zone groundwater. The average source area concentration of PCE decreased from 6,033 µg/L in March 2008 to 65.8 µg/L in December 2012. The average source area concentrations of TCE and cis-1,2-DCE decreased from 824 µg/L and 2,027 µg/L in March 2008 to 102 µg/l and 1,270 µg/L in December 2012, respectively. The reduction of mass in the Shallow Zone is resulting in consistent decreasing trends in HVOC concentrations in Intermediate Zone groundwater and an overall reduction in the extent. Source area PCE and TCE concentrations in the Intermediate Zone have decreased by one and two orders of magnitude, respectively, in response to the groundwater interim actions targeted at the Shallow Zone.

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Table 1
Soil Analytical Summary Table - VOCs
NuStar Vancouver Facility
Vancouver, Washington

Sample ID	Collection Date	Sample Depth (feet)	Method	Parameter in µg/Kg (ppb)								
				1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloro-ethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl chloride
MW-1	11/3/1993	8	8010	<0.5	<0.5	<0.5	<0.5	<0.5	4.7	<0.5	1.5	--
		17	8010	<0.5	<0.5	<0.5	4.1	<0.5	25	<0.5	6.4	--
		27	8010	<0.5	<0.5	<0.5	6.8	<0.5	10	<0.5	1.4	--
MW-2	11/3/1993	20.5	8010	<0.5	<0.5	<0.5	<0.5	<0.5	5.6	<0.5	1.4	--
		29.5	8010	<0.5	<0.5	<0.5	21	<0.5	5.2	<0.5	5.6	--
MW-3	11/3/1993	12.5	8010	<0.5	<0.5	<0.5	<0.5	<0.5	4.2	<0.5	<0.5	--
		20	8010	<0.5	<0.5	<0.5	<0.5	<0.5	11	<0.5	0.59	--
		27.5	8010	<0.5	<0.5	<0.5	<0.5	<0.5	4.9	<0.5	<0.5	--
MW-4	11/4/1994	9.5	8010	<0.5	<0.5	<0.5	<0.5	<0.5	5.9	<0.5	<0.5	--
		18.5	8010	<0.5	<0.5	<0.5	<0.5	<0.5	16	<0.5	<0.5	--
		27.5	8010	<0.5	<0.5	<0.5	<0.5	<0.5	0.96	<0.5	<0.5	--
MW-5	11/4/1994	12.5	8010	<2.5	<2.5	<2.5	<2.5	<2.5	210	<2.5	<2.5	--
		21.5	8010	<2.5	<2.5	<2.5	<2.5	<2.5	160	<2.5	<2.5	--
		26	8010	<2.5	<2.5	<2.5	<2.5	<2.5	190	<2.5	<2.5	--
MW-6	11/4/1994	15.5	8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
		27	8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--
MW-7	11/4/1996	5	8010	<10,000	<10.0	<10.0	<10.0	<10.0	220	<20	<10.0	--
		15	8010	<10.0	<10.0	<10.0	<10.0	<10.0	520	<20	<10.0	--
		27.5	8010	<10.0	<10.0	<10.0	<10.0	<10.0	2,000	<30	170	--
		41	8010	<10.0	<10.0	<10.0	31	<10.0	1,800	<20	280	--
		50	8010	<10.0	<10.0	<10.0	34	<10.0	240	<20	96	--
		65	8010	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<20	<10.0	--
MW-8	11/5/1996	5	8010	<10.0	<10.0	<10.0	<10.0	<10.0	14	<20	<10.0	--
		10	8010	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<20	<10.0	--
		27.5	8010	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<30	<10.0	--
MW-9	11/5/1996	15	8010	<10.0	<10.0	<10.0	<10.0	<10.0	42	<20	<10.0	--
		20	8010	<10.0	<10.0	<10.0	<10.0	<10.0	50	<20	<10.0	--
		24.5	8010	<10.0	<10.0	<10.0	<10.0	<10.0	43	<20	<10.0	--
MW-10	11/5/1996	27.5	8010	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<20	<10.0	--
		29	8010	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<30	<10.0	--
MW-11	11/6/1996	24.5	8010	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<20	<10.0	--
		29	8010	<10.0	<10.0	<10.0	<10.0	<10.0	85	<30	230	--
MW-12	11/6/1996	15	8010	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<20	<10.0	--
		26	8010	<10.0	<10.0	<10.0	<10.0	<10.0	1,200	<30	370	--
		27.5	8010	<10.0	<10.0	<10.0	<10.0	<10.0	5,600	260	1,200	--
		35	8010	55	<10.0	66	1,900	16	10,000	110	7,000	--
MW-13	11/7/1996	20	8010	<10.0	<10.0	<10.0	12	<10.0	<10.0	<20	<10.0	--
		24.5	8010	<10.0	<10.0	<10.0	<10.0	<10.0	1,600	<30	100	--
		33.5	8010	13	<10.0	<10.0	19	<10.0	15,000	54	8,500	--
		38	8010	23	53	<10.0	3,200	53	77,000	120	25,000	--
GP1	10/23/1997	20	8010	<50	<50	<50	<50	<50	54.5	<50	<50	--
GP2	10/23/1997	5	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
		10	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
		15	8010	<50	<50	<50	<50	<50	78	<50	<50	--
		20	8010	<50	<50	<50	<50	<50	915	<50	77.5	--

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Table 1
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NuStar Vancouver Facility
Vancouver, Washington

Sample ID	Collection Date	Sample Depth (feet)	Method	Parameter in µg/Kg (ppb)								
				1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloro-ethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl chloride
GP3	10/23/1997	5	8010	<50	<50	<50	<50	<50	1,070	<50	<50	--
		10	8010	<500	<500	<500	<500	<500	11,500	<500	1,280	--
		15	8010	<100	<100	<100	<100	<100	1,240	<100	248	--
		20	8010	<50	<50	<50	<50	<50	191	<50	<50	--
		25	8010	<50	<50	<50	<50	<50	69.9	<50	<50	--
GP4	10/23/1997	20	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
GP5	10/23/1997	15	8010	<50	<50	<50	<50	<50	58.2	<50	<50	--
GP6	10/24/1997	15	8010	<50	<50	<50	<50	<50	86.9	<50	<50	--
GP7	10/24/1997	10	8010	<50	<50	<50	<50	<50	151	<50	<50	--
GP8	10/24/1997	5	8010	<50	<50	<50	<50	<50	73.4	<50	<50	--
		10	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
		20	8010	<50	<50	<50	<50	<50	2,100	101	123	--
		25	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
GP9	10/24/1997	11.5	8010	<50	<50	<50	<50	<50	261	<50	89.5	--
		20	8010	<250	<250	<250	<250	<250	10,900	<250	1,320	--
		25	8010	<50	<50	<50	<50	<50	56.8	<50	<50	--
GP10	10/24/1997	15	8010	<50	<50	<50	<50	<50	387	<50	<50	--
MW-14	10/30/1997	10	8010	--	--	--	--	--	--	--	--	--
		25	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
MW-15	10/30/1997	10	8010	--	--	--	--	--	--	--	--	--
		25	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
		30	8010	--	--	--	--	--	--	--	--	--
MW-16	10/30/1997	10	8010	--	--	--	--	--	--	--	--	--
		25	8010	<50	<50	<50	<50	<50	121	<50	<50	--
MW-17	10/30/1997	25	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
IW	7/22/1999	17-18.5	8010	<50	<50	<50	<50	<50	483	<50	<50	--
		23-24.5	8010	<50	<50	<50	<50	<50	9,760	74.3	731	--
		38-39.5	8010	<50	<50	<50	<50	<50	2,260	<50	182	--
		42.5-44	8010	<50	<50	<50	1,380	<50	1,300	<50	443	--
MP1	7/21/1999	20	8010	<50	<50	<50	<50	<50	1,240	<50	78.1	--
		35	8010	<50	<50	<50	<50	<50	2,620	<50	153	--
MP2	7/21/1999	20	8010	<50	<50	<50	<50	<50	2,120	<50	172	--
		35	8010	<50	<50	<50	<50	<50	6,040	<50	446	--
MP3	7/23/1999	25	8010	<50	<50	<50	<50	<50	5,740	<50	1,070	--
		35	8010	<50	<50	<50	<50	<50	1,090	<50	164	--
MP4	7/23/1999	25	8010	<50	<50	<50	<50	<50	29,500	198	985	--
		30	8010	<50	<50	<50	<50	<50	3,430	<50	265	--
S1	7/19/1999	25	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
		70	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
TMP2	7/19/1999	35	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
TMP3	7/20/1999	5	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
V1	7/20/1999	25	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
MW-18	9/11/2000	25	8010	<50	<50	<50	<50	<50	<50	<50	<50	--

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Vancouver, Washington

Sample ID	Collection Date	Sample Depth (feet)	Method	Parameter in µg/Kg (ppb)								
				1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloro-ethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl chloride
MGMS-1	3/6/2000	35-37	8010	<50	<50	218	4,780	<50	55	<50	1,780	--
MGMS-2	3/6/2000 - 3/7/2000	45	8010	<50	<50	<50	145	<50	410	<50	247	--
	3/9/2000	90	8010	--	--	--	--	--	--	--	--	--
MGMS-3	3/6/2000 - 3/7/2000	45	8010	<50	<50	<50	<50	<50	718	<50	104	--
EX	7/22/1999	17-18.5	8010	<50	<50	<50	<50	<50	1,950	<50	171	--
		23-24.5	8010	<50	<50	<50	<50	<50	2,190	<50	108	--
		38-39.5	8010	<500	<500	<500	<500	<500	185,000	1,660	8,080	--
		42.5-44	8010	<50	<50	<50	76.6	<50	19,200	165	1,540	--
EX-3	5/18/2000	20	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
		40	8010	<50	<50	<50	1,010	<50	937	<50	615	--
EX-4	5/18/2000	20	8010	<50	<50	<50	<50	<50	384	<50	<50	--
EX-5	5/19/2000	25	8010	<50	<50	<50	<50	<50	191	<50	73	--
IN-1	9/29/2000	25	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
IN-2	5/17/2000	20	8010	<50	<50	<50	133	<50	267	<50	<50	--
		40	8010	<50	<50	<50	86,200	1,530	1,310	<50	9,200	--
IN-3	5/17/2000	20	8010	<50	<50	<50	<50	<50	61,000	<50	4,650	--
IN-4	5/17/2000	25	8010	<50	<50	<50	<50	<50	1,060	<50	<50	--
		40	8010	<50	<50	<50	271	<50	6,640	96.6	1,890	--
IN-5	5/18/2000	25	8010	<50	<50	<50	<50	<50	255	<50	<50	--
IN-6	9/28/2000	25	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
IN-7	9/28/2000	25	8010	<50	<50	<50	<50	<50	<50	<50	<50	--
IN-8	9/28/2000	25	8010	<50	<50	<50	82.8	<50	8,180	<50	130	--
IN-9	9/28/2000	20	8010	<50	<50	<50	<50	<50	126	<50	<50	--
AGP-03-13	5/10/2006	13	8260B	<95.6	--	<95.6	<95.6	<95.6	<95.6	<95.6	<95.6	<956
AGP-10-6.5	4/25/2006	6.5	8260B	<359	<359	<359	<359	<359	3,140	<359	<359	<3590
AGP-12-13	4/25/2006	13	8260B	<78.3	--	<78.3	<78.3	<78.3	2,990	<78.3	568	<783
AGP-07-46.5	4/25/2006	46.5	8260B	<96.7	--	<96.7	348	<96.7	11,900	<96.7	2,060	<967
AGP-08-37.5	4/24/2006	37.5	8260B	367	<91.8	349	22,600	<206	180	<91.8	937	<918
AGP-09-48.5	4/25/2006	48.5	8260B	<91.0	<91.0	<91.0	599	<91.0	12,400	<91	2,350	<910
AGP-10-49.5	4/26/2006	49.5	8260B	<90.3	<90.3	<90.3	753	<90.3	6,410	<90.3	1,620	<903
AGP-11-33	4/26/2006	33	8260B	<90.4	<90.4	<90.4	<90.4	<90.4	958	<90.4	219	<904
AGP-12-34.5	4/25/2006	34.5	8260B	<148	--	<148	618 J	<148	4,170 J	<148	1,310 J	<1480
AGP-12-37.5	4/25/2006	37.5	8260B	8,470	<657	5,060	169,000	<3520	<657	<657	7,820	25,100
AGP-12-48	4/25/2006	48	8260B	<92.7	--	<81.4	2,110	<81.4	508	<81.4	875	<814
AGP-20-17.5	4/28/2005	17.5	8260B	<107	--	<107	<107	<107	544	<107	<107	<1070
AGP-21-13	5/1/2006	13	8260B	<93.9	--	<93.9	<93.9	<93.9	99.5	<93.9	<93.9	<939
AGP-22-18	5/2/2006	18	8260B	<184	--	<184	<184	<184	41,700	<184	2180	<1840
AGP-23-12.5	5/8/2006	12.5	8260B	<103	--	<103	<103	<103	483	<103	<103	<1030
AGP-24-12	5/8/2006	12	8260B	<96.1	--	<96.1	<96.1	<96.1	1,930	<96.1	144	<961
AGP-26-18	5/3/2006	18	8260B	<115	--	<115	<115	<115	4,030	<115	182	<1150
AGP-27-8.75	5/2/2006	8.75	8260B	<89.6	--	<89.6	<89.6	<89.6	1,510	<89.6	<89.6	<896
AGP-28-9	5/3/2006	9	8260B	<218	--	<218	<218	<218	59,300	<218	536	<2180
AGP-28-17.5	5/3/2006	17.5	8260B	<403	--	<403	<403	<403	65,200	<403	1870	<4030
AGP-29-9.5	5/4/2006	9.5	8260B	<4780	--	<4780	<4780	<4780	1,320,000	<4780	<4780	<47800
AGP-29-18	5/4/2006	18	8260B	<93	--	<93	<93	<93	14,900	<93	<93	<930

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Vancouver, Washington

Sample ID	Collection Date	Sample Depth (feet)	Method	Parameter in µg/Kg (ppb)								
				1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloro-ethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl chloride
AGP-32-14	5/9/2006	14	8260B	<98.4	--	<98.4	<98.4	<98.4	<98.4	<98.4	<98.4	<984
AGP-33-14	5/12/2006	14	8260B	<95.2	--	<95.2	<95.2	<95.2	<95.2	<95.2	<95.2	<952
AGP-35-18.5	5/15/2006	18.5	8260B	<95.3	--	<95.3	<95.3	<95.3	<95.3	<95.3	<95.3	<953
AGP-36-18	5/16/2006	18	8260B	<93.3	--	<93.3	<93.3	<93.3	<93.3	<93.3	<93.3	<933
AGP-38-24	5/11/2006	24	8260B	<109	--	<109	<109	<109	204	<109	<109	<1090
AGP-39-17.5	5/16/2006	17.5	8260B	<96.4	--	<96.4	<96.4	<96.4	<96.4	<96.4	<96.4	<964
AGP-42-17	6/19/2006	17	8260B	<98.8	--	<98.8	<98.8	<98.8	<98.8	<98.8	<98.8	<988
AGP-43-16.5	6/15/2006	16.5	8260B	<106	--	<106	<106	<106	<106	<106	<106	<1060
AGP-45-7	6/23/2006	7	8260B	<99.4	--	<99.4	<99.4	<99.4	<99.4	<99.4	<99.4	<994
AGP-01-47.5	5/10/2006	47.5	8260B	<90.6	--	<90.6	<90.6	<90.6	<90.6	<90.6	<90.6	<906
AGP-02-43	5/11/2006	43	8260B	<116	--	<116	<116	<116	<116	<116	<116	<1160
AGP-03-41.5	5/10/2006	41.5	8260B	<135	--	<135	<135	<135	<135	<135	<135	<1350
AGP-04-38	5/5/2006	38	8260B	<109	--	<109	135	<109	<109	<109	<109	<1090
AGP-05-34	5/5/2006	34	8260B	<94	--	<94	496	<94	141	<94	103	<940
AGP-06-48	5/2/2006	48	8260B	<108	--	<108	230	<108	6,050	<108	821	<1080
AGP-13-37.5	5/1/2006	37.5	8260B	602	--	347	22,400	<142	158	<98.7	1,380	<987
AGP-14-49	4/27/2006	49	8260B	<84.6	--	<84.6	1,990	<84.6	<84.6	<84.6	<84.6	<846
AGP-15-42.5	4/26/2006	42.5	8260B	<186	--	97.2	7,400	<178	5,770	<63.1	2,220	<631
AGP-16-37	4/27/2006	37	8260B	<100	--	<100	294	<100	16,200	<100	4,150	<1000
AGP-17-39	4/28/2006	39	8260B	732	--	1,250	46,000	<728	68,000	<201	61,200	<2010
AGP-18-37.5	4/28/2006	37.5	8260B	276	--	106	8,850	<183	22,800	<104	11,100	<1040
AGP-19-42.5	4/28/2006	42.5	8260B	<184	--	<184	5,360	1,840	61,300	<184	27,300	<1,840
AGP-20-43	5/1/2006	43	8260B	<108	--	<108	3,030	<108	3,520	<108	2,690	<1,080
AGP-21-32.5	5/1/2006	32.5	8260B	<93	--	<93	<93	<93	837	<93	113	<930
AGP-21-39	5/1/2006	39	8260B	<419	--	<419	<419	<419	145,000	<419	4,290	<4,190
AGP-21-48	5/1/2006	48	8260B	<88.4	--	<88.4	760	<88.4	<88.4	<88.4	110	<884
AGP-22-38.5	5/2/2006	38.5	8260B	<109	--	<109	261	<109	26,400	476	4,090	<1,090
AGP-23-47.5	5/9/2006	47.5	8260B	190	--	97.7	3,710	<93.9	192	<93.9	1,950	<939
AGP-24-37.5	5/8/2006	37.5	8260B	<90.5	--	<90.5	431	<90.5	34,800	<90.5	4,430	<905
AGP-25-42	5/4/2006	42	8260B	<85.8	--	<85.8	721	<85.8	2,430	<85.8	829	<858
AGP-26-32.5	5/3/2006	32.5	8260B	<128	--	<128	<128	<128	434	<128	<128	<1,280
AGP-27-28	5/2/2006	28	8260B	<124	--	<124	<124	<124	712	<124	<124	<1,240
AGP-28-37.5	5/3/2006	37.5	8260B	<96.4	--	<96.4	<96.4	<96.4	262	<96.4	<96.4	<964
AGP-29-28	5/4/2006	28	8260B	<102	--	<102	<102	<102	821	<102	<102	<1,020
AGP-29-42	5/4/2006	42	8260B	<95.1	--	<95.1	198	<95.1	4,140	<95.1	1,330	<951
AGP-30-29	5/9/2006	29	8260B	<92.5	--	<92.5	242	<92.5	<92.5	<92.5	<92.5	<925
AGP-31-27.5	5/8/2006	27.5	8260B	<92.3	--	<92.3	233	<92.3	1,040	<92.3	<92.3	<923
AGP-31-42.5	5/8/2006	42.5	8260B	<80.1	--	<80.1	<80.1	<80.1	<80.1	<80.1	<80.1	<801
AGP-32-31.5	5/9/2006	31.5	8260B	<96.9	--	<96.9	1,660	<96.9	<96.9	<96.9	<96.9	1,060
AGP-33-49	5/12/2006	49	8260B	<87.5	--	<87.5	<87.5	<87.5	<87.5	<87.5	<87.5	<875
AGP-34-27	5/15/2006	27	8260B	<95.8	--	<95.8	<95.8	<95.8	383	<95.8	<95.8	<958
AGP-34-42.5	5/15/2006	42.5	8260B	<97.2	--	<97.2	334	<97.2	179	<97.2	<97.2	<972
AGP-35-37.5	5/15/2006	37.5	8260B	<92.3	--	<92.3	<92.3	<92.3	<92.3	<92.3	<92.3	<923
AGP-37-28	5/11/2006	28	8260B	<132	--	<132	1,420	<132	498	<132	<132	<1,320
AGP-37-38	5/12/2006	38	8260B	<105	--	<105	2,810	<105	<105	<105	<105	<1,050

Please refer to notes at end of table.

Table 1
Soil Analytical Summary Table - VOCs
NuStar Vancouver Facility
Vancouver, Washington

Sample ID	Collection Date	Sample Depth (feet)	Method	Parameter in µg/Kg (ppb)								
				1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloro-ethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl chloride
AGP-38-46	5/11/2006	46	8260B	<474	--	<474	2,380	<474	101,000	<474	9,510	<4,740
AGP-39-47.5	5/16/2006	47.5	8260B	<73.6	--	<73.6	713	<73.6	1,040	<73.6	542	<736
AGP-44-45.5	6/23/2006	45.5	8260B	<91.3	--	<91.3	460	<91.3	3,470	<91.3	657	<913
AGP-44-51.5	6/23/2006	51.5	8260B	<79.2	--	<79.2	<79.2	<79.2	207	<79.2	<79.2	<792
AGP-52-4	6/13/2007	15.5-16	8260B	<228	<228	<228	<228	<228	<228	<228	<228	<228
AGP-54-5	6/15/2007	20.5-21	8260B	<228	<228	<228	<228	<228	<228	<228	<228	<228
AGP-55-6	6/19/2007	20.5-21	8260B	<223	<223	<223	<223	<223	<223	<223	<223	<223
AGP-56-6	6/19/2007	17.5-18	8260B	<209	<209	<209	<209	<209	<209	<209	<209	<209
AGP-57-4	6/19/2007	16-16.5	8260B	<216	<216	<216	<216	<216	<216	<216	<216	<216
AGP-57-4 DUP	6/19/2007	16-16.5	8260B	<217	<217	<217	<217	<217	<217	<217	<217	<217
CB-1(17.5)	9/20/2010	17.5	8260B	--	--	--	<30	--	10,000	--	93	--
CB-1(29.5)	9/20/2010	29.5	8260B	--	--	--	<40	--	160,000	--	<40	--
CB-1(37.5)	9/20/2010	37.5	8260B	--	--	--	34	--	200	--	69	--
CB-1(9)	9/20/2010	9	8260B	--	--	--	<40	--	6,700,000	--	<4,000	--
CB-2 (18)	9/20/2010	18	8260B	--	--	--	<5	--	19	--	<5	--
CB-2 (28)	9/20/2010	28	8260B	--	--	--	<5	--	15	--	<5	--
CB-2 (42)	9/20/2010	42	8260B	--	--	--	1,900	--	42,000	--	4,700	--
CB-2 (9.5)	9/20/2010	9	8260B	--	--	--	<40	--	130,000	--	<40	--
CB-3 (29)	9/21/2010	29	8260B	--	--	--	230	--	34,000	--	720	--
CB-3 (9)	9/21/2010	9	8260B	--	--	--	<5	--	1,800	--	6.9	--
CB-3(18)	9/21/2010	18	8260B	--	--	--	<40	--	24,000	--	180	--
CB-4 (18)	9/21/2010	18	8260B	--	--	--	<5	--	2,000	--	<5	--
CB-4 (28)	9/21/2010	28	8260B	--	--	--	<5	--	80	--	<5	--
CB-4 (38.5)	9/21/2010	38.5	8260B	--	--	--	1,300	--	26,000	--	2,000	--

Notes:

1. Concentrations in micrograms per kilogram (µg/Kg) parts per billion (ppb).
2. < = Not detected at corresponding numerical limit.
3. **Bolded** values indicate analyte detected above laboratory method detection limits (MDLs).
4. J = (EPA) - Estimated value below the lowest calibration point. Confidence correlates with concentration.
5. -- = Compound not reported or sample not analyzed.

Shaded indicates soil samples collected in saturated soils.

Table 2
Soil Analytical Summary Tables - Total Organic Carbon
NuStar Terminals Services, Inc. Vancouver Facility

Sample Location	Collection Date	Sample Depth (feet)	TOC (mg/Kg)
MW-14	10/30/1997	10	1,030
	10/30/1997	25	15,900
MW-15	10/30/1997	10	<50
	10/30/1997	30	1,230
MW-16	10/30/1997	10	<50
	10/30/1997	25	460
MGMS-1	3/6/2000	35-37	4,970
MGMS-2	03/06/00-03/07/00	45	1,210
	3/9/2000	90	<50
MGMS-3	03/06/00-03/07/00	45	<50
GP3	10/23/1997	10	1,900
	10/23/1997	15	2,140
	10/23/1997	20	84.7
GP8	10/24/1997	10	87.9
	10/24/1997	20	2,400
AGP-03-13	5/10/2006	13	<531
AGP-04-38	5/5/2006	38	<577
AGP-08-37.5	4/24/2006	37.5	1,690 J
AGP-12-13	4/25/2006	13	4,350 J
AGP-19-42.5	4/28/2006	42.5	883 J
AGP-23-12.5	5/8/2006	12.5	1,610
AGP-27-28	5/2/2006	28	<631
AGP-29-18	5/4/2006	18	<556
AGP-31-27.5	5/8/2006	27.5	<607
AGP-32-31.5	5/9/2006	31.5	8,040
AGP-36-18	5/16/2006	18	<520
AGP-39-17.5	5/16/2006	17.5	<532

Notes:
1. TOC = Total Organic Carbon.
2. mg/Kg (ppm) = Milligrams per kilogram (parts per million).
3. J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-1	11/17/1993	--	500	--	--	--	<250	<250	--	14,000	--	--	--	750	<250	--	1,400	<500
	9/1/1995	<250	<500	<250	<250	<250	<250	<250	<250	13,000	<250	<250	<250	620	<250	--	890	610
	9/24/1996	<5	<20	<2	<2	<5.0	54	<2	8.4	11,000	83	17	<2.0	2,600	68	--	1,800	420
	12/2/1996	0.8	<0.50	<0.50	<0.20	<0.20	6.7	<0.50	0.3	1,500	4.4	<0.20	1.1	1,200	7.3	--	310	1.6
	11/12/1997	<125	<250	<125	<125	<125	<125	<125	<125	11,600	<125	<125	<125	6,330	<125	--	2,880	<250
	8/11/1999	<50	<250	<25	<250	<25.0	43.1	<25	<25	8,590	86	<25	<25.0	2,520	52.5	--	1,210	408
	11/16/1999	<50	<125	<25	<50	<25.0	38	<25	<25	6,250	47.5	<25	<25.0	2,400	28	--	829	148
	2/29/2000	<100	<500	<50	<50	<50.0	<50	<50	<50	6,720	60.9	<50	<50.0	1,370	<100	--	590	438
	6/27/2000	<100	<500	<50	<50	<50.0	<50	<50	<50	6,480	65.1	<50	<50.0	1,780	<100	--	795	284
	8/31/2000	<100	<500	<50	<50	<50.0	<50	<50	<50	5,160	<50	<50	<50.0	1,960	<100	--	720	<50
	11/30/2000	<20	<100	<10	<10	<10.0	15	<10	<10	1,550	12.7	<10	<10.0	660	<20	--	234	<10
	2/27/2001	<100	<100	<50	<50	<50.0	<50	<50	<50	4,990	<50	<50	<50.0	1,140	<100	--	440	190
	5/29/2001	<50	<250	<25	<25	<25.0	<25	<25	<25	4,050	<25	<25	<25.0	1,040	<50	--	407	91
	9/25/2001	<50	<50	<50	<50	--	<50	<50	<50	5,000	<50	<50	<50.0	890	<50	--	440	240
	12/17/2001	<2	<10	<1	<1	<1.0	<1	<1	<1	109	1.26	<1	<1.0	164	<2	--	42.9	<1
	3/19/2002	<50	<25	<25	<50	<25.0	35	<25	<25	4,120	35	<25	<25.0	710	<25	--	349	170
	5/30/2002	<10	<5	<5	<10	<5.0	10.8	<5	<5	1,140	6.6	<5	<5.0	307	<5	--	101	22.3
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/8/2002	<20	<10	<10	<20	<10.0	22.8	<10	<10	1,980	20.2	<10	<10.0	367	<10	--	174	14.4
	5/30/2003	<20	<10	<10	<20	<10.0	21.2	<10	<10	2,180	<10	<10	<10.0	1,200	14.2	--	340	22.6
	11/2/2004	<20	<10	<10	<20	<10.0	22.4	<10	<10	2,130	23.6	<10	<10.0	335	<10	--	169	22.8
	11/16/2004	<12	<12	<12	<12	<12.0	15	<12	<12	1,300	<12	<12	<12.0	310	<12	--	130	<12
	5/18/2005	<5	<2.5	<2.5	<5	<2.5	12	<2.5	<2.5	773	14.1	<2.5	<2.5	193	<2.5	--	87.6	3.8
	5/23/2007	<10	<10	<10	<10	< 10.0	15.5	<10	<10	1,110	<10	<10	< 10.0	58.5	<10	--	45.4	11.7
	9/11/2007	<50	<25	<25	<50	<25.0	<25	<25	<25	916	<25	<25	<25.0	34	<25	--	34	62.5
	12/13/2007	<10	<5	<5	<10	<5.00	9.7	<5	<5	526	5	<5	<5.00	81.9	<5	--	45.4	8.8
	3/5/2008	<1	<0.500	<0.500	<1	<0.500	16.1	<0.500	1.66	826	9.18	2.3	<0.500	49.7	0.88	<0.500	45.6	58.8
	9/19/2008	<20	<10	<10	<20	< 10.0	20.4	<10	<10	633	<10	<10	< 10.0	108	<10	<10	74.8	<10
	12/10/2008	<2.5	<2.5	<2.5	<2.5	< 2.5	15	<2.5	<2.5	570	6.2	<2.5	< 2.5	28	<2.5	<2.5	25	48
	3/27/2009	<2.5	<2.5	<2.5	<2.5	< 2.5	17	<0.50	<2.5	580	5.7	<2.5	< 2.5	39	<2.5	<2.5	42	4.4
	6/17/2009	<0.90	<0.90	<0.90	<0.90	< 0.90	6.3	<0.90	<0.90	310	3.6	0.99	< 0.90	21	<0.90	<0.90	14	9.7
	9/18/2009	<0.80	<0.80	<0.80	<0.80	< 0.80	19	<0.80	<0.80	590	4.2	1.9	< 0.80	29	<0.80	<0.50	27	8.1
	12/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	4.8	<0.50	<0.50	170	0.72	0.67	< 0.50	53	0.53	<0.50	26	<0.50
	3/19/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	9.3	<0.50	0.61	300	3.6	1.4	< 0.50	22	<0.50	<0.50	21	26
	6/15/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	9.6	<0.50	<0.50	< 0.50	22	<0.50	<0.50	6.6	<0.50
	9/23/2010	<0.90	<0.90	<0.90	<0.90	< 0.9	12	<0.90	<0.90	380	3.4	1.6	< 0.9	25	<0.90	<0.90	27	7.1
	12/9/2010	<1.5	<1.5	<1.5	<1.5	< 1.5	7.1	1.5	<1.5	250	2.2	<1.5	< 1.5	25	<1.5	<1.5	17	8

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-1 (continued)	3/10/2011	<1.5	<1.5	<1.5	<1.5	< 1.5	7.5	<1.5	<1.5	250	3	<1.5	< 1.5	16	<1.5	<1.5	16	18
	6/9/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.4	<0.5	<0.5	<0.5	11	<0.5	<0.5	3.4	<0.5
	9/19/2011	<1.5	<1.5	<1.5	<1.5	<1.5	12	<1.5	<1.5	300	3.2	<1.5	<1.5	5.2	<1.5	<1.5	13	30
	12/9/2011	<1.5	<1.5	<1.5	<1.5	<1.5	11	<1.5	<1.5	260	2.9	<1.5	<1.5	6.2	<1.5	<1.5	8.4	40
	3/9/2012	<0.50	<0.50	<0.50	<0.50	<0.5	7.8	<0.50	<0.50	200	2.4	1	<0.5	3.1	<0.50	<0.50	9.5	19
	06/22/2012	<0.5	<0.5	<0.5	<0.5	<0.5	4.8	<0.5	<0.5	140	1.7	0.53	<0.5	17	<0.5	<0.5	13	14
	9/13/2012	<1.5	<1.5	<1.5	<1.5	<1.5	10	<1.5	<1.5	260	2.4	<1.5	<1.5	<1.5	<1.5	<1.5	7	25
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	47	0.6	<0.50	<0.50	26	<0.50	<0.50	14	<0.50
MW-2	11/17/1993	--	51	--	--	--	12	<0.50	--	10	--	--	--	<0.50	<0.50	--	<0.50	<0.10
	9/1/1995	<0.50	16	<0.50	<0.20	<0.20	8.2	<0.50	<0.50	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	2.2
	9/24/1996	<0.50	19	<0.20	<0.20	<0.20	9.6	0.5	<0.20	9.4	<0.20	<0.20	<0.20	<0.20	<0.50	--	0.3	5.1
	12/2/1996	<0.50	8.8	<0.50	<0.20	<0.20	6.9	0.6	<0.20	11	<1	<0.20	<0.20	<0.50	<1	--	<0.30	7.2
	11/13/1997	<0.50	<1	<0.50	<0.50	<0.50	5.32	0.571	<0.50	7.9	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<1
	8/11/1999	<1	18.3	<0.50	<0.50	<0.50	6.38	<0.50	<0.50	20	<0.50	<0.50	<0.50	<0.50	<1	--	10.4	1.64
	11/16/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/2000	<1	16	<0.50	<0.50	<0.50	5.68	<0.50	<0.50	23.5	<0.50	<0.50	<0.50	<0.50	<1	--	4.52	1.21
	6/27/2000	<1	18.3	<0.50	<0.50	<0.50	5.34	<0.50	1.27	23.4	<0.50	<0.50	<0.50	12.8	<1	--	16.6	<0.50
	8/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1	--	<0.50	<0.50
	9/25/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/19/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2002	<1	1.68	<0.50	<1	<1.0	2.65	<0.50	<0.50	0.51	<0.50	<0.50	<0.50	0.61	<0.50	--	<0.50	<0.50
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/8/2002	<1	10.4	<0.50	<1	<1.0	3.13	<0.50	<0.50	1.84	<0.50	<0.50	<0.50	1.05	<0.50	--	0.98	<0.50
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2003	<1	3.64	<0.50	<1	<1.0	1.95	<0.50	<0.50	0.59	<0.50	<0.50	<0.50	6.6	<0.50	--	1.13	<0.50
	11/10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/23/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/16/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/14/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-2	2/7/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(continued)	5/23/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/12/2007	<1	5.9	<0.50	<1	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	3/7/2008	<1	7.86	<0.500	<1	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.50	0.5	<0.500	<0.500	<0.500	<0.500
	9/18/2008	<1	5.93	<0.500	<1	< 0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	< 0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	3/24/2009	<0.50	4.8	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/16/2009	<0.50	5.1	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	1.0	<0.50	<0.50	0.85	<0.50
	3/19/2010	<0.50	5.7	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/23/2010	<0.5	3.8	<0.50	<0.5	< 0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	<0.5	<0.5
	3/9/2011	<0.50	4.8	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/16/2011	<0.50	4.3	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/9/2012	<0.50	4.3	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/13/2012	<0.50	3.4	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
MW-3	11/17/1993	--	210	--	--	--	27	4	--	240	--	--	--	190	20	--	97	130
	9/1/1995	<50	<100	<50	<50	<50.0	<50	<50	<50	2,700	<50	<50	<50.0	1,300	<50	--	140	730
	9/24/1996	<5	<20	7.9	<2	<2.0	12	<2	<2	1,100	9.5	4	<2.0	1,800	21	--	330	82
	12/2/1996	<50	<50	<50	<20	<20.0	<30	<50	<20	650	<100	<20	<20.0	2,100	<100	--	470	<50
	11/12/1997	<25	<50	<25	<25	<25.0	<25	<25	<25	464	<25	<25	<25.0	2,000	<25	--	241	<50
	8/11/1999	<20	<100	<10	<10	<10.0	<10	<10	<10	500	<10	<10	<10.0	1,760	25.4	--	247	<10
	11/16/1999	<20	<50	<10	<20	<20.0	14	<10	<10	628	15.2	<10	<10.0	700	<10	--	132	<10
	2/29/2000	<20	<100	<10	<10	<10.0	<10	<10	<10	473	<10	<10	<10.0	1,890	25.4	--	356	<10
	6/27/2000	<20	<100	<10	<10	<10.0	<10	<10	<10	410	<10	10.2	<10.0	1,460	<20	--	241	<10
	8/31/2000	<20	<100	<10	<10	<10.0	52.2	<10	<10	2,580	25.5	<10	<10.0	399	<20	--	100	171
	11/30/2000	<5	<25	<2.5	<2.5	<2.5	13.3	<2.5	<2.5	374	3.73	<2.5	<2.5	366	<5	--	80.3	3.1
	2/27/2001	<5	<25	3.64	<2.5	<2.5	5.78	<2.5	<2.5	153	<2.5	2.5	<2.5	358	<5	--	76.1	<2.5
	5/29/2001	<5	<25	2.8	<2.5	<2.5	<2.5	<2.5	<2.5	112	<2.5	<2.5	<2.5	647	5.12	--	93.3	<2.5
	9/25/2001	<1.3	3.1	2.4	<1.3	<1.3	10	2	<1.3	210	3	1.7	<1.3	550	7.2	--	90	4.9
	12/17/2001	<10	<50	<5	<5	<5.0	<5	<5	<5	164	<5	<5	<5.0	826	16.9	--	155	<5
	3/19/2002	<5	<2.5	2.75	<5	<5.0	<2.5	<2.5	<2.5	138	4.1	<2.5	<2.5	758	9.6	--	107	<2.5
	5/30/2002	<10	7.8	<5	<10	<10.0	27.8	<5	<5	1,380	42.6	6	<5.0	302	11.5	--	55.1	96.7
	11/8/2002	<5	15	<2.5	<5	<5.0	29.4	3.55	<2.5	399	9.05	5.7	<2.5	359	5.8	--	67.1	19.4
	5/30/2003	<5	<2.5	6.45	<5	<5.0	<2.5	<2.5	<2.5	50.1	3.65	<2.5	<2.5	706	4.95	--	72.6	<2.5
	11/16/2004	<10	<5	<5	<10	<10.0	15	<5	<5	440	5.9	<5	<5.0	270	<5	--	72	<5
	3/23/2005	<2	2.26	4.16 B	<2	<2.0	8.92	<1	<1	246	8.4	2.86	<1.0	329	5.04	--	71.9	3.84
	5/18/2005	<2	<1	3.86	<2	<2.0	5.74	<1	<1	188	4.72	3.02	<1.0	304	5.06	--	88.5	<1
	5/23/2007	<2	<2	<2	<2	< 2.00	<2	<2	<2	110	6.3	<2	< 2.00	349	4.54	--	70.6	<2
	9/11/2007	<5	9.95	14.4	<5	<5.00	43	6.1	<2.50	950	28.2	12	<2.50	601	31	--	223	6.1
	12/12/2007	<10	<5	<5	<10	<10.0	<5	<5	<5	95.7	<5	<5	<5.00	254	<5	--	63.2	<5
	3/6/2008	<1	<0.500	2.10 J	<1	<1.00	1.32	<0.500	<0.500	127	8.49	2.37	<0.50	144	5.66	<0.500	94.7	<0.500
	9/19/2008	<5	3.7	2.65 J	<5	< 2.50	10.6	<2.50	<2.50	187	5.85	2.95	< 2.50	283	6.6	<2.50	75	<2.50
	12/10/2008	<0.90	1.5	1.9	<0.90	< 0.90	5.3	1.2	<0.90	120	4.3	1.5	< 0.90	200	3.8	<0.90	54	<0.90

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-3 (continued)	3/26/2009	<0.50	<0.50	1.4	<0.50	< 0.50	1.6	<0.50	<0.50	83	4.3	1.2	< 0.50	180	3.6	<0.50	46	<0.50
	6/17/2009	<0.50	<0.50	1.1	<0.50	< 0.50	0.89	<0.50	<0.50	76	4.7	0.71	< 0.50	190	3.4	<0.50	49	<0.50
	9/18/2009	<0.50	<0.50	3.3	<0.50	< 0.50	10	<0.50	<0.50	180	6.2	2.2	< 0.50	270	7.3	<0.50	62	1.2
	12/17/2009	<0.90	<0.90	0.96	<0.90	< 0.90	<0.90	<0.90	<0.90	50	3.2	<0.90	< 0.90	180	3.2	<0.90	47	<0.90
	3/19/2010	<0.90	<0.90	1 BE	<0.90	< 0.90	<0.90	<0.90	<0.90	77	5.4	<0.90	< 0.90	280	4.1	<0.90	49	<0.90
	6/16/2010	<0.50	<0.50	2.3	<0.50	< 0.50	1.6	0.9	<0.50	42	1.7	<0.50	< 0.50	180	1.9	<0.50	30	<0.50
	9/23/2010	<0.5	<0.5	2.8 BE	<0.5	< 0.50	0.56	<0.5	<0.5	75	4.4	0.51	< 0.50	220	3	<0.5	39	<0.5
	12/9/2010	<0.5	<0.5	2.7	<0.5	< 0.5	<0.5	<0.5	<0.5	39	3.4	<0.5	< 0.5	210	3	<0.5	35	<0.5
	3/10/2011	<0.50	<0.50	5.4	<0.50	< 0.50	<0.50	<0.50	<0.50	8.9	1.1	<0.50	< 0.50	110	1.6	<0.50	15	<0.50
	6/10/2011	<0.5	<0.5	1.6	<0.5	< 0.50	2.2	0.76	<0.5	36	1.1	0.54	< 0.50	99	1.6	<0.5	30	<0.5
	9/16/2011	<0.50	<0.50	2	<0.50	< 0.50	3	0.59	<0.50	70	1.7	0.91	< 0.50	130	2.4	<0.50	31	<0.50
	12/9/2011	<0.50	<0.50	2.2	<0.50	< 0.50	2.9	0.54	<0.50	62	1.6	0.83	< 0.50	190	2.6	<0.50	45	<0.50
	3/12/2012	<0.50	<0.50	2.4	<0.50	<0.50	0.83	<0.50	<0.50	52	2.8	1	< 0.50	140	3.1	<0.50	45	<0.50
	06/21/2012	<0.5	<0.5	2.3	<0.5	<0.5	0.9	<0.5	<0.5	45	2.7	0.56	< 0.50	170	2.7	<0.5	37	<0.5
	9/13/2012	<0.500	<0.500	1.7	<0.500	<0.500	4.1	<0.500	<0.500	100	2.1	1.4	< 0.50	140	3.3	<0.500	45	<0.500
	12/13/2012	<0.50	<0.50	1.3	<0.50	<0.50	0.8	<0.50	<0.50	27	1.6	<0.50	<0.50	170	2.0	<0.50	36	<0.50
MW-4	11/17/1993	--	850	--	--	--	12	<50	--	20	--	--	--	40	<50	--	5.4	<10
	9/1/1995	<5	340	<5	<5	<5.0	5.2	<50	<5	14	<5	<5	<5.0	<50	<50	--	<50	30
	9/24/1996	<0.50	300	<0.20	<0.20	<0.20	7.1	1.4	<0.20	3.2	<0.20	1	<0.20	0.5	<0.50	--	0.8	4.7
	12/2/1996	<0.50	310	<0.50	0.3	0.3	3.8	1	<0.20	19	<1	0.3	<0.20	<0.50	<1	--	<0.30	39
	11/13/1997	<0.50	252	<0.50	<0.50	<0.50	4.22	1.23	<0.50	6.91	<0.50	0.688	<0.50	<0.50	<0.50	--	<0.50	<1
	8/11/1999	<2	144	<1	<1	<1.0	1.21	<1	<1	<1	<1	<1	<1.0	3.6	<2	--	<1	<1
	11/16/1999	<1	26.3	<0.50	<1	<0.50	2.3	<0.50	<0.50	4.18	<0.50	<0.50	<0.50	1.2	<0.50	--	0.88	2.07
	2/29/2000	<2	119	<1	<1	<1.0	2.84	<1	<1	4.1	<1	<1	<1.0	<1	<2	--	<1	5.72
	6/28/2000	<5	59.4	<2.5	<2.5	<2.5	3.89	<2.5	<2.5	2.5	<2.5	<2.5	<2.5	<2.5	<5	--	<2.5	<2.5
	7/5/2000	Well Abandoned																
MW-5	11/17/1993	--	1,900	--	--	--	<25	<25	--	100	--	--	--	1,200	<25	--	52	<50
	9/1/1995	<1	<2	<1	<2	<2,500	<1	<1	<1	1,300	<1	<1	<1,300	60,000	<1	--	<1	<2
	9/24/1996	<5	140	<2	<2	<2.0	35	<2	7.5	2,600	80	5.3	<2.0	16,000	64	--	670	370
	12/2/1996	71	<50	<50	27	27	<30	<50	<20	5,600	<100	<20	<20.0	27,000	110	--	1,700	340
	11/12/1997	<500	<1	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	28,000	<500	--	1,250	<1
	8/11/1999	<200	<1	<100	<100	<100	<100	<100	<100	1,750	<100	<100	<100	25,100	<200	--	862	238
	2/29/2000	<100	<500	<50	<50	<50.0	<50	<50	<50	126	<50	<50	<50.0	5,250	<100	--	135	<50
	8/31/2000	<50	<250	<25	<25	<25.0	41.4	<25	<25	1,860	<25	<25	<25.0	5,660	<50	--	347	280
	11/30/2000	<50	<250	<25	<25	<25.0	27.3	<25	<25	3,850	26.8	<25	<25.0	6,150	<50	--	511	189
	2/27/2001	<50	<250	<25	<25	<25.0	<25	<25	<25	1,370	<25	<25	<25.0	7,350	<50	--	445	127
	5/30/2001	<50	<250	<25	<25	<25.0	<25	<25	<25	2,410	<25	<25	<25.0	5,560	<50	--	439	129
	9/25/2001	<25	200	<25	<25	<25.0	34	<25	<25	1,800	<25	<25	<25.0	2,200	<25	--	180	180
	12/17/2001	<100	<500	<50	<50	<50.0	<50	<50	<50	1,480	<50	<50	<50.0	10,100	<100	--	646	<50

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Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-5 (continued)	3/19/2002	<50	<25	<25	<50	<50.0	<25	<25	<25	360	<25	<25	<25.0	4,640	<25	--	221	114
	5/29/2002	<50	46	<25	<50	<50.0	<25	<25	<25	916	<25	<25	<25.0	4,330	<25	--	238	39.5
	8/29/2002	<50	<25	<25	<50	<50.0	<25	<25	<25	1,160	<25	<25	<25.0	4,090	<25	--	288	310
	11/8/2002	<5	178	<2.5	<5	<5.0	8.3	<2.5	<2.5	385	3.25	<2.5	<2.5	603	<2.5	--	63.4	66
	1/23/2003	<50	<25	<25	<50	<50.0	<25	<25	<25	582	<25	<25	<25.0	4,090	<25	--	349	<25
	5/30/2003	<10	14.1	<5	<10	<10.0	<5	<5	<5	382	<5	<5	<5.0	1,450	7.9	--	140	67
	11/10/2003	<1	84.2	<1	<1	<1.0	1.06	<1	<1	90.7	<1	<1	<1.0	161	<1	--	30.8	9.42
	5/4/2004	<20	<20	<20	<20	<20.0	<20	<20	<20	432	<20	<20	<20.0	2,440	<20	--	178	188
	11/16/2004	<50	<50	<50	<50	<50.0	<50	<50	<50	6,300	<50	<50	<50.0	1,800	<50	--	370	990
	3/23/2005	<20	<10	<10	<20	<20.0	26.2	<10	<10	2,350	27.6	<10	<10.0	511	<10	--	147	604
	5/18/2005	<5	<2.5	<2.5	<5	<5.0	9.25	<2.5	6.45	817	10.2	<2.5	<2.5	611	<2.5	--	156	329
	8/18/2005	<5	5.15	<2.50	<5	<5.00	14.4	<2.50	<2.50	397	4.7	<2.50	<2.50	169 B	<2.50	--	81.8	278
	11/15/2005	<20	<10	<10	<20	<20.0	36.2	<10	<10	2,790	14	<10	<10.0	408	<10	--	177	615
	2/21/2006	<1	<0.500	<0.500	<1	< 1.00	<0.500	<0.500	<0.500	72.7	1.06	<0.500	< 0.500	184	0.78	--	31.5	5.05
	6/5/2006	<20	<20	<20	<20	< 20.0	<20	<20	<20	2,800	<20	<20	< 20.0	157	<20	--	75	199
	9/6/2006	<2	10.6	<1	<2	< 2.00	8.3	<1	<1	377	3.66	<1	< 1.00	104	<1	--	45	29.9
	12/6/2006	<2	<1	<1	<2	< 2.00	1.32	<1	1.34	113	1.28	1.52	< 1.00	240	1.6	--	58	43.3
	2/7/2007	<10	<5	<5	<10	< 10.0	<5	<5	<5	1,220	18	<5	< 5.00	124	<5	--	26.9	600
	5/22/2007	<5	<5	<5	<5	< 5.00	<5	<5	<5	634	8	<5	< 5.00	102	<5	--	40.8	59.4
	9/12/2007	<1	67.5	<0.50	<1	<1.00	<0.50	<0.50	<0.50	16.2	<0.50	<0.50	<0.50	0.89	<0.50	--	1.38	1.86
	12/13/2007	<1	<0.50	<0.50	<1	<1.00	7.1	<0.50	4.67	2,420	9.22	1.14	<0.50	180	<0.50	--	179	416
	3/7/2008	<1	<0.500	<0.500	<1	<1.00	2.18	<0.500	1.33	411	3.21	<0.500	<0.50	86.4	<0.500	<0.500	26.1	105
	9/18/2008	<1	101	<0.500	<1	< 0.500	0.79	<0.500	<0.500	11.2	<0.500	<0.500	< 0.500	1.14	<0.500	<0.500	1.27	1.74
	12/10/2008	<2	<2	<2	<2	< 2.0	3.7	<2	<2	360	2.3	<2	< 2.0	49	<2	<2	53	150
	3/27/2009	<0.50	4.2	<0.50	<0.50	< 0.50	4	<0.50	<0.50	170	1	<0.50	< 0.50	0.59	<0.50	<0.50	<0.50	64
	6/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	4.1	<0.50	0.6	160	2.5	<0.50	< 0.50	11	<0.50	<0.50	12	11
	9/18/2009	<0.50	65 BE	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	3.6	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	0.5	1.2
	12/17/2009	<0.50	<0.80	<0.50	<0.50	< 0.50	2.1	<0.50	1.4	340	2	<0.50	< 0.50	19	<0.50	<0.50	37	93
	3/19/2010	<0.50	1.4	<0.50	<0.50	< 0.50	4.4	<0.50	<0.50	72	<0.50	<0.50	< 0.50	24	<0.50	<0.50	14	21
	6/16/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	3.6	<0.50	0.83	94	0.65	0.54	< 0.50	4.1	<0.50	<0.50	10	23
	9/23/2010	<0.5	59	<0.5	<0.5	< 0.50	0.84	<0.5	<0.5	9.7	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	0.97	1.3
	12/9/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	0.84	<0.5	<0.5	140	0.73	<0.5	< 0.5	5.6	<0.5	<0.5	8.8	15
	3/11/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.96	<0.50	<0.50	34	<0.50	<0.50	< 0.50	8.4	<0.50	<0.50	7.6	4.7
	6/10/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	5	<0.5	<0.5	40	<0.5	0.63	< 0.50	2.2	<0.5	<0.5	3.8	26
	9/19/2011	<0.50	2.3	<0.50	<0.50	< 0.50	2.8	<0.50	<0.50	97	<0.50	<0.50	< 0.50	1.3	<0.50	<0.50	11	6.3
	12/9/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	47	<0.50	<0.50	< 0.50	2.7	<0.50	<0.50	7.7	2.8
	3/12/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	4.5	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	3.4
	06/22/2012	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	13	<0.5	<0.5	< 0.50	0.54	<0.5	<0.5	2.9	3
	9/14/2012	<0.50	20	<0.50	<0.50	< 0.50	0.75	<0.50	<0.50	26	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	3.4
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	0.72	<0.50	<0.50	67	0.65	<0.50	<0.50	<0.50	<0.50	<0.50	1.7	6.6

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-6	11/17/1993	--	<1	--	--	--	<0.50	<0.50	--	1.2	--	--	--	2.1	<0.50	--	0.54	<1
	9/1/1995	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<1
	9/24/1996	<0.50	<2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.3	<0.20	<0.20	<0.20	<0.20	<0.50	--	<0.20	<1
	12/2/1996	<0.50	<0.50	<0.50	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<1	<0.20	<0.20	<0.50	<1	--	<0.20	<0.20
	11/12/1997	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.03	<0.50	--	<0.50	<1
	8/11/1999	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1	--	1.37	<0.50
	11/16/1999	<1	<2.5	<0.50	<1	<1.0	<0.50	<0.50	<0.50	0.51	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	2/29/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.654	<1	--	<0.50	<0.50
	6/27/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1	--	<0.50	<0.50
	8/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/29/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1	--	<0.50	<0.50
	9/25/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/18/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	1.51	<0.50	<0.50	<0.50	1.31	<0.50	--	<0.50	<0.50
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/8/2002	<1	<0.50	<0.50	<1	<1.0	0.51	<0.50	<0.50	2.55	<0.50	<0.50	<0.50	0.97	<0.50	--	0.55	0.52
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2003	<0.50	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	<0.50	3.73	<0.50	--	0.99	<0.50
	11/10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/2004	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	0.88	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	3/23/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/17/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/14/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/7/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/23/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/12/2007	<1	<0.50	<0.50	<1	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	3/6/2008	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.50	1.16	<0.500	<0.500	<0.500	<0.500
	9/19/2008	<1	<0.500	<0.500	<1	< 0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	< 0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	3/24/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Please refer to notes at end of table.

Table 3
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NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-6 (continued)	9/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/19/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/23/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/15/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/5/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
MW-7	12/2/1996	81	<50	<50	39	59	<30	<50	110	110	<100	<20	<20.0	73,000	1,900	--	7,600	<50
	11/12/1997	<500	<1	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	36,400	<500	--	7,670	<1
	8/11/1999	<1	<5	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	49,000	1,210	--	4,650	<500
	11/16/1999	<100	<250	<50	<100	<100	<50	<50	92	353	<50	<50	<50.0	54,800	914	--	5,320	<50
	2/28/2000	<1	<5	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	52,400	<1	--	4,060	<500
	6/28/2000	<1	<5	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	54,300	<1	--	3,390	<500
	8/31/2000	<500	<2	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	50,900	824	--	3,960	<250
	11/30/2000	<500	<2	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	33,500	520	--	3,560	<250
	2/27/2001	<500	<2	<250	<250	<250	<250	<250	<250	386	<250	<250	<250	26,700	<500	--	3,290	<250
	5/30/2001	<200	<1,000	<100	<100	<100	<100	<100	<100	374	<100	<100	<100	20,400	214	--	2,820	<100
	9/25/2001	<25	<25	<25	<25	<25.0	28	<25	35	350	<25	<25	<25.0	19,000	260	--	2,500	<25
	12/17/2001	<100	<50	<50	<50	<50.0	84.6	<50	<50	506	<50	<50	<50.0	10,100	200	--	1,960	<50
	3/18/2002	<50	<25	<25	<50	<50.0	<25	<25	<25	206	<25	<25	<25.0	7,250	71	--	1,020	<25
	5/31/2002	<50	<25	<25	<50	<50.0	<25	<25	<25	42.5	<25	<25	<25.0	5,500	<25	--	311	<25
	8/29/2002	<50	<25	<25	<50	<50.0	<25	<25	50.5	93	<25	<25	<25.0	4,940	44.5	--	634	<25
	11/7/2002	<50	<25	<25	<50	<50.0	<25	<25	<25	123	<25	<25	<25.0	5,810	43	--	758	<25
	1/23/2003	<20	<10	<10	<20	<20.0	<10	<10	<10	59.8	<10	<10	<10.0	2,010.00	14	--	282	<10
	5/28/2003	<10	<5	<5	<5	<5.0	6.3	<5	<5	<5	<5	<5	<5.0	1,080	10.9	--	67.9	<5
	11/11/2003	<20	<20	<20	<20	<20.0	40.2	<20	<20	246	<20	<20	<20.0	2,460	62	--	599	<20
	1/27/2004	<20	<10	<10	<20	<20.0	17	<10	<10	105	<10	<10	<10.0	3,510	33	--	380	<10
	5/4/2004	<20	<20	<20	<20	<20.0	<20	<20	<20	72.4	<20	<20	<20.0	3,940	22	--	323	<20
	11/16/2004	<50	<50	<50	<50	<50.0	<50	<50	<50	99	<50	<50	<50.0	8,000	<50	--	520	<50
	3/24/2005	<50	<25	<25	<50	<50.0	<25	<25	<25	98.5	<25	<25	<25.0	3,930	26	--	404	<25
	5/18/2005	<10	<5	<5	<10	<10.0	<5	<5	<5	72.7	<5	<5	<5.0	1,310	12.4	--	180	<5
	5/18/2005 (DUP)	<10	<5	<5	<10	<10.0	<5	<5	<5	69.4	<5	<5	<5.0	1,250	12.4	--	179	<5
	8/18/2005	<20	<10	<10	<20	<20.0	<10	<10	<10	54.8	<10	<10	<10.0	1,800	<10	--	237	<10
	11/15/2005	<20	<10	<10	<20	<20.0	15.2	<10	<10	107	<10	<10	<10.0	1,960	29.6	--	333	<10
	2/21/2006	<20	<10	<10	<20	< 20.0	<10	<10	<10	<10	<10	<10	< 10.0	2,640	<10	--	139	<10
	6/5/2006	<200	<200	<200	<200	< 200	<200	<200	<200	<200	<200	<200	< 200	26,100	<200	--	568	<200
	9/6/2006	<100	<50	<50	<100	< 100	<50	<50	<50	56	<50	<50	< 50.0	12,800	<50	--	422	<50
	12/6/2006	<200	<100	<100	<200	< 200	<100	<100	<100	<100	<100	<100	< 100	24,600	<100	--	408	<100

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NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-7 (continued)	2/7/2007	<200	<100	<100	<200	< 200	<100	<100	<100	<100	<100	<100	< 100	31,500	<100	--	352	<100
	5/22/2007	<200	<200	<200	<200	< 200	<200	<200	<200	<200	<200	<200	< 200	29,100	<200	--	450	<200
	9/12/2007	<200	<100	<100	<200	<200	<100	<100	<100	<100	<100	<100	<100	21,300	<100	--	366	<100
	12/13/2007	<500	<250	<250	<500	<500	<250	<250	<250	345	<250	<250	<250	18,700	<250	--	1,040	280
	3/6/2008[7.]	<1	<0.500	<0.500	<1	< 0.500	5.06	2.57	3.99	42.3	2.9	<0.500	< 0.500	26,300	38.7	<0.500	430	<0.500
	6/10/2008	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	27,000	<500	<500	575	<500
	9/18/2008	<500	<500	<500	<500	< 500	<500	<500	<500	<500	<500	<500	< 500	23,200	<500	<500	530	<500
	12/11/2008	<50	<50	<50	<50	< 50	<50	<50	<50	130	<50	<50	< 50	15,000	<50	<50	450	<50
	12/11/2008 DUP	<50	<50	<50	<50	< 50	<50	<50	<50	120	<50	<50	< 50	14,000	<50	<50	430	<50
	3/23/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	420	<0.50	<0.50	< 0.50	3,330	<0.50	<0.50	270	<0.50
	6/18/2009	<3	<3	<3	<3	< 3.0	3.7	<3	<3	520	<3	<3	< 3.0	890	5.2	<3	350	<3
	6/18/2009 DUP	<2.5	<2.5	<2.5	<2.5	< 2.5	3.8	<2.5	<2.5	520	<2.5	<2.5	< 2.5	910	5.6	<2.5	360	<2.5
	9/18/2009	<3	<3	<3	<3	< 3.0	9.8	<3	5.5	930	<3	<3	< 3.0	2,600	10	<3	250	<3
	9/18/09 DUP	<3	<3	<3	<3	< 3.0	8.7	<3	4.8	850	<3	<3	< 3.0	2,600	9.3	<3	240	<3
	12/18/2009	<5	<5	<5	<5	< 5.0	6.7	<5	<5	330	<5	<5	< 5.0	1,600	6.7	<5	160	<5
	12/18/2009 DUP	<5	<5	<5	<5	< 5.0	6.6	<5	<5	320	<5	<5	< 5.0	1,500	6.6	<5	160	<5
	3/16/2010	<2.5	<2.5	<2.5	<2.5	< 2.5	<2.5	<2.5	<2.5	180	<2.5	<2.5	< 2.5	510	<2.5	<2.5	52	<2.5
	3/16/2010 DUP	<2	<2	<2	<2	< 2.0	<2	<2	<2	180	<2	<2	< 2.0	560	<2	<2	55	<2
	6/17/2010	<1.5	<1.5	<1.5	<1.5	< 1.5	<1.5	<1.5	<1.5	360	<1.5	<1.5	< 1.5	200	2.7	<1.5	72	<1.5
	6/17/2010 DUP	<1.5	<1.5	<1.5	<1.5	< 1.5	<1.5	<1.5	<1.5	360	<1.5	<1.5	< 1.5	200	2.8	<1.5	72	<1.5
	9/23/2010	<3	<3	<3	<3	< 3.0	3.3	<3	<3	690	<3	<3	< 3.0	750	3.5	<3	110	4.8
	9/23/2010 DUP	<3	<3	<3	<3	< 3.0	3.1	<3	<3	700	<3	<3	< 3.0	740	3.8	<3	100	4.1
	12/10/2010	<0.9	<0.9	<0.9	<0.9	< 0.9	1.8	<0.9	<0.9	94	<0.9	<0.9	< 0.9	220	1.6	<0.9	36	1.7
	12/10/2010 DUP	<0.9	<0.9	<0.9	<0.9	< 0.9	1.7	<0.9	<0.9	98	<0.9	<0.9	< 0.9	230	1.7	<0.9	36	1.8
	3/11/2011	<0.90	<0.90	<0.90	<0.90	< 0.9	6.6	<0.90	1.6	150	0.91	<0.90	< 0.9	420	5.1	<0.90	82	9.3
	03/11/2011 DUP	<0.90	<0.90	<0.90	<0.90	< 0.9	6.5	<0.90	1.9	150	1.1	<0.90	< 0.9	400	5.2	<0.90	80	9.7
	6/7/2011	<2.5	<2.5	<2.5	<2.5	<2.5	4.8	<2.5	3.4	1,400	3.3	<2.5	<2.5	430	4	<2.5	110	7.9
	06/07/2011 DUP	<6	<6	<6	<6	<6	<6	<6	<6	1,400	<6	<6	<6	400	<6	<6	110	7.8
	9/19/2011	<5	<5	<5	<5	<5	<5	<5	<5	1,300	<5	<5	<5	410	<5	<5	84	78
	9/19/2011 DUP	<7	<7	<7	<7	<7	<7	<7	<7	1,300	<7	<7	<7	420	<7	<7	87	81
	12/7/2011	<5	<5	<5	<5	<5	8	<5	6.9	3,400	6.8	<5	<5	200	<5	<5	32	110
	12/7/2011 DUP	<6	<6	<6	<6	<6	7.6	<6	7.8	3,400	6.8	<6	<6	210	<6	<6	32	110
	3/12/2012	<5	<5	<5	<5	<5	9.2	<5	<5	1,600	<5	<5	<5	41	<5	<5	8.6	600
	03/12/2012 DUP	<7	<7	<7	<7	<7	9.5	<7	<7	1,600	<7	<7	<7	42	<7	<7	8.9	660
	06/22/2012	<2	9.2	<2	<2	<2	9.8	<2	<2	540	<2	<2	<2	24	<2	<2	5.1	300
	06/22/2012 DUP	<2	8.1	<2	<2	<2	9	<2	<2	500	<2	<2	<2	25	<2	<2	5.2	290
	9/14/2012	<0.50	6.3	<0.50	<0.50	<0.50	3.8	<0.50	0.54	180	0.7	<0.50	<0.50	28	<0.50	0.52	5.2	80
	9/14/2012 DUP	<0.50	5.7	<0.50	<0.50	<0.50	3.8	<0.50	<0.50	180	0.78	<0.50	<0.50	28	<0.50	<0.50	5.3	79
	12/14/2012	<0.50	6.3	<0.50	<0.50	<0.50	1.9	<0.50	<0.50	130	<0.50	<0.50	<0.50	8.2	<0.50	<0.50	5.3	16
	12/14/2012 DUP	<0.50	5.6	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	130	<0.50	<0.50	<0.50	11	<0.50	<0.50	6.8	18

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-8	12/2/1996	<0.50	<0.50	<0.50	<0.20	<0.20	1	<0.50	0.2	6.5	<1	<0.20	<0.20	2.3	<1	--	12	<0.50
	11/13/1997	<1	<2	<1	<1	<1.0	1.72	<1	2.44	9.32	<1	<1	<1.0	52.4	4	--	38.6	<2
	8/11/1999	<1	<5	<0.50	<0.50	<0.50	0.75	<0.50	<0.50	1.82	<0.50	<0.50	<0.50	46.2	4.79	--	24.3	<0.50
	11/16/1999	<1	<2.5	<0.50	<1	<1.0	1.22	<0.50	<0.50	2.11	<0.50	<0.50	<0.50	39.8	1.55	--	15.5	<0.50
	2/28/2000	<1	<5	<0.50	<0.50	<0.50	0.929	<0.50	0.721	2.38	<0.50	<0.50	<0.50	41.8	3.7	--	20.5	<0.50
	6/27/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.46	<0.50	<0.50	<0.50	33.7	2.88	--	17.5	<0.50
	8/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2001	<100	<5	<0.50	<0.50	<0.50	0.611	<0.50	<0.50	0.601	<0.50	<0.50	<0.50	11.8	<1	--	5.46	<0.50
	9/25/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/18/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2002	<1	<0.50	<0.50	<1	<1.0	1.09	<0.50	<0.50	2.02	<0.50	<0.50	<0.50	12.1	<0.50	--	4.47	<0.50
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	0.84	<0.50	<0.50	<0.50	40.4	1.55	--	11.2	<0.50
	11/10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	<1	<0.50	<0.50	<1	<1.0	1.02	<0.50	<0.50	1.99	<0.50	<0.50	<0.50	8.88	<0.50	--	2.4	<0.50
	11/16/2004	<0.50	<0.50	<0.50	<0.50	<0.50	0.9	<0.50	<0.50	1.6	<0.50	<0.50	<0.50	0.6	<0.50	--	3.1	<0.50
	3/23/2005	<1	<0.50	<0.50	<1	<1.0	0.78	<0.50	<0.50	1.82	<0.50	<0.50	<0.50	13.5	0.53	--	2.41	<0.50
	5/17/2005	<1	<0.50	<0.50	<1	<1.0	1.1	<0.50	<0.50	6.45	<0.50	<0.50	<0.50	13.2	<0.50	--	6.92	<0.50
	5/17/2005 (DUP)	<1	<0.50	<0.50	<1	<1.0	1.19	<0.50	<0.50	6.97	<0.50	<0.50	<0.50	11.4	<0.50	--	6.39	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/16/2005	<1	<0.500	<0.500	<1	<1.00	0.78	<0.500	<0.500	4.19	<0.500	<0.500	<0.500	14.8	0.65	--	2.99	<0.500
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/2006	<1	<1	<1	<1	< 1.00	1.26	<1	<1	19.8	<1	<1	< 1.00	20.7	<1	--	11.4	<1
	12/6/2006	<1	<0.50	<0.50	<1	< 1.00	1.11	<0.50	<0.50	14.2	<0.50	<0.50	< 0.50	18.3	<0.50	--	5.08	<0.50
	2/7/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/23/2007	<1	<1	<1	<1	< 1.00	<1	<1	<1	<1	<1	<1	< 1.00	22.8	<1	--	2.32	<1
	9/12/2007	<1	<0.50	<0.50	<1	<1.00	<0.50	<0.50	<0.50	0.52	<0.50	<0.50	<0.50	12.4	0.6	--	0.65	<0.50
	12/12/2007	<1	<0.50	<0.50	<1	<1.00	1.03	<0.50	<0.50	13.7	<0.50	<0.50	<0.50	8.27	<0.50	--	2.71	<0.50
	3/6/2008	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	1.64	<0.500	<0.500	<0.50	19.1 J	<0.500	<0.500	1.4	<0.500
	6/10/2008[7.]	<1	<1	<1	<1	<1.00	1.07	<1	<1	10.5	<1	<1	<1.00	10.8	<1	<1	3.87	<1
	9/18/2008	<1	<0.500	<0.500	<1	< 0.500	<0.500	<0.500	<0.500	1.58	<0.500	<0.500	< 0.500	13.2	0.5	<0.500	1.21	<0.500
	12/9/2008	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	< 0.50	9.1	<0.50	<0.50	0.57	<0.50
	12/9/2008 DUP	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	< 0.50	9.7	<0.50	<0.50	0.59	<0.50
	3/26/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	2	<0.50	<0.50	< 0.50	8	<0.50	<0.50	0.56	<0.50
	6/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	0.77	<0.50	<0.50	12	<0.50	<0.50	< 0.50	4.8	<0.50	<0.50	1.4	<0.50

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-8 (continued)	9/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	< 0.50	11	<0.50	<0.50	<0.50	<0.50
	12/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	3.2	<0.50	<0.50	< 0.50	8.4	<0.50	<0.50	0.51	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	2	<0.50	<0.50	< 0.50	11	<0.50	<0.50	<0.50	<0.50
	6/14/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	1.1	<0.50	<0.50	20	0.52	<0.50	< 0.50	4.2	<0.50	<0.50	1.1	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	< 0.5	8.1	<0.5	<0.5	<0.5	<0.5
	12/8/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	1.4	<0.5	<0.5	20	1.1	<0.5	< 0.5	2.5	<0.5	<0.5	0.6	<0.5
	3/11/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.93	<0.50	<0.50	20	0.58	<0.50	< 0.50	7.9	<0.50	<0.50	0.95	<0.50
	6/8/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	1.5	<0.5	<0.5	40	0.82	<0.5	< 0.50	4	<0.5	<0.5	1.1	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1.3	<0.50	<0.50	< 0.50	10	<0.50	<0.50	0.54	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	0.54	<0.50	<0.50	< 0.50	10	<0.50	<0.50	<0.50	<0.50
	3/6/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	7.5	<0.50	<0.50	<0.50	6.8	<0.50	<0.50	0.56	<0.50
	06/20/2012	<0.5	<0.5	<0.5	<0.5	<0.5	0.89	<0.5	<0.5	22	<0.5	<0.5	<0.5	6.1	<0.5	<0.5	1.4	<0.5
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	1.30	<0.50	<0.50	36.0	1.00	<0.50	<0.50	4.8	<0.50	<0.50	1	<0.80
MW-9	12/2/1996	<50	<50	<50	<20	<20.0	<30	<50	<20	<20	<100	<20	<20.0	5,000	200	--	1,600	<50
	11/13/1997	<50	<100	<50	<50	<50.0	<50	<50	<50	487	<50	<50	<50.0	2,890	<50	--	1,840	<100
	8/11/1999	<20	<100	<10	<10	<10.0	<10	<10	<10	54	<10	<10	<10.0	1,490	43.2	--	517	<10
	11/16/1999	<20	<50	<10	<20	<20.0	<10	<10	<10	103	<10	<10	<10.0	1,730	32	--	305	<10
	2/28/2000	<20	<100	<10	<10	<10.0	<10	<10	<10	<10	<10	<10	<10.0	2,040	36.4	--	315	<10
	6/27/2000	<50	<250	<25	<25	<25.0	<25	<25	<25	<25	<25	<25	<25.0	1,300	<50	--	298	<25
	8/31/2000	<10	<50	<5	<5	<5.0	<5	<5	<5	<5	<5	<5	<5.0	1,560	31.3	--	229	<5
	11/30/2000	<10	<50	<5	<5	<5.0	21.7	<5	10.5	1,330	11.7	<5	<5.0	823	26.6	--	528	8.15
	9/25/2001	<2.5	<2.5	<2.5	<2.5	<2.5	3.8	<2.5	<2.5	9.1	<2.5	<2.5	<2.5	680	16	--	140	<2.5
	12/17/2001	<5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	306	<5	--	74.2	<2.5
	3/18/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	113	<0.50	--	19.1	<0.50
	5/31/2002	<2	<1	<1	<2	<2.0	<1	<1	<1	1.22	<1	<1	<1.0	296	1.44	--	44	<1
	8/29/2002	<2	<1	<1	<2	<2.0	<1	<1	<1	1.88	<1	<1	<1.0	294	2.12	--	67.4	<1
	11/7/2002	<5	<2.5	<2.5	<5	<5.0	<2.5	<2.5	<2.5	17.2	<2.5	<2.5	<2.5	453	4	--	145	<2.5
	1/23/2003	<2	<1	<1	<2	<2.0	<1	<1	<1	1.66	<1	<1	<1.0	205	2.74	--	59.5	<1
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	1.81	<0.50	<0.50	0.97	<0.50	<0.50	<0.50	141	2.85	--	27.4	<0.50
	11/11/2003	<5	<5	<5	<5	<5.0	<5	<5	<5	23.7	<5	<5	<5.0	401	6.25	--	91.4	<5
	1/27/2004	<2	<1	<1	<2	<2.0	<1	<1	<1	2.58	<1	<1	<1.0	179	2.54	--	58.1	<1
	5/4/2004	<1	<1	<1	<1	<1.0	<1	<1	<1	1.09	<1	<1	<1.0	178	2.56	--	51.9	<1
	11/15/2004	<25	<25	<25	<25	<25.0	28	<25	<25	1,200	27	<25	<25.0	1,800	<25	--	1,000	<25
	3/24/2005	<5	<2.5	<2.5	<5	<5.0	3.3	<2.5	<2.5	54.2	<2.5	<2.5	<2.5	675	8	--	239	<2.5
	5/18/2005	<2	<1	<1	<2	<2.0	<1	<1	<1	2.68	<1	<1	<1.0	2.41	2.08	--	62.4	<1
	8/18/2005	<5	<2.50	<2.50	<5	<5.00	<2.50	<2.50	<2.50	20.5 B	<2.50	<2.50	<2.50	551	7.6	--	209	<2.50
	11/15/2005	<10	<5	<5	<10	<10.0	27.1	<5	6.8	1,020	18.6	<5	<5.00	1,040	14.1	--	633	21.2
	2/21/2006	<10	<5	<5	<10	< 10.0	<5	<5	<5	16.7	<5	<5	< 5.00	534	<5	--	165	<5
	6/5/2006	<1	<1	<1	<1	< 1.00	<1	<1	<1	1.47	<1	<1	< 1.00	151	2.6	--	57.3	<1
	9/5/2006	<5	<2.50	<2.50	<5	< 5.00	5.5	<2.50	<2.50	117	3.15	<2.50	< 2.50	698	6.8	--	314	<2.50
	12/6/2006	<5	<2.50	<2.50	<5	< 5.00	2.95	<2.50	<2.50	59	<2.50	<2.50	< 2.50	578	5.55	--	237	<2.50

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-9 (continued)	2/7/2007	<5	<2.50	<2.50	<5	< 5.00	3.15	<2.50	<2.50	72.6	<2.50	<2.50	< 2.50	591	6.1	--	239	2.65
	5/23/2007	<2	<2	<2	<2	< 2.00	<2	<2	<2	6.32	<2	<2	< 2.00	210	3	--	90.4	<2
	9/12/2007	<2	<1	<1	<2	<2.00	2.34	<1	<1	47.1	1.44	<1	<1.00	282	5.12	--	184	<1
	12/13/2007	<5	<2.50	<2.50	<5	<5.00	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	253	4.45	--	78.4	<2.50
	3/6/2008	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	1.92	<0.500	<0.500	<0.50	138	3.77	<0.500	61.5	<0.500
	6/10/2008	<1	<1	<1	<1	<1.00	<1	<1	<1	2.73	<1	<1	<1.00	297	5.16	<1	87.7	<1
	9/18/2008	<5	<2.50	<2.50	<5	< 2.50	7.05	<2.50	<2.50	172	3.8	<0.5000	< 0.500	524	5.35	<0.500	315	4.15
	12/9/2008	<0.90	<0.90	<0.90	<0.90	< 0.90	3.8	<0.90	1.3	130	2.5	<0.90	< 0.90	270	5.1	<0.90	140	2.3
	3/26/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	5.4	<0.50	<0.50	< 0.50	170	4	<0.50	56	<0.50
	6/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	2.7	<0.50	1.1	72	2.8	<0.50	< 0.50	420	4.9	<0.50	180	1.8
	9/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	3.1	<0.50	<0.50	< 0.50	170	4.4	<0.50	60	<0.50
	12/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	0.57	<0.50	<0.50	< 0.50	120	2.5	<0.50	43	<0.50
	3/19/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	0.8	<0.50	<0.50	< 0.50	160	3	<0.50	48	<0.50
	6/16/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	100	1.4	<0.50	36	<0.50
	9/21/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	< 0.5	140	2.9	<0.5	50	<0.5
	12/10/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.5	100	1.3	<0.5	330	<0.5
	3/11/2011	<0.50	<0.50	<0.50	<0.50	< 0.5	0.66	<0.50	<0.50	17	0.82	<0.50	< 0.5	190	2.7	<0.50	81	0.52
	03/11/2011 DUP	<0.50	<0.50	<0.50	<0.50	< 0.5	0.67	<0.50	<0.50	17	0.85	<0.50	< 0.5	200	2.8	<0.50	84	0.51
	6/10/2011	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	< 0.5	53	1.9	<0.5	31	<0.5
	9/19/2011	<0.50	<0.50	<0.50	<0.50	< 0.5	2.1	<0.50	<0.50	72	2.3	<0.50	< 0.5	230	3.1	<0.50	120	0.78
	12/9/2011	<0.90	<0.90	<0.90	<0.90	< 0.5	53	<0.90	11	1,800	40	<0.90	< 0.5	600	10	<0.90	590	26
	3/12/2012	<0.50	<0.50	<0.50	<0.50	< 0.5	0.66	<0.50	<0.50	20	0.57	<0.50	< 0.5	140	2	<0.50	56	<0.50
	06/22/2012	<0.5	<0.5	<0.5	<0.5	< 0.5	3.3	<0.5	1.1	140	4.3	<0.5	< 0.5	220	3.3	<0.5	180	2.3
	9/14/2012	<0.900	<0.900	<0.900	<0.900	<0.900	<0.900	<0.900	<0.900	17	<0.900	<0.900	<0.900	210	2	<0.900	78	<0.900
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	29	1	<0.50	<0.50	110	1	<0.50	49	<0.50
MW-10	12/2/1996	<0.50	<0.50	<0.50	<0.20	<0.20	<0.30	<0.50	<0.20	<0.20	<1	<0.20	<0.20	2.7	<1	--	0.4	<0.50
	11/13/1997	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.53	<0.50	--	3.65	<1
	8/11/1999	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.02	<1	--	1.24	<0.50
	11/16/1999	<1	<2.5	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	69.6	1.89	--	10.3	<0.50
	2/28/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.63	<1	--	1.16	<0.50
	6/27/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.72	<1	--	3.74	<0.50
	8/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.25	<1	--	2.52	<0.50
	9/25/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/18/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.05	<0.50	--	1.43	<0.50
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-10 (continued)	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	0.86	<0.50	<0.50	<0.50	2.21	<0.50	--	1.28	<0.50
	11/10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.93	<0.50	--	0.98	<0.50
	11/16/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.1	<0.50	--	3.4	<0.50
	3/23/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.02	<0.50	--	1.21	<0.50
	5/17/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.26	<0.50	--	1.19	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/14/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/7/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/23/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/12/2007	<1	<0.50	<0.50	<1	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.59 J	<0.50	--	0.83	<0.50
	3/5/2008	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.50	1.66	<0.500	<0.500	1.67	<0.500
	9/18/2008	<1	<0.500	<0.500	<1	< 0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	< 0.500	1.13	<0.500	<0.500	1.4	<0.500
	3/25/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	1.5	<0.50	<0.50	1.6	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	1.4	<0.50	<0.50	2	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	1.3	<0.50	<0.50	1.6	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.5	1.2	<0.5	<0.5	1.4	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	< 0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.5	1.4	<0.50	<0.50	0.8	<0.50
	9/14/2011	<0.50	<0.50	<0.50	<0.50	< 0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.5	1	<0.50	<0.50	2.1	<0.50
	3/6/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	2	<0.50
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.98	<0.50	<0.50	1.4	<0.50
MW-11	12/2/1996	<50	<50	<50	<20	<20.0	<30	<50	52	140	<100	<20	<20.0	2,200	550	--	5,900	<50
	11/13/1997	<50	<100	<50	<50	<50.0	<50	<50	<50	<50	<50	<50	<50.0	686	90.3	--	2,720	<100
	8/10/1999	<5	<25	<2.5	<2.5	<2.5	13.7	<2.5	22.8	14.4	<2.5	<2.5	<2.5	259	112	--	1,300	<2.5
	11/16/1999	<20	<50	<10	<20	<20.0	12	<10	16.8	18.8	<10	<10	<10.0	478	94.8	--	1,500	<10
	2/28/2000	<5	<25	<2.5	<2.5	<2.5	2.71	<2.5	7.9	5.05	<2.5	<2.5	<2.5	247	30.2	--	473	<2.5
	6/27/2000	<10	<50	<5	<5	<5.0	12.1	<5	28.9	14.8	<5	<5	<5.0	337	108	--	1,390	<5
	8/31/2000	<20	<100	<10	<10	<10.0	15.4	<10	28	24.8	<10	<10	<10.0	646	159	--	1,690	<10
	11/30/2000	<20	<100	<10	<10	<10.0	12.2	<10	26.4	19.3	<10	<10	<10.0	342	125	--	1,550	<10
	2/27/2001	<5	<25	<2.5	<2.5	<2.5	3.65	<2.5	7.82	7.1	<2.5	<2.5	<2.5	198	35.1	--	468	<2.5
	5/30/2001	<10	<50	<5	<5	<5.0	5.2	<5	13.6	9.09	<5	<5	<5.0	256	48.8	--	858	<5
	9/25/2001	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	260	57	--	820	<13
	12/17/2001	<10	<50	<5	<5	<5.0	<5	<5	15.4	25.9	<5	<5	<5.0	983	40.9	--	1,390	<5

Please refer to notes at end of table.

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Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
	3/18/2002	<10	<5	<5	<10	<10.0	11.9	<5	19.4	17.1	<5	<5	<5.0	433	79.8	--	1,370	<5
	5/30/2002	<10	<5	<5	<10	<10.0	5.9	<5	10.9	15.6	<5	<5	<5.0	571	45.6	--	965	<5
	11/7/2002	<10	<5	<5	<10	<10.0	15	<5	19.3	18.9	<5	<5	<5.0	347	112	--	1,640	<5
	1/23/2003	<5	<2.5	<2.5	<5	<5.0	3.35	<2.5	4.3	5.35	<2.5	<2.5	<2.5	265	24.1	--	534	<2.5
	5/28/2003	<10	<5	<5	<10	<10.0	13.3	<5	17.9	17.6	<5	<5	<5.0	305	105	--	1,580	<5
	11/11/2003	<5	<5	<5	<5	<5.0	5	<5	5.15	9.15	<5	<5	<5.0	191	38.8	--	504	<5
	1/26/2004	<10	<5	<5	<10	<10.0	9.6	<5	11.5	13.5	<5	<5	<5.0	369	73.3	--	1,070	<5
	3/22/2004	Well Abandoned																
MW-12	12/2/1996	<50	<50	<50	<20	<20.0	<30	<50	<20	29	<100	<20	<20.0	2,500	<100	--	950	<50
	11/12/1997	<250	<500	<250	<250	<250	<250	<250	<250	2,710	<250	<250	<250	12,900	645	--	5,400	<500
	8/11/1999	<200	<1	<100	<100	<100	120	<100	<100	2,680	<100	<100	<100	11,300	758	--	3,520	<100
	11/16/1999	<200	<500	<100	<200	<200	<100	<100	<100	160	<100	<100	<100	18,200	922	--	4,630	<100
	2/28/2000	<200	<1	<100	<100	<100	<100	<100	<100	908	<100	<100	<100	3,780	<200	--	1,210	<100
	6/27/2000	<100	<500	<50	<50	<50.0	161	<50	<50	2,880	<50	<50	<50.0	12,000	712	--	3,180	<50
	8/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2001	<50	<250	<25	<25	<25.0	64.8	<25	54	1,650	<25	<25	<25.0	4,990	298	--	1,810	<25
	9/25/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/18/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2002	<5	<2.5	<2.5	<5	<5.0	4.25	<2.5	<2.5	101	<2.5	<2.5	<2.5	344	6.6	--	81.6	<2.5
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/29/2003	<5	<2.5	<2.5	<5	<5.0	28.4	<2.5	8	601	5.7	<2.5	<2.5	362	18.2	--	199	<2.5
	11/10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/16/2004	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	59	<2.5	<2.5	<2.5	410	3.5	--	96	<2.5
	3/23/2005	<20	<10	<10	<20	<20.0	247	<10	53	3,640	40.2	<10	<10.0	1,080	49.8	--	639	14.2
	5/18/2005	<1	<0.50	<0.50	<1	<1.0	0.96	<0.50	0.98	30.1	0.57	<0.50	<0.50	51.1	0.92	--	21.4	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/14/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/7/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/2007	<5	<5	<5	<5	< 5.00	35.6	<5	7.45	785	11.1	<5	< 5.00	233	7.8	--	139	<5
	9/11/2007	<100	<50	<50	<100	<100	316	<50	57	6,700	53	<50	<50.0	431	<50	--	516	<50
	12/12/2007	<2	<1	<1	<2	<2.00	1.1	<1	<1	43.8	<1	<1	<1.00	106	3.16	--	39.6	<1
	3/5/2008	<1	4.97	<0.500	<1	<1.00	156	2.01	46.2	3,170	41.8	<0.500	<0.50	440	21.2	<0.500	329	18.5

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-12 (continued)	9/19/2008	<50	<25	<25	<50	< 25.0	394	<25	66	7,650	69	<25	< 25.0	968	45	<25	924	58
	12/10/2008	<4	<4	<4	<4	< 4.0	33	<4	6.6	670	8.7	<4	< 4.0	99	5	<4	80	<4
	3/27/2009	<4	4.8	<4	<4	< 4.0	230	<4	39	4,800	46	<4	< 4.0	540	28	<4	440	31
	03/27/2009 DUP	<4	5	<4	<4	< 4.0	250	<4	44	4,700	51	<4	< 4.0	600	32	<4	490	35
	6/18/2009	<15	<15	<15	<15	<15	170	<15	32	3,500	36	<15	<15	270	<15	<15	230	26
	6/18/09 DUP	<15	<15	<15	<15	<15	170	<15	32	3,600	37	<15	<15	310	<15	<15	250	25
	9/18/2009	<15	<15	<15	<15	< 15	240	<15	46	4,200	50	<15	< 15	540	26	<15	440	51
	9/18/2009 DUP	<15	<15	<15	<15	< 15	260	<15	49	4,600	52	<15	< 15	590	28	<15	470	56
	12/18/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	2.4	<0.50	<0.50	100	1.1	1.3	< 0.50	170	2.2	<0.50	65	<0.50
	12/18/2009 DUP	<0.50	<0.50	<0.50	<0.50	< 0.50	2.2	<0.50	<0.50	96	1.1	1.3	< 0.50	160	2.1	<0.50	62	<0.50
	3/19/2010	<0.50	4.1	<0.50	<0.50	< 0.50	220	2.6	48	4,400	53	<0.50	< 0.50	480	28	0.7	380	37
	3/19/2010 DUP	<15	<15	<15	<15	< 15	270	<15	44	4,900	54	<15	< 15	600	29	<15	460	39
	6/16/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	0.56	<0.50	<0.50	19	<0.50	<0.50	< 0.50	38	<0.50	<0.50	17	<0.50
	06/16/2010 DUP	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	18	0.54	<0.50	< 0.50	37	<0.50	<0.50	16	<0.50
	9/23/2010	<15	<15	<15	<15	< 15	260	<15	47	4,800	56	<15	< 15	780	38	<15	560	68
	9/23/2010 DUP	<15	<15	<15	<15	< 15	260	<15	49	4,800	57	<15	< 15	800	41	<15	580	65
	12/9/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	3.5	<0.5	<0.5	< 0.5	5.1	<0.5	<0.5	2.1	<0.5
	12/9/2010 DUP	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	4.4	<0.5	<0.5	< 0.5	5.8	<0.5	<0.5	2	<0.5
	3/10/2011	<0.50	0.67	<0.50	<0.50	< 0.5	94	0.96	17	1,900	19	0.55	< 0.5	340	12	<0.50	220	11
	03/10/2011 DUP	<0.50	0.87	<0.50	<0.50	< 0.5	93	1	17	1,600	19	0.55	< 0.5	260	13	<0.50	180	11
	6/7/2011	<0.5	<0.5	<0.5	<0.5	< 0.5	1.8	<0.5	<0.5	59	1	<0.5	< 0.5	53	0.7	<0.5	25	<0.5
	6/7/2011 DUP	<0.5	<0.5	<0.5	<0.5	< 0.5	1.8	<0.5	<0.5	60	1	<0.5	< 0.5	58	0.69	<0.5	27	<0.5
	9/19/2011	<0.50	3	<0.50	<0.50	< 0.5	240	2.5	45	4,700	55	<0.50	< 0.5	860	65	0.94	690	63
	9/19/2011 DUP	<20	<20	<20	<20	<20	240	<20	53	4,700	60	<20	<20	860	60	<20	680	68
	12/7/2011	<0.50	<0.50	<0.50	<0.50	<0.5	130	1.3	28	2,900	33	<0.50	<0.5	520	34	0.54	380	40
	12/7/2011 DUP	<0.50	<15	<0.50	<0.50	<0.5	140	1.3	29	2,900	33	<0.50	<0.5	580	34	0.55	400	41
	3/12/2012	<15	<15	<15	<15	<15	210	<15	44	3,800	45	<15	<15	770	48	<15	540	46
	03/12/2012 DUP	<20	<20	<20	<20	<20	220	<20	44	4,000	47	<20	<20	740	50	<20	540	45
	06/22/2012	<5	<5	<5	<5	<5	100	<5	16	1,700	39	<5	<5	270	13	<5	200	22
	06/22/2012 DUP	<5	<5	<5	<5	<5	100	<5	16	1,700	39	<5	<5	270	13	<5	190	22
	9/14/2012	<5	<5	<5	<5	<5	220	<5	45	4,700	56	<5	<5	890	61	<5	590	58
	9/14/2012 DUP	<15	<15	<15	<15	<15	270	<15	58	5,400	73	<15	<15	1,100	76	<15	730	84
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	62	0.97	<0.50	<0.50	38	0.52	<0.50	22	<0.50
	12/13/2012 DUP	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	62	0.92	<0.50	<0.50	38	0.53	<0.50	23	<0.50
MW-13	12/2/1996	0.7	<0.50	<0.50	<0.20	<0.20	<0.30	<0.50	0.3	9.1	<1	<0.20	<0.20	750	6.6	--	82	<0.50
	11/12/1997	<250	<500	<250	<250	<250	291	<250	<250	5,050	<250	<250	<250	18,100	<250	--	9,050	<500
	8/11/1999	<200	<1	<100	<100	<100	<100	<100	<100	2,280	<100	<100	<100	9,590	<200	--	3,920	<100
	11/16/1999	<50	<125	<25	<50	<50.0	108	<25	51	2,620	<25	<25	<25.0	7,210	67.5	--	3,050	--
	2/28/2000	<200	<1	<100	<100	<100	<100	<100	<100	562	<100	<100	<100	1,340	<200	--	602	<100
	6/28/2000	<100	<500	<50	<50	<50.0	132	<50	142	4,210	<50	<50	<50.0	14,700	155	--	6,360	<50
	8/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-13 (continued)	2/27/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2001	<200	<1,000	<100	<100	<100	<100	<100	<100	2,460	<100	<100	<100	10,300	<200	--	4,620	<100
	9/25/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/18/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2002	<2	<1	<1	<2	<2.0	1.44	<1	1.28	60.4	<1	<1	<1.0	241	1.68	--	86.4	<1
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	1.71	<0.50	1.75	79.6	1.26	<0.50	<0.50	121	1.58	--	130	<0.50
	11/10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/16/2004	<12	<12	<12	<12	<12.0	<12	<12	<12	<12	<12	<12	<12.0	1,200	<12	--	230	<12
	3/23/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/18/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	3.14	<0.50	<0.50	<0.50	71.2	<0.50	--	10.3	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/14/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/12/2007	<50	<25	<25	<50	<50.0	55	<25	28	1,290	<25	<25	<25.0	2,730	29.5	--	2,020	<25
	12/12/2007	<1	<0.50	<0.50	<1	<1.00	<0.50	<0.50	<0.50	3.36	<0.50	<0.50	<0.50	51.3	0.64	--	19.5	<0.50
	3/5/2008	<1	<0.500	<0.500	<1	<1.00	8.32	<0.500	4.46	174	4.52	<0.500	<0.50	383	4.21	<0.500	337	0.96
	6/25/2008	<5	<5	<5	<5	<5.00	15.2	<5	<5	320	10.4	<5	<5.00	132	<5	--	160	<5
	9/19/2008	<5	<2.50	<2.50	<5	< 2.50	5.6	<2.50	<2.50	116	2.65	<2.50	< 2.50	266	<2.50	<2.50	187	<2.50
	12/10/2008	<0.50	<0.50	<0.50	<0.50	< 0.50	1.5	<0.50	0.62	32	0.69	<0.50	< 0.50	25	0.6	<0.50	39	<0.50
	3/27/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	0.7	<0.50	<0.50	15	<0.50	<0.50	< 0.50	25	<0.50	<0.50	17	<0.50
	3/27/2009 DUP	<0.50	<0.50	<0.50	<0.50	< 0.50	0.79	<0.50	<0.50	15	<0.50	<0.50	< 0.50	25	<0.50	<0.50	17	<0.50
	6/18/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	2.4	<0.50	0.8	58	1.8	<0.50	< 0.50	16	<0.50	<0.50	42	<0.50
	9/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	5.8	<0.50	3.3	130	2.9	<0.50	< 0.50	430	4	<0.50	270	1
	12/18/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	0.62	<0.50	<0.50	16	<0.50	<0.50	< 0.50	66	0.61	<0.50	45	<0.50
	3/19/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	2.7	<0.50	1.4	64	1.2	<0.50	< 0.50	130	1.3	<0.50	110	<0.50
	6/16/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	< 0.50	14	<0.50	<0.50	7.6	<0.50
	9/23/2010	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	2.7	<0.5	<0.5	< 0.50	45	<0.5	<0.5	12	<0.5
	12/21/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	3/11/2011	<0.50	<0.50	<0.50	<0.50	< 0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.5	1.5	<0.50	<0.50	0.65	<0.50
	6/9/2011	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	1.8	<0.5	<0.5	< 0.5	6.1	<0.5	<0.5	4.2	<0.5
	9/19/2011	<0.50	0.54	<0.50	<0.50	< 0.5	35	<0.50	17	700	20	<0.50	< 0.5	2,200	17	0.63	1,300	3.6
	12/9/2011	<9	<9	<9	<9	< 0.5	23	<9	11	530	18	<9	< 0.5	2,800	12	<9	1,400	<9

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Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-13 (continued)	3/12/2012	<9	<9	<9	<9	<9	24	<9	14	600	14	<9	<9	1,800	11	<9	1,200	<9
	06/22/2012	<4	<4	<4	<4	<4	40	<4	13	940	30	<4	<4	1,300	8.6	<4	1,000	4.5
	9/14/2012	<4	<4	<4	<4	<4	38	<4	21	900	22	<4	<4	3,100	16	<4	1,800	<4
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	13	0.62	<0.50	<0.50	88	<0.50	<0.50	51	<0.50
MW-14	11/12/1997	<5	<10	<5	<5	<5.0	5.01	<5	<5	<5	<5	<5	<5.0	42.6	<5	--	394	<10
	8/10/1999	<20	<100	<10	<10	<10.0	<10	<10	<10	15.1	<10	<10	<10.0	121	35.6	--	853	<10
	11/16/1999	<2	<5	<1	<2	<2.0	2.48	<1	2.48	4.2	<1	<1	<1.0	186	10.8	--	313	<1
	2/28/2000	<100	<500	<50	<50	<50.0	<50	<50	83.2	85.1	<50	<50	<50.0	711	190	--	5,300	<50
	6/27/2000	<10	<50	<5	<5	<5.0	10.1	<5	18.9	219	<5	<5	<5.0	207	46.2	--	1,150	<5
	8/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/30/2000	<2	<10	<1	<1	<1.0	1.08	<1	1.88	2.27	<1	<1	<1.0	21.3	5.54	--	157	<1
	2/27/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2001	<1	<50	<5	<5	<5.0	6.16	<5	13.8	30.4	<5	<5	<5.0	268	28.2	--	1,280	<5
	9/25/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/18/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2002	<10	<5	<5	<10	<10.0	<5	<5	<5	8.4	<5	<5	<5.0	78.3	11.9	--	303	<5
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	0.9	<0.50	1.47	4.15	<0.50	<0.50	<0.50	80.6	4.99	--	188	<0.50
	11/10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	<25	<25	<25	<25	<25.0	<25	<25	<25	96	<25	<25	<25.0	480	<25	--	1,200	<25
	3/23/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/17/2005	<2	<1	<1	<2	<2.0	4.64	<1	2.3	41.1	<1	<1	<1.0	127	9.28	--	367	<1
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/14/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/12/2007	<20	<10	<10	<20	<20.0	21.6	<10	<10	162	<10	<10	<10.0	180	22.2	--	963	<10

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-14 (continued)	3/5/2008	<1	<0.500	0.850 J	<1	<1.00	24.3	<0.500	13.9	217	3.86	<0.500	<0.50	549	27.2	<0.500	1,770	<0.500
	6/25/2008	<5	<5	<5	<5	<5.00	15.2	<5	10.2	113	<5	<5	<5.00	360	18.2	--	1,290	<5
	9/19/2008	<5	<2.50	<2.50	<5	< 2.50	19.1	<2.50	8.6	173	<2.50	<2.50	< 2.50	425	16.6	<2.50	1,320	<2.50
	12/10/2008	<5	<5	<5	<5	< 5.0	17	<5	9.6	160	<5	<5	< 5.0	330	17	<5	1,200	<5
	3/27/2009	<2.5	<2.5	<2.5	<2.5	< 2.5	16	<2.5	6.7	160	2.5	<2.5	< 2.5	320	14	<2.5	980	<2.5
	6/17/2009	<2.5	<2.5	<2.5	<2.5	< 2.5	21	<2.5	12	150	<2.5	<2.5	< 2.5	400	21	<2.5	1,400	<2.5
	9/18/2009	<0.50	<0.50	0.74	<0.50	< 0.50	19	<0.50	8.8	150	2	<0.50	< 0.50	440	17	<0.50	1,300	<0.50
	12/15/2009	<2.5	<2.5	<2.5	<2.5	< 2.5	11	<2.5	4.7	120	<2.5	<2.5	< 2.5	410	7.6	<2.5	820	<2.5
	3/17/2010	<2.5	<2.5	<2.5	<2.5	< 2.5	22	<2.5	9.5	140	<2.5	<2.5	< 2.5	320	15	<2.5	1,300	<2.5
	7/2/2010	<2.5	<2.5	<2.5	<2.5	< 2.5	7	<2.5	4.8	52	<2.5	<2.5	< 2.5	220	5.9	<2.5	610	<2.5
	9/22/2010	<3	<3	<3	<3	< 3.0	16	<3	6.5	140	<3	<3	< 3.0	230	10	<3	800	<3
	12/8/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	1.2	<0.5	0.7	11	<0.5	<0.5	< 0.5	82	1.5	<0.5	150	<0.5
	3/9/2011	<3	<3	<3	<3	< 3.0	6.8	<3	3.8	55	<3	<3	< 3.0	200	5	<3	540	<3
	6/8/2011	<0.5	<0.5	<0.5	<0.5	< 0.5	0.64	<0.5	<0.5	1.8	<0.5	<0.5	< 0.5	27	1.1	<0.5	66	<0.5
	9/14/2011	<2.5	<2.5	<2.5	<2.5	<2.5	12	<2.5	5.7	120	<2.5	<2.5	<2.5	300	8	<2.5	850	<2.5
	12/6/2011	<2.5	<2.5	<2.5	<2.5	<2.5	8.4	<2.5	3.9	88	<2.5	<2.5	<2.5	320	5.7	<2.5	740	<2.5
	3/7/2012	<2.5	<2.5	<2.5	<2.5	<2.5	9.3	<2.5	4.6	87	<2.5	<2.5	<2.5	270	6.1	<2.5	760	<2.5
	06/19/2012	<2.5	<2.5	<2.5	<2.5	<2.5	11	<2.5	5.6	70	<2.5	<2.5	<2.5	200	7.4	<2.5	730	<2.5
	9/11/2012	<2.5	<2.5	<2.5	<2.5	<2.5	11	<2.5	5.1	110	<2.5	<2.5	<2.5	280	6.6	<2.5	730	<2.5
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.51	<0.50	<0.50	<0.50	16	<0.50	<0.50	27	<0.50
MW-15	11/13/1997	<0.50	<1	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	6.78	<0.50	<0.50	<0.50	2.38	1.68	--	1.81	<1
	8/11/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/16/1999	<1	<2.5	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	967	13.7	--	63.4	<0.50
	2/28/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	17.9	1.55	--	1.01	<0.50
	6/27/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.44	1.03	--	0.565	<0.50
	8/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.32	<1	--	<0.50	<0.50
	9/25/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/18/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.59	0.63	--	<0.50	<0.50
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/29/2003	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	0.53	<0.50	<0.50	<0.50	4.42	<0.50	--	1.3	<0.50
	11/10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-15 (continued)	11/2/2004	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.9	<0.50	--	<0.50	<0.50
	11/16/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.73	<0.50	<0.50	<0.50	12	<0.50	--	3.1	<0.50
	3/24/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.74	<0.50	--	1.49	<0.50
	5/17/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.54	<0.50	--	0.58	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/14/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/13/2007	<1	<0.50	<0.50	<1	<1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.54 J	<0.50	--	<0.50	<0.50
	3/7/2008	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.50	2.63 J	<0.500	<0.500	<0.500	<0.500
	9/18/2008	<1	<0.500	<0.500	<1	< 0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	< 0.500	0.86	<0.500	<0.500	<0.500	<0.500
	3/25/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	1	<0.50	<0.50	<0.50	<0.50
	9/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	0.81	<0.50	<0.50	<0.50	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	0.7	<0.50	<0.50	<0.50	<0.50
	9/23/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.5	0.76	<0.5	<0.5	<0.5	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/16/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	0.64	<0.50	<0.50	<0.50	<0.50
	3/9/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.7	<0.50	<0.50	<0.50	<0.50
	9/10/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	<0.50	<0.50
MW-16	11/12/1997	<5	<10	<5	<5	<5.0	19.8	<5	27.8	23.6	<5	<5	<5.0	328	57.5	--	142	<10
	8/11/1999	<5	<25	<2.5	<2.5	<2.5	15.2	<2.5	<2.5	7.2	<2.5	<2.5	<2.5	205	55.6	--	85.6	<2.5
	11/16/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/28/2000	<2	<10	<1	<1	<1.0	10.4	<1	12	7.4	<1	<1	<1.0	523	54.5	--	112	<1
	6/27/2000	<10	<50	<5	<5	<5.0	12.4	<5	13.9	8.39	<5	<5	<5.0	236	45	--	93.8	<5
	8/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2001	<10	<50	<5	<5	<5.0	9.28	<5	12	8.95	<5	<5	<5.0	302	30.1	--	110	<5
	9/25/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/18/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2002	<5	<2.5	<2.5	<5	<5.0	13.5	<2.5	10.6	8.65	<2.5	<2.5	<2.5	467	24	--	119	<2.5
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/29/2003	<5	<2.5	<2.5	<5	<5.0	3.6	<2.5	3.35	2.85	<2.5	<2.5	<2.5	412	13.4	--	76	<2.5
	11/10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

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NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-16 (continued)	11/2/2004	<2	<10	<1	<1	<1.0	<1	<1	<1	1.66	<1	<1	<1.0	260	6.9	--	25.4	<1
	11/16/2004	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	300	7.8	--	26	<2.5
	3/24/2005	<2	<1	<1	<2	<2.0	1.8	<1	1.34	1.96	<1	<1	<1.0	373	11.8	--	49.4	<1
	5/17/2005	<1	<0.50	<0.50	<1	<1.0	4.39	<0.50	3.14	9.25	<0.50	<0.50	<0.50	120	9.09	--	41.5	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2005	<1	<0.500	<0.500	<1	<1.00	2.75	<0.500	1.86	2.5	<0.500	<0.500	<0.500	152	8.94	--	33.4	<0.500
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/6/2006	<2	<2	<2	<2	< 2.00	12.2	<2	3.38	210	<2	<2	< 2.00	84.6	2.56	--	25.2	5.64
	12/6/2006	<2	<1	<1	<2	< 2.00	4.2	<1	2.12	16.7	<1	<1	< 1.00	176	5.88	--	45.6	<1
	5/23/2007	<1	<1	<1	<1	< 1.00	2.57	<1	<1	14	<1	<1	< 1.00	98.8	3.35	--	23.8	<1
	9/13/2007	<1	<0.50	<0.50	<1	<1.00	3.15	<0.50	1.08	6.6	<0.50	<0.50	< 0.50	163	5.87	--	49.2	<0.50
	12/12/2007	<2	<1	<1	<1	<1.00	2.32	<1	1.44	5.9	<1	<1	<1.00	110	5.92	--	28.2	<1
	3/7/2008	<1	<0.500	<0.500	<1	<1.00	3	<0.500	1.86	5.93	<0.500	<0.500	<0.50	280	6.12	<0.500	73.3	<0.500
	9/18/2008	<5	<2.50	<2.50	<5	< 2.50	2.7	<2.50	<2.50	5.15	<2.50	<2.50	< 2.50	300	6.2	<2.50	65.2	<2.50
	12/9/2008	<1	<1	<1	<1	< 1.0	2.6	<1	1.8	5.5	<1	<1	< 1.0	300	5.7	<1	67	<1
	3/26/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.4	<0.50	0.82	3.2	<0.50	<0.50	< 0.50	150	5.2	<0.50	28	<0.50
	6/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	5	<0.50	0.95	29	<0.50	<0.50	< 0.50	54	1.8	<0.50	16	0.68
	9/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.5	<0.50	1.1	2	<0.50	<0.50	< 0.50	220	4.8	<0.50	33	<0.50
	12/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	0.87	<0.50	0.6	1.4	<0.50	<0.50	< 0.50	100	3.2	<0.50	19	<0.50
	3/19/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	1.2	<0.50	1	2	<0.50	<0.50	< 0.50	110	4.5	<0.50	36	<0.50
	6/16/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	4.9	<0.50	0.91	37	<0.50	<0.50	< 0.50	39	0.94	<0.50	9.9	1.6
	9/23/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	1.4	<0.5	0.94	2.8	<0.5	<0.5	< 0.5	240	4.2	<0.5	43	<0.5
	12/10/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	0.85	<0.5	0.54	1.6	<0.5	<0.5	< 0.5	94	2.4	<0.5	18	<0.5
	3/10/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	1.8	<0.50	0.5	6.2	<0.50	<0.50	< 0.50	110	1.9	<0.50	21	<0.50
	6/9/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	4.9	<0.5	1.2	63	<0.5	<0.5	< 0.50	28	<0.5	<0.5	7.1	2.2
	9/19/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	1.2	<0.50	<0.50	5.1	<0.50	<0.50	< 0.50	160	2.7	<0.50	13	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.92	<0.50	0.61	2.2	<0.50	<0.50	< 0.50	210	2.9	<0.50	38	<0.50
	06/20/2012	<0.5	<0.5	<0.5	<0.5	<0.5	3.6	<0.5	0.56	24	<0.5	<0.5	<0.5	60	0.98	<0.5	14	0.62
	9/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	1.7	<0.50	0.61	6.5	<0.50	<0.50	<0.50	190	2.4	<0.50	35	<0.50
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	0.68	5.7	<0.50	<0.50	<0.50	110	1.1	<0.50	24	<0.50
MW-17	11/13/1997	<0.50	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.9	<0.50	--	<0.50	<1
	8/11/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/16/1999	<1	<2.5	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	127	1.5	--	9.54	<0.50
	2/28/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.85	<1	--	2.51	<0.50
	6/27/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.27	<1	--	<0.50	<0.50
	8/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1	--	<0.50	<0.50
	9/25/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-17 (continued)	3/18/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.82	<0.50	--	<0.50	<0.50
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.75	<0.50	--	0.92	<0.50
	11/10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.5	<0.50	--	<0.50	<0.50
	3/23/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/17/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.06	<0.50	--	6.68	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/14/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/7/2007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/23/2007	<1	<1	<1	<1	< 1.00	<1	<1	<1	8.82	<1	<1	< 1.00	37.8	<1	--	28.2	<1
	9/11/2007	<1	<0.50	<0.50	<1	< 1.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	0.50 J	<0.50	--	<0.50	<0.50
	3/5/2008	<1	<0.500	<0.500	<1	< 1.00	0.9	<0.500	<0.500	0.96	<0.500	<0.500	<0.50	1.05	<0.500	<0.500	3.62	<0.500
	9/19/2008	<1	<0.500	<0.500	<1	< 0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	< 0.500	<0.500	<0.500	<0.500	0.8	<0.500
	3/25/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	0.57	<0.50	<0.50	1	<0.50	<0.50	< 0.50	0.69	<0.50	<0.50	3	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	0.8	<0.50	<0.50	< 0.50	0.72	<0.50	<0.50	3.2	<0.50
	3/23/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	1.2	<0.50	<0.50	3.9	<0.50	<0.50	< 0.50	3.2	0.58	<0.50	18	<0.50
	9/20/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	0.69	<0.5	<0.5	< 0.5	0.71	<0.5	<0.5	3	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.65	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	2.5	<0.50	<0.50	8.2	<0.50
	9/13/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	0.96	<0.50	<0.50	< 0.50	0.71	<0.50	<0.50	3.1	<0.50
	3/7/2012	<0.50	<0.50	<0.50	<0.50	<0.5	1.6	<0.50	<0.50	5.4	<0.50	<0.50	<0.5	6.8	0.56	<0.50	25	<0.50
	9/11/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.73	<0.50	<0.50	<0.50	0.66	<0.50	<0.50	2.5	<0.50
MW-18i	9/29/2000	ND	ND	0.694	ND	--	0.843	ND	ND	16.5	ND	ND	--	11.7	ND	--	8.32	ND
	11/30/2000	<1	<5	<0.50	<0.50	<0.50	0.907	<0.50	<0.50	11.6	<0.50	<0.50	<0.50	12.4	<1	--	17.6	<0.50
	2/27/2001	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	10.2	<2.5	<2.5	<2.5	15.2	<5	--	10	<2.5
	5/30/2001	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	6.47	<2.5	<2.5	<2.5	29.5	<5	--	8.06	<2.5
	9/25/2001	<1	<1	<1	<1	<1.0	1.8	<1	<1	23	<1	<1	<1.0	62	2.3	--	39	<1
	3/29/2002	<1	<0.50	<0.50	<1	<1.0	1.2	<0.50	<0.50	17.3	<0.50	<0.50	<0.50	71.1	1.22	--	31	<0.50
	5/30/2002	<1	<0.50	<0.50	<1	<1.0	1.18	<0.50	<0.50	18.6	<0.50	<0.50	<0.50	53.2	1.14	--	19.3	<0.50
	8/29/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	6.91	<0.50	<0.50	<0.50	18.2	<0.50	--	7.34	<0.50
	11/7/2002	<1	<0.50	<0.50	<1	<1.0	0.56	<0.50	<0.50	10.1	<0.50	<0.50	<0.50	23.3	<0.50	--	9.7	<0.50
	1/23/2003	<1	<0.50	<0.50	<1	<1.0	0.68	<0.50	<0.50	12.3	<0.50	<0.50	<0.50	27.6	0.5	--	12.5	<0.50

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Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-18i (continued)	5/29/2003	<1	<0.50	<0.50	<1	<1.0	0.59	<0.50	<0.50	10.4	<0.50	<0.50	<0.50	23.9	0.5	--	10.8	<0.50
	11/11/2003	<1	<1	<1	<1	<1.0	<1	<1	<1	16.1	<1	<1	<1.0	31.5	<1	--	16.3	<1
	1/27/2004	<1	<0.50	<0.50	<1	<1.0	0.67	<0.50	<0.50	14.2	<0.50	<0.50	<0.50	69.7	0.53	--	12	<0.50
	5/4/2004	<1	<1	<1	<1	<1.0	<1	<1	<1	15.6	<1	<1	<1.0	112	<1	--	12.1	<1
	8/17/2004	<1	<0.50	3.76	<0.50	<0.50	0.81	1.86	<0.50	22.6	0.78	<0.50	<0.50	43.8	0.96	--	24	<1
	11/2/2004	<0.50	<0.50	<0.50	<0.50	<0.50	1.09	<0.50	<0.50	21.8	<0.50	<0.50	<0.50	32.2	0.6	--	17.8	<0.50
	11/16/2004	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	24	<0.50	<0.50	<0.50	42	0.69	--	21	<0.50
	2/1/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	8.92	<0.50	<0.50	<0.50	13	<0.50	--	6.01	<0.50
	5/18/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	11	<0.50	<0.50	<0.50	9.69	<0.50	--	7.3	<0.50
	8/18/2005	<1	<0.500	<0.500	<1	<1.00	1.17	<0.500	<0.500	18 B	<0.500	<0.500	<0.500	21.4 B	0.58	--	16.3 B	<0.500
	08/18/2005 (DUP)	<1	<0.500	<0.500	<1	<1.00	1.17	<0.500	<0.500	18.5 B	<0.500	<0.500	<0.500	21.8 B	0.57	--	16.2 B	<0.500
	11/15/2005	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	7.31	<0.500	<0.500	<0.500	11.4	<0.500	--	6.31	<0.500
	2/21/2006	<1	<0.500	<0.500	<1	< 1.00	0.93	<0.500	<0.500	14.8	<0.500	<0.500	< 0.500	24.3	0.52	--	15.2	<0.500
	6/6/2006	<1	<1	<1	<1	< 1.00	<1	<1	<1	5.88	<1	<1	< 1.00	8.46	<1	--	4.47	<1
	9/6/2006	<1	<0.50	<0.50	<1	< 1.00	<0.50	<0.50	<0.50	5.79	<0.50	<0.50	< 0.50	7.89	<0.50	--	4.23	<0.50
	12/6/2006	<1	<0.50	<0.50	<1	< 1.00	0.56	<0.50	<0.50	11.6	<0.50	<0.50	< 0.50	11.2	<0.50	--	6.91	<0.50
	2/7/2007	<1	<0.50	<0.50	<1	< 1.00	0.68	<0.50	<0.50	12	<0.50	<0.50	< 0.50	15	<0.50	--	9.32	<0.50
	5/23/2007	<1	<1	<1	<1	< 1.00	<1	<1	<1	14.6	<1	<1	< 1.00	17.2	<1	--	11.3	<1
	9/11/2007	<1	<0.50	<0.50	<1	< 1.00	<0.50	<0.50	<0.50	4.87	<0.50	<0.50	< 0.50	1.13	<0.50	--	1.46	<0.50
	12/13/2007	<1	<0.50	<0.50	<1	< 1.00	<0.50	<0.50	<0.50	2.99	<0.50	<0.50	< 0.50	5.57	<0.50	--	3.32	<0.50
	3/6/2008	<1	<0.500	<0.500	<1	<1.00	0.82	<0.500	<0.500	13.2	<0.500	<0.500	<0.50	13.2	<0.500	<0.500	9.78	<0.500
	6/10/2008	<1	1	1	<1	<1.00	<1	<1	<1	4.17	<1	<1	<1.00	4.31	<1	--	2.18	<1
	9/17/2008	<1	<0.500	<0.500	<1	< 0.500	<0.500	<0.500	<0.500	3.95	<0.500	<0.500	< 0.500	3.1	<0.500	<0.500	2.55	<0.500
	12/9/2008	<0.50	<0.50	<0.50	<0.50	< 0.50	0.7	<0.50	<0.50	12	<0.50	<0.50	< 0.50	8.5	<0.50	<0.50	7.4	<0.50
	3/26/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	0.51	<0.50	<0.50	8	<0.50	<0.50	< 0.50	4.8	<0.50	<0.50	4.7	<0.50
	6/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	3.3	<0.50	<0.50	< 0.50	2.5	<0.50	<0.50	1.7	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	8.2	<0.50	<0.50	< 0.50	5.9	<0.50	<0.50	4.5	<0.50
	12/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	< 0.50	2.5	<0.50	<0.50	1.6	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	0.52	<0.50	<0.50	11	<0.50	<0.50	< 0.50	9.7	<0.50	<0.50	6	<0.50
	6/15/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	3	<0.50	<0.50	< 0.50	3.6	<0.50	<0.50	1.8	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	0.71	<0.5	0.5	15	<0.5	<0.5	< 0.5	9.8	<0.5	<0.5	7.4	<0.5
	12/9/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	0.66	<0.5	0.5	15	<0.5	<0.5	< 0.5	12	<0.5	<0.5	8	<0.5
	3/10/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.5	<0.50	<0.50	12	<0.50	<0.50	< 0.50	9.4	<0.50	<0.50	5.2	<0.50
	6/9/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	2	<0.5	<0.5	< 0.50	2.1	<0.5	<0.5	1	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	3.3	<0.50	<0.50	< 0.50	2.9	<0.50	<0.50	1.9	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	9.8	<0.50	<0.50	< 0.50	8.5	<0.50	<0.50	4.8	<0.50
	3/7/2012	<0.50	<0.50	<0.50	<0.50	<0.50	0.62	<0.50	<0.50	15	<0.50	<0.50	<0.50	12	<0.50	<0.50	6.4	<0.50
	06/21/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	0.97	<0.50
	9/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.2	<0.50	<0.50	<0.50	1.7	<0.50	<0.50	1.0	<0.50
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.3	<0.50	<0.50	<0.50	3.9	<0.50	<0.50	2.1	<0.50

Please refer to notes at end of table.

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NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-19	11/7/2002	<20	<10	<10	<20	<20.0	252	<10	66.2	2,450	23	<10	<10.0	3,100	139	--	1,810	79.2
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2003	<50	<25	<25	<50	<50.0	109	<25	36	1,300	<25	<25	<25.0	7,160	104	--	2,070	35.5
	11/11/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/16/2004	<50	<50	<50	<50	<50.0	<50	65	<50	490	<50	<50	<50.0	7,300	130	--	1,400	<50
	3/23/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/18/2005	<10	<5	<5	<10	<10.0	19.3	<5	<5	161	<5	<5	<5.0	1,500	33.8	--	205	24.6
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2005	<20	<10	<10	<20	<20.0	27	<10	18.8	230	<10	<10	<10.0	3,080	67.2	--	785	14.6
	11/15/2005 (DUP)	<20	<10	<10	<20	<20.0	25	<10	20.2	221	<10	<10	<10.0	2,860	64.4	--	762	15.2
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/2006	<10	<10	<10	<10	< 10.0	<10	<10	<10	80.9	<10	<10	< 10.0	1,280	13.1	--	237	<10
	12/6/2006	<20	<10	<10	<20	< 20.0	<10	<10	<10	76.2	<10	<10	< 10.0	2,060	17.2	--	304	<10
	5/22/2007	<20	<20	<20	<20	< 20.0	<20	<20	<20	114	<20	<20	< 20.0	2,720	51.4	--	504	<20
	9/11/2007	<50	<25	<25	<50	<50.0	<25	<25	<25	85.5	<25	<25	<25.0	3,370	62.5	--	608	<25
	12/12/2007	<50	<25	<25	<50	<50.0	<25	<25	<25	80	<25	<25	<25.0	2,070	38.5	--	326	<25
	3/5/2008 [7]	<1	<0.500	<0.500	<1	<1	12.5	<0.500	20.5	149	4.53	<0.500	<0.50	4,060	66	<0.500	1,030	6.41
	6/25/2008	<20	<20	<20	<20	<20.0	45.8	<20	29.6	435	<20	<20	<20.0	2,790	46.6	--	1,410	<20
	9/19/2008	<50	<25	<25	<50	< 25.0	62	<25	37.5	715	<25	<25	< 25.0	4,990	56.5	<25	2,870	39.5
	12/10/2008	<25	<25	<25	<25	< 25	51	<25	<25	500	<25	<25	< 25	6,600	110	<25	1,100	<25
	3/27/2009	<15	<15	<15	<15	< 15	53	<15	39	650	<15	<15	< 15	4,500	120	<15	1,900	25
	3/27/2009 DUP	<15	<15	<15	<15	< 15	56	<15	39	670	<15	<15	< 15	4,800	130	<15	1,900	25
	6/18/2009	<2.5	<2.5	<2.5	<2.5	< 2.5	5.4	<2.5	5.3	82	<2.5	<2.5	< 2.5	680	8.6	<2.5	240	<2.5
	6/18/2009 DUP	<2.5	<2.5	<2.5	<2.5	< 2.5	5.1	<2.5	5.4	80	<2.5	<2.5	< 2.5	660	8.4	<2.5	240	<2.5
	9/18/2009	<2.5	<2.5	<2.5	<2.5	< 2.5	12	<2.5	36	170	4.6	<2.5	< 2.5	9,400	140	<2.5	2,000	11
	9/18/2009 DUP	<2.5	<2.5	<2.5	<2.5	< 2.5	12	<2.5	36	170	4.4	<2.5	< 2.5	9,700	140	<2.5	2,000	12
	12/18/2009	<10	<10	<10	<10	< 10	87	<10	29	780	13	<10	< 10	3,200	57	<10	1,200	35
	12/18/2009 DUP	<10	<10	<10	<10	< 10	84	<10	27	740	12	<10	< 10	3,100	53	<10	1,200	32
	3/19/2010	<5	<5	<5	<5	< 5	<5	<5	8.3	45	<5	<5	< 5	1,900	19	<5	380	<5
	3/19/10 DUP	<7	<7	<7	<7	< 7	<7	<7	8.3	44	<7	<7	< 7	1,800	18	<7	360	<7
	6/17/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	6.7	<0.50	<0.50	< 0.50	67	<0.50	<0.50	25	<0.50
	6/17/2010 DUP	<0.50	<0.50	<0.50	<0.50	< 0.50	0.53	<0.50	<0.50	6.9	<0.50	<0.50	< 0.50	65	0.52	<0.50	24	<0.50
	9/23/2010	<2.5	<2.5	<2.5	<2.5	< 2.5	8.7	<2.5	21	110	3.6	<2.5	< 2.5	3,400	50	<2.5	920	12
	9/23/2010 DUP	<2.5	<2.5	<2.5	<2.5	< 2.5	8.5	<2.5	21	110	3.4	<2.5	< 2.5	3,700	49	<0.25	890	13
	12/9/2010	<15	<15	<15	<15	< 15	59	<15	38	590	<15	<15	< 15	6,200	68	<15	1,500	48
	12/9/2010 DUP	<1.5	<1.5	<1.5	<1.5	< 1.5	58	<1.5	37	590	<1.5	<1.5	< 1.5	6,000	67	<1.5	1,500	48

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-19 (continued)	3/8/2011	<5	<5	<5	<5	< 5.0	23	<5	12	280	<5	<5	< 5.0	1,500	18	<5	590	13
	6/10/2011	<0.9	<0.9	<0.9	<0.9	<0.90	22	<0.9	2.7	160	1.4	<0.9	<0.90	240	3.6	<0.9	130	5.6
	6/10/2011 DUP	<0.9	<0.9	<0.9	<0.9	<0.5	19	<0.9	2.3	140	1.3	<0.9	<0.5	220	3.3	<0.9	120	5
	9/19/2011	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	53	<1.5	<1.5	<1.5	400	3	<1.5	78	<1.5
	9/19/2011 DUP	<2	<2	<2	<2	<2	<2	<2	<2	53	<2	<2	<2	410	3.2	<2	80	<2
	12/9/2011	<1.5	<1.5	<1.5	<1.5	<1.5	5	<1.5	4.3	110	<1.5	<1.5	<1.5	730	10	<1.5	220	3.9
	12/9/2011 DUP	<2	<2	<2	<2	<2	5.4	<2	4.7	120	<2	<2	<2	770	10	<2	230	3.9
	3/9/2012	<2.5	<2.5	<2.5	<2.5	<2.5	46	<2.5	26	820	1	<2.5	<2.5	2,400	50	<2.5	1,200	67
	03/09/2012 DUP	<4	<4	<4	<4	<4	43	<4	24	770	8.8	<4	<4	2,400	46	<4	1,200	62
	06/22/2012	<5	<5	<5	<5	<5	74	<5	17	1,000	14	<5	<5	1,300	21	<5	1,000	57
	06/22/2012 DUP	<5	<5	<5	<5	<5	74	<5	18	1,000	13	<5	<5	1,300	22	<5	1,000	57
	9/14/2012	<5	<5	<5	<5	<5	<5	<5	5.7	300	<5	<5	<5	2,200	31	<5	340	8
	9/14/2012 DUP	<5	<5	<5	<5	<5	<5	<5	5.9	300	<5	<5	<5	2,300	31	<5	340	<5
	12/14/2012	<1.5	9.8	<1.5	<1.5	<1.5	21	<1.5	1.8	330	3.6	<1.5	<1.5	290	3.2	<1.5	140	3.1
	12/14/2012 DUP	<1.0	9.3	<1.0	<1.0	<1.0	21	<1.0	1.7	340	3.7	<1.0	<1.0	300	3.1	<1.0	140	3
MW-19i	6/10/2008	<1	<1	<1	<1	<1.00	<1	<1	<1	8.46	<1	<1	<1.00	<1	<1	<1	1.28	<1
	9/17/2008	<1	<0.500	<0.500	<1	< 0.500	1.93	0.53	<0.500	27.1	<0.500	<0.500	< 0.500	1.72	<0.500	<0.500	5.77	<0.500
	12/10/2008	<0.50	<0.50	<0.50	<0.50	< 0.50	1.8	<0.50	<0.50	28	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	5.6	<0.50
	3/26/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.7	<0.50	<0.50	25	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	3.3	<0.50
	6/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	0.9	<0.50	<0.50	10	<0.50	<0.50	< 0.50	0.67	<0.50	<0.50	1.5	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.7	0.64	<0.50	28	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1.8	0.79
	12/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	0.87	<0.50	<0.50	10	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	0.7	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	1.1	0.53	<0.50	15	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1.9	<0.50
	6/15/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	4.7	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	1.2	0.58	<0.5	20	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	2.4	<0.5
	12/9/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	1	<0.5	<0.5	14	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	1	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.94	<0.50	<0.50	14	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1.4	<0.50
	6/9/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	0.88	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	<0.5	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	4.1	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	0.73	<0.50
	12/9/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.72	<0.50	<0.50	8.8	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1	<0.50
	3/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	0.86	<0.50	<0.50	13	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50
	06/21/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.65	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
MW-20i	6/10/2008	<1	<1	<1	<1	<1.00	<1	<1	<1	18	<1	<1	<1.00	5.77	<1	<1	3.2	<1
	9/17/2008	<1	<0.500	<0.500	<1	< 0.500	2.12	<0.500	<0.500	42.3	<0.500	<0.500	< 0.500	12.8	<0.500	<0.500	11	<0.500
	12/11/2008	<0.50	<0.50	<0.50	<0.50	< 0.50	2.1	<0.50	<0.50	47	<0.50	<0.50	< 0.50	11	<0.50	<0.50	9.3	<0.50
	3/25/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.8	<0.50	<0.50	36	<0.50	<0.50	< 0.50	8.4	<0.50	<0.50	6.4	<0.50
	6/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.6	<0.50	<0.50	30	<0.50	<0.50	< 0.50	6.3	<0.50	<0.50	5.1	<0.50
	9/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.6	<0.50	<0.50	34	<0.50	<0.50	< 0.50	7.4	<0.50	<0.50	5	<0.50
	12/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	9.3	<0.50	<0.50	< 0.50	1.1	<0.50	<0.50	0.69	<0.50

Please refer to notes at end of table.

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Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-20i (continued)	3/18/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	2.1	<0.50	<0.50	47	<0.50	<0.50	< 0.50	11	<0.50	<0.50	6.9	<0.50
	6/15/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	0.51	<0.50	<0.50	13	<0.50	<0.50	< 0.50	4.3	<0.50	<0.50	2.3	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	1.8	<0.5	<0.5	43	<0.5	<0.5	< 0.5	17	<0.5	<0.5	10	<0.5
	12/9/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	13	<0.5	<0.5	< 0.5	3.7	<0.5	<0.5	2	<0.5
	3/11/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	9.6	<0.50	<0.50	< 0.50	2.4	<0.50	<0.50	2.3	<0.50
	6/8/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	2.9	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	<0.5	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.96	<0.50	<0.50	21	<0.50	<0.50	< 0.50	7.6	<0.50	<0.50	4.5	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	1.2	<0.50	<0.50	26	<0.50	<0.50	< 0.50	6.4	<0.50	<0.50	4.2	<0.50
	3/7/2012	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	32	<0.50	<0.50	<0.50	11	<0.50	<0.50	5.9	<0.50
	06/21/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8.3	<0.5	<0.5	<0.5	2.6	<0.5	<0.5	1.5	<0.5
	9/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	0.83	<0.50	<0.50	18	<0.50	<0.50	<0.50	6.1	<0.50	<0.50	3.8	<0.50
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.9	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	0.84	<0.50
MW-21i-40	6/10/2008	<1	<1	<1	<1	<1	7.64	<1	4.96	142	<1	<1	<1	126	1.63	<1	136	<1
	9/18/2008	<1	<0.500	<0.500	<1	<1.00	7.48	<0.500	4.38	124	0.77	<0.500	<1.00	107	2.01	<0.500	133	<0.500
	12/11/2008	<0.50	<0.50	<0.50	<0.50	< 0.500	6.6	<0.50	3.6	130	0.84	<0.50	< 0.500	100	1.6	<0.50	110	<0.50
	3/26/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	6.2	<0.50	3.6	130	0.63	<0.50	< 0.50	77	1.3	<0.50	88	<0.50
	6/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	6.6	<0.50	3.1	120	0.79	<0.50	< 0.50	71	1.5	<0.50	88	<0.50
	9/18/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	5.9	<0.50	3.2	120	1	<0.50	< 0.50	75	1.3	<0.50	92	0.55
	12/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	5.7	<0.50	2.6	120	1	<0.50	< 0.50	90	1.2	<0.50	89	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	5.5	<0.50	2.8	120	0.74	<0.50	< 0.50	84	1.1	<0.50	91	<0.50
	6/15/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	5.4	<0.50	2.4	120	0.89	<0.50	< 0.50	62	1.2	<0.50	64	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	< 0.50	4.9	<0.5	2.2	110	0.73	<0.5	< 0.50	68	0.93	<0.5	75	<0.5
	12/8/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	5.1	<0.5	2.3	110	0.77	<0.5	< 0.5	72	1	<0.5	69	<0.5
	3/10/2011	<0.50	<0.50	<0.50	<0.50	< 0.5	4.6	<0.50	1.9	100	0.64	<0.50	< 0.5	53	1	<0.50	57	<0.50
	6/9/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	4.7	<0.5	2.1	110	0.7	<0.5	< 0.50	50	0.96	<0.5	55	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	5	<0.50	1.9	110	0.65	<0.50	< 0.50	54	1.1	<0.50	57	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	4.8	<0.50	2.1	110	0.66	<0.50	< 0.50	61	0.96	<0.50	60	<0.50
	3/7/2012	<0.50	<0.50	<0.50	<0.50	<0.50	5.3	<0.50	2.1	110	0.76	<0.50	<0.50	74	1.5	<0.50	58	<0.50
	06/20/2012	<0.5	<0.5	<0.5	<0.5	<0.5	5	<0.5	2	160	0.84	<0.5	<0.5	19	0.81	<0.5	23	<0.5
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	5	<0.50	1.8	110	0.63	<0.50	<0.50	50	1.1	<0.50	48	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	5.3	<0.50	2	120	0.69	<0.50	<0.50	74	1.1	<0.50	53	<0.50
MW-21i-105	6/10/2008	<2	<2	<2	<2	<2.00	2	<2	<2	15.8	<2	<2	<2.00	53.2	<2	<0.50	25.1	<2
	9/18/2008	<1	<0.500	<0.500	<1	< 0.500	0.78	<0.500	<0.500	5.42	<0.500	<0.500	< 0.500	2.97	<0.500	<0.50	1.77	<0.500
	12/11/2008	<0.50	<0.50	<0.50	<0.50	< 0.50	2.2	<0.50	0.88	61	<0.50	<0.50	< 0.50	33	0.87	<0.50	17	<0.50
	3/26/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.4	<0.50	<0.50	61	<0.50	<0.50	< 0.50	0.76	<0.50	<0.50	0.7	<0.50
	6/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.8	<0.50	<0.50	76	<0.50	<0.50	< 0.50	4.3	0.6	<0.50	3.4	<0.50
	9/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.6	<0.50	<0.50	73	<0.50	<0.50	< 0.50	11	0.59	<0.50	6.7	<0.50
	12/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.5	<0.50	<0.50	60	<0.50	<0.50	< 0.50	14	0.65	<0.50	9.3	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	1.7	<0.50	<0.50	64	<0.50	<0.50	< 0.50	6.2	0.58	<0.50	7.6	<0.50
	6/15/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	1.7	<0.50	0.63	60	<0.50	<0.80	< 0.50	29	0.84	<0.50	22	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	1.7	<0.5	<0.5	75	<0.5	<0.5	< 0.5	5.2	0.55	<0.50	5.1	<0.5
	12/8/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	2	<0.5	0.52	72	<0.5	<0.5	< 0.5	27	0.91	<0.50	14	<0.50

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-21i-105 (continued)	3/9/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	1.9	<0.50	0.69	61	<0.50	<0.50	< 0.50	32	1.1	<0.50	17	<0.50
	6/9/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	1.6	<0.5	0.61	63	<0.5	<0.5	< 0.50	29	0.7	<0.5	17	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	1.9	<0.50	<0.50	88	<0.50	<0.50	< 0.50	12	0.59	<0.50	12	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	1.6	<0.50	<0.50	73	<0.50	<0.50	< 0.50	15	0.58	<0.50	9.3	<0.50
	3/7/2012	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	38	<0.50	<0.50	<0.50	5.6	<0.50	<0.50	5.7	<0.50
	06/20/2012	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	52	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	3	<0.5
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	0.82	<0.50	<0.50	34	<0.50	<0.50	<0.50	5	<0.50	<0.50	6.3	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	1.4	<0.50	<0.50	60	1	<0.50	<0.50	13	<0.50	<0.50	15	<0.50
MW-22i	6/10/2008	<1	<1	<1	<1	<1	1.02	<1	<1	30	<1	<1	<1	10.3	<1	<1	30	<1
	9/17/2008	<1	<0.500	<0.500	<1	< 0.500	7.48	<0.500	4.38	124	0.77	<0.500	< 0.500	107	2.01	<0.500	133	<0.500
	12/11/2008	<0.50	<0.50	<0.50	<0.50	< 0.50	1.2	<0.50	0.73	63	<0.50	<0.50	< 0.50	1.1	<0.50	<0.50	6.8	<0.50
	3/25/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.1	<0.50	0.64	50	<0.50	<0.50	< 0.50	2.5	<0.50	<0.50	14	<0.50
	6/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.2	<0.50	0.52	39	<0.50	<0.50	< 0.50	8.5	<0.50	<0.50	24	<0.50
	9/17/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1	<0.50	0.57	40	<0.50	<0.50	< 0.50	3.3	<0.50	<0.50	21	<0.50
	12/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	0.8	<0.50	<0.50	28	<0.50	<0.50	< 0.50	3.8	<0.50	<0.50	20	<0.50
	3/18/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	0.86	<0.50	<0.50	34	<0.50	<0.50	< 0.50	2.6	<0.50	<0.50	16	<0.50
	6/14/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	0.6	<0.50	<0.50	17	<0.50	<0.50	< 0.50	4	<0.50	<0.50	18	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	0.75	<0.5	<0.5	24	<0.5	<0.5	< 0.5	3.6	<0.5	<0.5	18	<0.5
	12/8/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	0.73	<0.5	<0.5	21	<0.5	<0.5	< 0.5	3.5	<0.5	<0.5	18	<0.5
	3/11/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.67	<0.50	<0.50	17	<0.50	<0.50	< 0.50	3.6	<0.50	<0.50	17	<0.50
	6/8/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	0.6	<0.5	<0.5	18	<0.5	<0.5	< 0.50	1.8	<0.5	<0.5	12	<0.5
	9/14/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.55	<0.50	<0.50	18	<0.50	<0.50	< 0.50	1.3	<0.50	<0.50	11	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.58	<0.50	<0.50	17	<0.50	<0.50	< 0.50	2.5	<0.50	<0.50	14	<0.50
	3/6/2012	<0.50	<0.50	<0.50	<0.50	<0.50	0.51	<0.50	<0.50	13	<0.50	<0.50	<0.50	2.4	<0.50	<0.50	13	<0.50
	06/20/2012	<0.50	<0.50	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	12	<0.50	<0.50	<0.50	1.9	<0.50	<0.50	11	<0.50
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	16	<0.50	<0.50	<0.50	2	<0.50	<0.50	10	<0.50
	12/13/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	13	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	11	<0.50
MW-23i	6/10/2008	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	6/10/2008 (DUP)	<1	<1	<1	<1	< 1.00	<1	<1	<1	<1	<1	<1	< 1.00	<1	<1	<1	<1	<1
	9/17/2008	<1	<0.500	<0.500	<1	< 0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	< 0.500	<0.500	<0.500	<0.500	<0.500	<0.500
	12/9/2008	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/25/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	0.54	<0.50	<0.50	<0.50	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/17/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	7/2/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	12/8/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-23i (continued)	6/8/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	<0.5	<0.5
	9/13/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/6/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/7/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
	06/19/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
	9/11/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.67	< 0.50	< 0.50	< 0.50	< 0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
MW-24i	10/1/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	3.3	<0.50	0.94	52	<0.50	<0.50	< 0.50	52	1.9	<0.50	29	<0.50
	12/10/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	3.5	<0.5	<0.5	< 0.5	6.3	<0.5	<0.5	2	<0.5
	3/14/2011	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.88	<0.50	<0.50	15	<0.50	<0.50	< 0.50	23	1	<0.50	7.4	<0.50
	6/7/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	2	<0.5	<0.5	< 0.50	6.6	<0.5	<0.5	1.4	<0.5
	9/16/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	13	<0.50	2.5	270	1.7	<0.50	< 0.50	27	5.6	<0.50	24	19
	12/7/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	5	<0.50	0.84	100	<0.50	<0.50	< 0.50	19	2.9	<0.50	14	7.5
	3/12/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	5.9	<0.50	<0.50	79	<0.50	<0.50	< 0.50	30	2.3	<0.50	11	4.5
	06/22/2012	<0.5	<0.5	<0.5	<0.5	< 0.50	1.8	<0.5	<0.5	14	<0.5	<0.5	< 0.50	0.85	<0.5	<0.5	<0.5	2.6
	9/16/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	13	<0.50	2.5	270	1.7	<0.50	< 0.50	27	5.6	<0.50	24	19
	12/14/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.1	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	0.65	<0.50
MW-24d	9/14/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/9/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/8/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	06/21/2012	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	<0.5	<0.5
	9/14/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/14/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
MW-25i	9/16/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	3/6/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	06/20/2012	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	<0.5	<0.5
	9/11/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
MW-26	9/16/2011	<2	<2	<2	<2	<2	7	<2	2.2	120	2.6	<2	<2	250	5.7	<2	490	<2
	12/8/2011	<2	<2	<2	<2	<2	7.1	<2	2.5	110	2.2	<2	<2	300	5.8	<2	500	<2
	3/6/2012	<2	<2	<2	<2	<2	8.2	<2	2.2	99	<2	<2	<2	210	4.6	<2	450	<2
	06/19/2012	<2	<2	<2	<2	<2	14	<2	3	90	<2	<2	<2	160	5.2	<2	460	<2
	9/11/2012	<2	<2	<2	<2	<2	6.3	<2	2.3	110	3	<2	<2	280	4.3	<2	460	<2
	12/12/2012	<2.0	<2.0	<2.0	<2.0	<2.0	5.6	<2.0	<2.0	120	3.7	<2.0	<2.0	300	3.8	<2.0	470	<2.0
MW-30i	3/4/2003	<1	--	<0.5	<1	<1.00	1.13	<0.5	<0.5	10.7	<0.5	--	--	26.6	0.73	<0.5	13.7	--
	5/28/2003	<1	--	<0.5	<1	<1.00	1.08	<0.5	<0.5	12.7	<0.5	--	--	22.6	0.65	<0.5	12.7	--
	8/26/2003	<1	--	<0.5	<1	<1.00	1.08	<0.5	<0.5	11.8	<0.5	--	--	31.6	0.81	<0.5	19	--
	11/11/2003	<1	--	<0.5	<1	<1.00	1.21	<0.5	<0.5	10.4	<0.5	--	--	24.7	6	<0.5	12.8	--
	1/27/2004	<1	--	<0.5	<1	<1.00	0.76	<0.5	<0.5	6.21	<0.5	--	--	13.2	<0.50	<0.5	6.17	--

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-30i (continued)	5/4/2004	<1	--	<0.5	<1	<1.00	1.01	<0.5	<0.5	10.1	<0.5	--	--	22.2	0.56	<0.5	11.6	--
	8/25/2004	<1	--	<0.5	<1	<1.00	0.96	<0.5	<0.5	9.82	<0.5	--	--	22.1	0.62	<0.5	11.2	--
	11/16/2004	<1	--	<0.5	<1	<1.00	0.94	<0.5	<0.5	8.82	<0.5	--	--	17	<0.50	<0.5	9.7	--
	11/16/2004 (DUP)	<1	--	<0.5	<1	<1.00	0.99	<0.5	<0.5	8.88	<0.5	--	--	16.9	<0.50	<0.5	9.36	--
	2/10/2005	<1	--	<0.5	<1	<1.00	0.65	<0.5	<0.5	5	<0.5	--	--	9.51	<0.50	<0.5	4.6	--
	11/16/2005	<1	--	<0.5	<1	<1.00	0.87	<0.5	<0.5	8.7	<0.5	--	--	10.9	<0.50	<0.5	6.65	--
	3/20/2006	<1	--	<0.5	<1	<1.00	0.76	<0.5	<0.5	8.43	<0.5	--	--	13.6	<0.50	<0.5	8.68	--
	9/6/2006	<1	--	<0.5	<1	<1.00	0.73	<0.5	<0.5	7.38	<0.5	--	--	12.6	<0.50	<0.5	8.54	--
	2/7/2007	<1	--	<0.5	<1	<1.00	0.53	<0.5	<0.5	5.45	<0.5	--	--	10.3	<0.50	<0.5	6.57	--
	9/11/2007	<1	--	<0.5	<1	<1.00	0.76 J	<0.5	<0.5	8.11 J	<0.5	--	--	15.4 J	<0.50	<0.5	11.7 J	--
	3/5/2008	<1	--	<0.5	<1	--	0.71	<0.5	<0.5	6.46	<0.5	--	--	12.2	<0.5	<0.5	7.95	--
	9/18/2008	<0.5	--	<0.5	<0.5	--	0.54	<0.5	<0.5	5.3	<0.5	--	--	12	<0.5	<0.5	8	--
	3/26/2009	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	0.85	<0.5	--	--	0.86	<0.5	<0.5	0.99	--
	6/15/2009	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	0.81	<0.5	--	--	2.9	<0.5	<0.5	1.4	--
	9/16/2009	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	1.4	<0.5	--	--	3.4	<0.5	<0.5	1.9	--
	12/14/2009	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	2.1	<0.5	<0.5	0.77	--
	3/16/2010	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	3.6	<0.5	--	--	5.1	<0.5	<0.5	2.7	--
	6/14/2010	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	0.55	<0.5	<0.5	<0.5	--
	9/22/2010	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	1.9	<0.5	--	--	3.2	<0.5	<0.5	2.5	--
	12/7/2010	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	0.64	<0.5	--	--	1.5	<0.5	<0.5	0.87	--
	3/10/2011	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	0.77	<0.5	<0.5	<0.5	--
	6/7/2011	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	9/14/2011	<1	--	<0.5	<1	--	<0.5	<0.5	<0.5	0.56	<0.5	--	--	1.33	<0.5	<0.5	1.38	--
	12/6/2011	<1	--	<0.5	<1	--	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	0.68	<0.5	<0.5	<0.5	--
	3/8/2012	--	--	<0.5	<1	--	<0.5	--	<0.5	<0.5	--	--	--	0.6 J	<0.5	--	<0.5	<0.5
	6/20/2012	--	--	<0.5	<1	--	<0.5	--	<0.5	<0.5	--	--	--	<0.5	<0.5	--	<0.5	<0.5
	9/11/2012	--	--	<0.5	<1	--	<0.5	--	<0.5	<0.5	--	--	--	0.91	<0.5	--	0.72	<0.5
MW-31i	3/4/2003	<1	--	<0.5	<1	<1.00	0.88	<0.5	<0.5	11.5	<0.5	--	--	47.7	1.02	<0.5	23.7	--
	5/27/2003	<1	--	<0.5	<1	<1.00	<0.5	<0.5	<0.5	4.45	<0.5	--	--	18.5	<0.5	<0.5	9.89	--
	8/27/2003	<1	--	<0.5	<1	<1.00	<0.5	<0.5	<0.5	4.55	<0.5	--	--	22.8	<0.5	<0.5	12.5	--
	11/11/2003	<1	--	<0.5	<1	<1.00	0.58	<0.5	<0.5	7.28	<0.5	--	--	27.4	0.58	<0.5	14.2	--
	1/28/2004	<1	--	<0.5	<1	<1.00	1.89	<0.5	0.83	27.4	0.62	--	--	70.1	1.66	<0.5	42.5	--
	5/7/2004	<1	--	<0.5	<1	<1.00	0.87	<0.5	<0.5	11.2	<0.5	--	--	34.7	0.76	<0.5	20	--
	8/25/2004	<1	--	<0.5	<1	<1.00	0.94	<0.5	0.54	12.4	<0.5	--	--	32.1	0.87	<0.5	20.9	--

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-31i (continued)	11/19/2004	<1	--	<0.5	<1	<1.00	1.63	<0.5	0.83	23.1	<0.5	--	--	59.2	1.33	<0.5	38.3	--
	2/16/2005	<1	--	<0.5	<1	<1.00	2.22	<0.5	1.19	32.8	<0.5	--	--	69.7	1.55	<0.5	46.1	--
	5/20/2005	<1	--	<0.5	<1	<1.00	2.71	<0.5	1.73	44.7	<0.5	--	--	69.7	1.67	<0.5	51.9	--
	8/19/2005	<1	--	<0.5	<1	<1.00	1.47	<0.5	0.74	20.9	0.73	--	--	41.3	0.86	<0.5	30.5	--
	11/17/2005	<1	--	<0.5	<1	<1.00	1.7	<0.5	0.67	26.6	0.83	--	--	47.7	1.03	<0.5	34.5	--
	3/24/2006	<1	--	<0.5	<1	<1.00	0.9	<0.5	<0.5	11	1.5	--	--	29.1	0.6	<0.5	20.1	--
	6/2/2006	<1	--	<0.5	<1	<1.00	1.01	<0.5	<0.5	15.9	1.84	--	--	28.9	<0.5	<0.5	17.3	--
	9/6/2006	<1	--	<0.5	<1	<1.00	0.86	<0.5	<0.5	10.9	0.6	--	--	22.8	0.53	<0.5	17	--
	2/7/2007	<1	--	<0.5	<1	<1.00	0.88	<0.5	<0.5	13.4	<0.5	--	--	25.9	<0.5	<0.5	18.1	--
	9/11/2007	<1	--	<0.5	<1	<1.00	0.83 J	<0.5	<0.5	11.6 J	<0.5	--	--	24.6 J	<0.5	<0.5	19.1 J	--
	3/10/2008	<1	--	<0.5	<1	--	0.87	<0.5	<0.5	13.5	<0.5	--	--	25.5	<0.5	<0.5	17.8	--
	9/17/2008	<0.5	--	<0.5	<0.5	--	0.88	<0.5	<0.5	13	<0.5	--	--	24	<0.5	<0.5	17	--
	3/25/2009	<0.5	--	<0.5	<0.5	--	0.81	<0.5	<0.5	13	<0.5	--	--	22	<0.5	<0.5	15	--
	6/15/2009	<0.5	--	<0.5	<0.5	--	0.8	<0.5	<0.5	15	<0.5	--	--	19	<0.5	<0.5	12	--
	9/18/2009	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	6.8	<0.5	--	--	11	<0.5	<0.5	7	--
	12/14/2009	<0.5	--	<0.5	<0.5	--	1.5	<0.5	0.94	26	<0.5	--	--	41	<0.5	<0.5	26	--
	3/19/2010	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	1.4	<0.5	--	--	3.2	<0.5	<0.5	1.9	--
	6/14/2010	<0.5	--	<0.5	<0.5	--	0.78	<0.5	<0.5	16	<0.5	--	--	22	<0.5	<0.5	11	--
	9/24/2010	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	1.3	<0.5	--	--	2.3	<0.5	<0.5	1.7	--
	12/7/2010	<0.5	--	<0.5	<0.5	--	0.9	<0.5	<0.5	16	<0.5	--	--	15	<0.5	<0.5	12	--
	3/22/2011	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	6.8	<0.5	--	--	8.8	<0.5	<0.5	5.7	--
	6/7/2011	<0.5	--	<0.5	<0.5	--	0.67	<0.5	<0.5	16	<0.5	--	--	21	<0.5	<0.5	9.9	--
	9/15/2011	<1	--	<0.5	<1	--	<0.5	<0.5	<0.5	4.05	<0.5	--	--	6.1	<0.5	<0.5	4.76	--
	12/6/2011	<1	--	<0.5	<1	--	<0.5	<0.5	<0.5	5.6	<0.5	--	--	6.51	<0.5	<0.5	3.86	--
	3/8/2012	--	--	<0.5	<1	--	<0.5	--	<0.5	2.8	--	--	--	3.5	<0.5	--	2	<0.5
	6/20/2012	--	--	<0.5	<1	--	0.62 J	--	<0.5	14	--	--	--	15	<0.5	--	6.7	<0.5
	9/10/2012	--	--	<0.5	<1	--	<0.5	--	<0.5	3.6	--	--	--	4.9	<0.5	--	2.7	<0.5
MW-32i	8/19/2004	<1	--	<0.50	<1	--	5.15	<0.50	2.37	78	2.13	--	--	152	3.59	<0.50	114	--
	10/30/2004	<1	--	<0.50	<1	--	7.07	<0.50	3.01	103	3.29	--	--	148	3.93	<0.50	129	--
	2/17/2005	<1	--	<0.50	<1	--	6.58	<0.50	3.18	111	2.39	--	--	166	3.78	<0.50	135	--
	5/20/2005	<2	--	<1	<2	--	11.7	<1	5.42	178	3.56	--	--	212	5.34	<1	171	--
	8/19/2005	<1	--	<0.50	<1	--	7.38	<0.50	3.66	111	3.81	--	--	173	3.5	<0.50	140	--
	11/18/2005	<1	--	<0.50	<1	--	8.45	<0.50	4.03	136	3.66	--	--	176	3.89	<0.50	151	--
	3/24/2006	<1	--	<0.50	<1	--	2.43	<0.50	0.85	40	1.57	--	--	73.2	1.31	<0.50	53	--
	06/02/2006 (DUP)	<1	--	<0.50	<1	--	4.39	<0.50	2.21	97.3	1.06	--	--	106	1.79	<0.50	71	--
	6/2/2006	<1	--	<0.50	<1	--	4.42	<0.50	2.24	95.4	1.69	--	--	104	1.75	<0.50	69.9	--
	9/6/2006	<1	--	<0.50	<1	--	1.52	<0.50	0.62	24.1	0.64	--	--	39.2	0.67	<0.50	26.1	--
	2/7/2007	<1	--	<0.50	<1	--	2.94	<0.50	1.43	57.7	0.71	--	--	68.4	1.1	<0.50	52.8	--
	9/12/2007	<1	--	<0.50	<1	--	2.92	<0.50	0.59	48.9	2.35	--	--	69.3	1.2	<0.50	51.8	--

Please refer to notes at end of table.

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Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-32i (continued)	2/29/2008	<1	--	<0.50	<1	--	2.24	<0.50	1.07	43.4	0.51	--	--	60.2	0.92	<0.50	38.5	--
	2/29/2008 DUP	<1	--	<0.50	<1	--	2.19	<0.50	1.14	44.0	<0.50	--	--	61.3	0.91	<0.50	38.7	--
	9/17/2008	<0.50	--	<0.50	<0.50	--	2.70	<0.50	1.50	52.0	0.50	--	--	64.0	0.81	<0.50	49.0	--
	3/26/2009	<0.50	--	<0.50	<0.50	--	3.20	<0.50	1.90	63.0	0.51	--	--	73.0	0.88	<0.50	55.0	--
	6/15/2009	<0.50	--	<0.50	<0.50	--	3.40	<0.50	1.80	74.0	0.61	--	--	70.0	0.93	<0.50	48.0	--
	9/18/2009	<0.50	--	<0.50	<0.50	--	4.40	<0.50	2.10	67.0	0.67	--	--	88.0	1.10	<0.50	70.0	--
	12/14/2009	<0.50	--	<0.50	<0.50	--	8.10	<0.50	4.60	120.0	1.40	--	--	160.0	2.20	<0.50	110.0	--
	3/16/2010	<0.50	--	<0.50	<0.50	--	2.00	<0.50	1.20	45.0	<0.50	--	--	49.0	0.51	<0.50	40.0	--
	6/14/2010	<0.50	--	<0.50	<0.50	--	5.50	<0.50	2.80	120.0	1.00	--	--	95.0	1.40	<0.50	67.0	--
	9/22/2010	<0.50	--	<0.50	<0.50	--	2.00	<0.50	0.96	41.0	<0.50	--	--	41.0	0.59	<0.50	32.0	--
	12/6/2010	<0.50	--	<0.50	<0.50	--	4.60	<0.50	2.20	75.0	0.74	--	--	88.0	1.30	<0.50	63.0	--
	3/10/2011	<0.50	--	<0.50	<0.50	--	4.00	<0.50	1.70	76.0	0.62	--	--	73.0	1.20	<0.50	53.0	--
	6/7/2011	<1	--	<0.50	<0.50	--	2.80	<0.50	1.40	67.0	<0.50	--	--	75.0	0.61	<0.50	37.0	--
	9/14/2011	<1	--	<0.50	<0.50	--	0.71	<0.50	<0.50	14.7	<0.50	--	--	17.0	<0.50	<0.50	8.8	--
	12/6/2011	<1	--	<0.50	<0.50	--	1.30	<0.50	0.53	23.3	<0.50	--	--	25.0	<0.50	<0.50	14.1	--
	3/8/2012	--	<0.50	--	<1	--	2.60	--	1.10	68.0	--	--	--	49.0	1.10	--	34.0	<0.50
	6/20/2012	--	<1	--	<2	--	3.70	--	1.3 J	84.0	--	--	--	55.0	<1	--	32.0	<1
	9/10/2012	--	<0.50	--	<1	--	<0.50	--	<0.50	10.0	--	--	--	12.0	<0.50	--	5.8	<0.50
MW-32s*	10/28/2004	<1	--	<0.50	<1	<1.0	<0.50	<0.50	--	<0.50	<0.50	--	--	<0.50	<0.50	--	<0.50	--
	2/9/2005	<1	--	<0.50	<1	<1.0	<0.50	<0.50	--	<0.50	<0.50	--	--	<0.50	<0.50	--	<0.50	--
	3/24/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.79	<0.50	--	<0.50	<0.50
	5/17/2005	<1	--	<0.50	<1	<1.0	<0.500	<0.500	--	<0.500	<0.500	--	--	<0.500	<0.500	--	<0.500	--
	8/16/2005	<1	--	<0.50	<1	<1.0	<0.500	<0.500	--	<0.500	<0.500	--	--	<0.500	<0.500	--	<0.500	--
	11/15/2005	<1	--	<0.50	<1	<1.0	<0.50	<0.50	--	<0.50	<0.50	--	--	<0.50	<0.50	--	<0.50	--
	3/20/2006	<1	--	<0.50	<1	<1.0	<0.50	<0.50	--	<0.50	<0.50	--	--	<0.50	<0.50	--	<0.50	--
	6/2/2006	<1	--	<0.50	<1	<1.0	<0.50	<0.50	--	<0.50	<0.50	--	--	<0.50	<0.50	--	<0.50	--
	2/7/2007	<1	--	<0.50	<1	<1.0	<0.50	<0.50	--	<0.50	<0.50	--	--	<0.50	<0.50	--	<0.50	--
	3/6/1908	<1	<0.500	<0.500	<1	--	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	--	<0.500	<0.500	<0.500	<0.500	<0.500
	9/17/2008	<1	<0.500	<0.500	<1	--	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	--	<0.500	<0.500	<0.500	<0.500	<0.500
	12/9/2008	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	6/16/2009	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	12/15/2009	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	7/2/2010	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	9/22/2010	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	12/7/2010	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	6/9/2011	<0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	--	0.94	<0.5	<0.5	1.1	<0.5
	9/15/2011	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	12/8/2011	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	06/21/2012	<0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5
	9/13/2012	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	12/11/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-E	2/27/2001	<2	<10	<1	<1	<1.0	9.89	<1	5.47	88.3	<1	<1	<1	61.9	5.58	--	161	<1
	5/29/2001	<5	<25	<2.5	<2.5	<2.5	6.18	<2.5	5.7	102	<2.5	<2.5	<2.5	76.6	<5	--	191	<2.5
	9/24/2001	<2.5	<2.5	<2.5	<2.5	<2.5	9.7	<2.5	4.1	92	<2.5	<2.5	<2.5	72	3.7	--	160	<2.5
	12/18/2001	<2	<10	<1	<1	<1.0	8.57	<1	3.91	81	<1	<1	<1	58.5	3.66	--	136	<1
	8/28/2002	<1	<0.50	<0.50	<1	<1.0	7.43	<0.50	3.7	81.7	0.52	<0.50	<0.50	54.8	3.01	--	133	<0.50
	11/8/2002	<1	<0.50	<0.50	<1	<1.0	7.04	<0.50	3.79	75.4	<0.50	<0.50	<0.50	57.8	3.23	--	139	<0.50
	5/29/2003	<1	<0.50	<0.50	<1	<1.0	6.1	<0.50	3.54	61.7	<0.50	<0.50	<0.50	49.3	2.96	--	140	<0.50
	8/19/2004	<1	--	<0.5	<1	<1.0	6.25	<0.5	3.01	64	<0.50	--	--	48.2	2.51	<0.5	132	--
	11/2/2004	<1	<0.50	<0.50	<1	<1.0	5.54	<0.50	2.58	61.7	<0.50	<0.50	<0.50	44.4	1.76	--	113	<0.50
	11/19/2004	<1	--	<0.5	<1	<1.0	5.3	<0.5	2.7	59.9	<0.50	--	--	46.5	1.79	<0.5	116	--
	2/17/2005	<1	--	<0.5	<1	<1.0	4.48	<0.5	2.56	55.4	<0.50	--	--	49.7	1.69	<0.5	117	--
	3/24/2005	<1	<0.50	<0.50	<1	<1.0	4.23	<0.50	2.59	52.8	<0.50	<0.50	<0.50	45.1	1.5	--	100	<0.50
	5/20/2005	<1	--	<0.5	<1	<1.0	5.56	<0.5	4.32	63	<0.50	--	--	60.3	2.41	<0.5	133	--
	8/19/2005	<1	--	<0.5	<1	<1.0	4.63	<0.5	2.86	54.8	<0.50	--	--	49	1.5	<0.5	104	--
	11/18/2005	<1	--	<0.5	<1	<1.0	4.94	<0.5	2.83	60.7	1.16	--	--	52.3	1.98	<0.5	117	--
	3/24/2006	<1	--	<0.5	<1	<1.0	3.97	<0.5	2.73	56.2	<0.50	--	--	53.8	1.5	<0.5	116	--
	6/2/2006	<1	--	<0.5	<1	<1.0	5.2	<0.5	3.41	62.1	<0.50	--	--	63	2.03	<0.5	125	--
	9/6/2006	<1	--	<0.5	<1	<1.0	4.36	<0.5	2.6	52.9	<0.50	--	--	46.9	1.28	<0.5	99	--
	2/7/2007	<1	--	<0.5	<1	<1.0	4.3	<0.5	2.61	56.5	<0.50	--	--	52.4	1.17	<0.5	111	--
	02/02/2007 (DUP)	<1	--	<0.5	<1	<1.0	4.4	<0.5	2.77	57.6	<0.50	--	--	53.4	1.1	<0.5	113	--
	9/11/2007	<1	--	<0.5	<1	--	4.66	<0.5	2.78	58.4	<0.5	--	--	63	1.47	<0.5	119	--
	9/11/2007 (DUP)	<2	--	<1	<2	--	4.18 J	<1	2.36 J	51.3 J	<1	--	--	54.2 J	1.36 J	<1	105 J	--
	3/4/2008	<1	--	<0.5	<1	--	4.29	<0.5	2.86	79.9	<0.5	--	--	47.4	1.25	<0.5	97.4	--
	9/17/2008	<0.5	--	<0.5	<0.5	--	4.6	<0.5	3	57	<0.5	--	--	66	1.1	<0.5	100	--
	3/25/2009	<0.5	--	<0.5	<0.5	--	4.9	<0.5	3.7	62	<0.5	--	--	72	1.5	<0.5	120	--
	6/15/2009	<0.5	--	<0.5	<0.5	--	5.2	<0.5	3.4	56	<0.5	--	--	50	1.3	<0.5	110	--
	9/18/2009	<0.5	--	<0.5	<0.5	--	4.3	<0.5	2.4	44	<0.5	--	--	66	1	<0.5	97	--
	12/14/2009	<0.5	--	<0.5	<0.5	--	4.6	<0.5	3.9	58	<0.5	--	--	63	1.1	<0.5	100	--
	3/17/2010	<0.5	--	<0.5	<0.5	--	4.4	<0.5	3.3	78	<0.5	--	--	48	0.95	<0.5	90	--
	6/14/2010	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	3.1	<0.5	--	--	7.5	<0.5	<0.5	9	--
	9/22/2010	<0.5	--	<0.5	<0.5	--	2.4	<0.5	1.3	46	<0.5	--	--	38	0.53	<0.5	52	--
	12/6/2010	<0.5	--	<0.5	<0.5	--	2.7	<0.5	1.9	48	<0.5	--	--	48	0.62	<0.5	65	--
	3/22/2011	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	1.1	<0.5	--	--	2.3	<0.5	<0.5	2.2	--
	6/7/2011	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	0.92	<0.5	--	--	1.9	<0.5	<0.5	2.3	--
	9/13/2011	<1	--	<0.5	<1	--	<0.5	<0.5	<0.5	8.98	<0.5	--	--	7.48	<0.5	<0.5	12.1	--
	12/6/2011	<1	--	<0.5	<1	--	<0.5	<0.5	<0.5	10.6	<0.5	--	--	5.07	<0.5	<0.5	9.55	--
	3/8/2012	--	--	<0.5	<1	--	<0.5	--	<0.5	16	--	--	--	1.2	<0.5	--	8.3	2.5
	03/08/2012 (DUP)	--	--	<0.5	<1	--	<0.5	--	<0.5	18	--	--	--	1.3	<0.5	--	8.1	2.8
	6/19/2012	--	--	<0.5	<1	--	1.3	--	0.65 J	25	--	--	--	0.9 J	<0.5	--	16	0.91 J
	9/10/2012	--	--	<0.5	<1	--	0.73	--	<0.5	14	--	--	--	2.2	<0.5	--	11	<0.5

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-F	6/14/1995	--	<10	<5	<5	<5.0	<5	5	<5	15	<5	--	<5.0	<5	<5	--	<5	<10
	2/27/2001	<1	<5	<0.50	<0.50	<0.50	0.754	<0.50	<0.50	5.99	<0.50	<0.50	<0.50	0.506	<1	--	1.18	<0.50
	5/29/2001	<1	<5	<0.50	<0.50	<0.50	0.58	<0.50	<0.50	6.47	<0.50	<0.50	<0.50	<0.50	<1	--	0.585	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	<0.50	6.5	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	1.44	<0.50	<0.50	17.9	<0.50	<0.50	<0.50	<0.50	<1	--	0.709	<0.50
	8/28/2002	<1	<0.50	<0.50	<1	<1.0	1.12	0.65	<0.50	9.54	<0.50	<0.50	<0.50	<0.50	<0.50	--	0.69	<0.50
	11/8/2002	<1	<0.50	<0.50	<1	<1.0	1.15	0.81	<0.50	9.86	<0.50	<0.50	<0.50	<0.50	<0.50	--	0.65	<0.50
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/29/2003	<1	<0.50	<0.50	<1	<1.0	1.11	0.83	<0.50	10.6	<0.50	<0.50	<0.50	<0.50	<0.50	--	0.62	<0.50
	8/17/2004	<1	--	<0.5	<1	<1.0	0.99	0.62	<0.5	7.3	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	11/16/2004	<1	--	<0.5	<1	<1.0	0.86	0.54	<0.5	7.14	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	2/9/2005	<1	--	<0.5	<1	<1.0	0.85	0.64	<0.5	8.14	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	3/24/2005	<1	<0.50	<0.50	<1	<1.0	0.87	0.64	<0.50	8.31	<0.50	<0.50	<0.50	0.52	<0.50	--	0.74	<0.50
	5/17/2005	<1	--	<0.5	<1	<1.0	1.04	1.03	<0.5	14.8	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	8/16/2005	<1	--	<0.5	<1	<1.0	0.84	0.64	<0.5	8.68	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	11/16/2005	<1	--	<0.5	<1	<1.0	0.82	<0.5	<0.5	9.18	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	3/20/2006	<1	--	<0.5	<1	<1.0	0.94	0.84	<0.5	11.4	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	6/2/2006	<1	--	<0.5	<1	<1.0	1.49	2.06	<0.5	24.7	<0.5	--	--	<0.5	<0.5	<0.5	0.77	--
	9/6/2006	<1	--	<0.5	<1	<1.0	0.74	0.62	<0.5	8.4	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	2/7/2007	<1	--	<0.5	<1	<1.0	0.82	0.82	<0.5	11.2	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	12/13/2007	<1	<0.50	<0.50	<1	<1.00	0.5	0.52	<0.50	5.93	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	3/8/2008	<1	--	<0.5	<1	--	0.81	0.6	<0.5	7.49	<0.5	--	--	<0.5	<0.5	<0.5	0.51	--
	9/18/2008	<1	<0.500	<0.500	<1	<0.500	0.85	0.72	<0.500	8.57	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.57	<0.500
	3/25/2009	<0.5	--	<0.5	<0.5	--	0.93	0.75	<0.5	10	<0.5	--	--	<0.5	<0.5	<0.5	0.59	--
	6/16/2009	<0.5	--	<0.5	<0.5	--	1.1	0.89	<0.5	13	<0.5	--	--	<0.5	<0.5	<0.5	0.84	--
	9/16/2009	<0.5	--	<0.5	<0.5	--	0.71	0.6	<0.5	7.3	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	12/18/2009	<0.5	--	<0.5	<0.5	--	0.71	0.54	<0.5	5.9	<0.5	--	--	<0.5	<0.5	<0.5	0.57	--
	3/16/2010	<0.5	--	<0.5	<0.5	--	0.69	<0.5	<0.5	6.3	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	9/22/2010	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	4.2	<0.5	--	--	0.5	<0.5	<0.5	0.52	--
	3/22/2011	<0.5	--	<0.5	<0.5	--	0.51	<0.5	<0.5	4.9	<0.5	--	--	<0.5	<0.5	<0.5	0.55	--
	9/13/2011	<1	--	<0.5	<1	--	<0.5	<0.5	<0.5	2.3	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	3/8/2012	--	--	<0.5	<1	--	<0.5	--	<0.5	2.6	--	--	--	<0.5	<0.5	--	<0.5	<0.5
	9/10/2012	--	--	<0.5	<1	--	<0.5	--	<0.5	1.5	--	--	--	<0.5	<0.5	--	<0.5	<0.5
MW-G	2/27/2001	<1	<5	<0.50	<0.50	<0.50	1.25	1.88	0.521	34.1	<0.50	<0.50	<0.50	1.68	<1	--	3.8	0.722
	5/29/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	2.53	<0.50	40.3	<0.50	<0.50	<0.50	1.78	<1	--	4.23	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	<0.50	2.2	2.9	<0.50	37	0.74	<0.50	<0.50	1.9	<0.50	--	4.3	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	1.54	<0.50	<0.50	24.6	<0.50	<0.50	<0.50	1.3	<1	--	3.07	<0.50
	8/28/2002	<1	<0.50	<0.50	<1	<1.0	1.59	2.51	<0.50	30.6	<0.50	<0.50	<0.50	1.25	<0.50	--	3.07	<0.50
	11/8/2002	<1	<0.50	<0.50	<1	<1.0	1.47	2.52	<0.50	28.3	<0.50	<0.50	<0.50	1.29	<0.50	--	3.15	<0.50
	5/29/2003	<1	<0.50	<0.50	<1	<1.0	1.55	2.66	<0.50	30	<0.50	<0.50	<0.50	1.22	<0.50	--	3.5	<0.50

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MW-G (continued)	8/17/2004	<1	--	<0.5	<1	<1.0	2.09	2.74	<0.5	32.2	0.56	--	--	1.18	<0.50	<0.5	2.94	--
	11/2/2004	<1	<0.50	<0.50	<1	<1.0	1.41	1.89	<0.50	23.8	<0.50	<0.50	<0.50	1.72	<0.50	--	3.85	<0.50
	11/16/2004	<1	--	<0.5	<1	<1.0	1.66	2.43	<0.5	28.7	<0.50	--	--	1.19	<0.50	<0.5	2.61	--
	2/9/2005	<1	--	<0.5	<1	<1.0	1.61	2.06	<0.5	26.6	<0.50	--	--	0.99	<0.50	<0.5	2.45	--
	3/24/2005	<1	<0.50	<0.50	<1	<1.0	1.73	2.45	<0.50	30.6	<0.50	<0.50	<0.50	1.15	<0.50	--	2.7	<0.50
	5/18/2005	<1	--	<0.5	<1	<1.0	1.94	2	<0.5	32.8	<0.50	--	--	1.35	<0.50	<0.5	2.64	--
	8/17/2005	<1	--	<0.5	<1	<1.0	1.98	2.18	<0.5	31.5	<0.50	--	--	1.26	<0.50	<0.5	3.05	--
	11/16/2005	<1	--	<0.5	<1	<1.0	1.88	1.98	<0.5	29.4	<0.50	--	--	1.3	<0.50	<0.5	2.76	--
	3/20/2006	<1	--	<0.5	<1	<1.0	2.03	2.08	<0.5	32	<0.50	--	--	1.39	<0.50	<0.5	3.04	--
	6/2/2006	<1	--	<0.5	<1	<1.0	2.15	1.59	<0.5	29.2	<0.50	--	--	1.99	<0.50	<0.5	3.63	--
	9/7/2006	<1	--	<0.5	<1	<1.0	1.9	1.74	<0.5	30	<0.50	--	--	1.8	<0.50	<0.5	3.4	--
	2/7/2007	<1	--	<0.5	<1	<1.0	1.85	1.29	<0.5	27.4	<0.50	--	--	2.17	<0.50	<0.5	3.78	--
	3/5/2008	<1	--	<0.5	<1	--	2.01	1.23	<0.5	25.2	<0.5	--	--	2.28	<0.5	<0.5	3.81	--
	9/18/2008	<0.5	--	<0.5	<0.5	--	1.8	0.97	<0.5	23	<0.5	--	--	2.5	<0.5	<0.5	4	--
	3/25/2009	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	0.56	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	6/16/2009	<0.5	--	<0.5	<0.5	--	1.1	0.56	<0.5	13	<0.5	--	--	0.89	<0.5	<0.5	1.7	--
	9/16/2009	<0.5	--	<0.5	<0.5	--	0.89	0.59	<0.5	11	<0.5	--	--	1	<0.5	<0.5	1.9	--
	09/16/2009 DUP	<0.5	--	<0.5	<0.5	--	0.92	0.62	<0.5	11	<0.5	--	--	1	<0.5	<0.5	2	--
	3/16/2010	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	1.7	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	6/14/2010	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	9/22/2010	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	1.4	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	12/6/2010	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	3	<0.5	--	--	<0.5	<0.5	<0.5	0.58	--
	3/22/2011	<0.5	--	<0.5	<0.5	--	<0.5	<0.5	<0.5	1.2	<0.5	--	--	<0.5	<0.5	<0.5	<0.5	--
	9/13/2011	<1	--	<0.5	<1	--	<0.5	<0.5	<0.5	3.03	<0.5	--	--	<0.5	<0.5	<0.5	0.75	--
	3/8/2012	--	--	<0.5	<1	--	<0.5	--	<0.5	4.6	--	--	--	<0.5	<0.5	--	1.1	<0.5
	9/11/2012	--		<0.5	<1	--	<0.5	--	<0.5	3.9	--	--	--	<0.5	<0.5	--	1.2	<0.5
EW-1	4/25/1991	--	<2	--	--	--	35	20	--	750	--	--	--	9,100	280	--	440	9.3
	11/17/1993	--	<200	---	--	--	<100	<100	--	1,700	--	--	--	8,600	<100	--	480	<200
	9/1/1995	<25	<50	<25	<25	<25.0	<25	<25	<25	140	<25	<25	<25.0	2,400	74	--	340	<50
	9/24/1996	<1	<4	3	<0.4	<0.4	8.5	2.1	<0.40	260	6.2	<0.40	<0.40	49	34	--	29	89
	12/2/1996	0.7	<0.50	1.9	<0.20	<0.20	5.7	5	1	530	3.3	<0.20	<0.20	310	86	--	98	10
	11/12/1997	<2.5	<5	<2.5	<2.5	<2.5	5.05	3.38	<2.5	68.5	4.91	<2.5	<2.5	111	5.1	--	47.4	9.2
	8/11/1999	<10	<50	<5	<5	<5.0	<5	<5	<5	14.5	<5	<5	<5.0	369	<10	--	39.9	<5
	11/16/1999	<5	<12.5	<2.5	<5	<5.0	<2.5	3.15	<2.5	41.7	3	<2.5	<2.5	314	6.9	--	35.5	5.1
	2/29/2000	<2	<10	<1	<1	<1.0	<1	6.42	<1	13.7	<1	<1	<1.0	97.3	3.48	--	20.8	<1
	6/27/2000	<2	<10	2.12	<1	<1.0	<1	6.42	<1	17.5	<1	<1	<1.0	293	5.37	--	35.1	<1
	8/31/2000	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	31.9	<2.5	<2.5	<2.5	325	<5	--	38.4	<2.5
	1/30/2000	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	45.6	<2.5	<2.5	<2.5	380	5.86	--	53.9	<2.5
	2/27/2001	<2	<10	1.42	<1	<1.0	2.51	2.83	<1	35	<1	<1	<1.0	240	7.98	--	47.5	2.43
	5/29/2001	<10	<50	<5	<5	<5.0	<5	<5	<5	22.4	<5	<5	<5.0	338	<10	--	61.1	<5
	9/25/2001	<5	<5	<5	<5	<5.0	<5	<5	<5	14	<5	<5	<5.0	320	9.5	--	61	<5
	12/17/2001	<2	<10	<1	<1	<1.0	1.19	<1	<1	25.8	<1	<1	<1.0	217	12.8	--	47.1	<1

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
EW-1 (continued)	3/19/2002	<2	<1	<1	<2	<2.0	1.04	<1	<1	17.5	<1	<1	<1.0	323	5.66	--	46.1	<1
	5/30/2002	<2	<1	1.38	<2	<2.0	1	1.68	<1	23.5	<1	<1	<1.0	319	6.46	--	39.9	<1
	8/29/2002	<2	<1	1.36	<2	<2.0	2.44	1.24	<1	20.4	<1	<1	<1.0	307	3.38	--	37.8	<1
	11/8/2002	<2	<1	1.46	<2	<2.0	3.02	3.96	<1	28.4	<1	<1	<1.0	274	5.54	--	50.2	<1
	1/23/2003	<2	<1	1.36	<2	<2.0	2.34	<1	<1	17	<1	<1	<1.0	252	5.06	--	51.9	<1
	5/30/2003	<2	<1	5.22	<2	<2.0	<1	<1	<1	6.12	<1	<1	<1.0	255	5.06	--	41.1	<1
	11/10/2003	<5	<5	<5	<5	<5.0	<5	<5	<5	9	<5	<5	<5.0	85.8	<5	--	16.2	<5
	1/27/2004	<1	<0.50	2.07	<1	<1.0	0.87	0.78	<0.50	5.2	<0.50	<0.50	<0.50	151	4.26	--	37.6	<0.50
	5/4/2004	<1	<1	4.73	<1	<1.0	<1	1.25	<1	4.36	<1	<1	<1.0	168	3.09	--	30.8	<1
	8/17/2004	<1	<0.50	3.76	<0.50	<0.50	0.81	1.86	<0.50	6.83	<0.50	<0.50	<0.50	144	1.73	--	23.2	<0.50
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/2004	<2.5	<2.5	4	<2.5	<2.5	<2.5	<2.5	<2.5	9.6	<2.5	<2.5	<2.5	180	3.6	--	33	<2.5
	3/23/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/18/2005	<2	<1	<1	<2	<2.0	<1	<1	<1	8.28	<1	<1	<1.0	207	<1	--	23.2	2.3
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/14/2005	<2	<1	1.06	<2	<2.00	1.36	2.7	<1	11.1	<1	<1	<1.00	187	<1	--	26.1	<1
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/2006	<1	<1	2.4	<1	< 1.00	<1	<1	<1	6.18	<1	<1	< 1.00	102	3.55	--	19.1	<1
	12/6/2006	<1	<0.50	2.07	<1	< 1.00	1.13	<0.50	<0.50	8.98	<0.50	<0.50	< 0.50	133	2.1	--	28.3	<0.50
	9/12/2007	<1	<0.50	2.66	<1	<1.00	0.51	1.14	<0.50	6.28	<0.50	<0.50	<0.50	76.9	1.47	--	18.3	<0.50
	3/6/2008	<1	<0.500	1.71 J	<1	< 1.00	0.64	1.04	<0.500	5.75	<0.500	<0.500	<0.50	80.9	1.45	<0.500	19.9	<0.500
	9/19/2008	<5	<2.50	<2.50	<5	< 2.50	<2.50	<2.50	<2.50	14.6	<2.50	<2.50	< 2.50	86.1	<2.50	<2.50	20.8	<2.50
	3/26/2009	<0.50	<0.50	3.6	<0.50	< 0.50	<0.50	0.76	<0.50	3.8	<0.50	<0.50	< 0.50	81	1	<0.50	14	<0.50
	9/17/2009	<0.50	<0.50	3.4	<0.50	< 0.50	0.63	<0.50	<0.50	8.3	<0.50	<0.50	< 0.50	100	0.74	<0.50	17	<0.50
	3/19/2010	<0.50	<0.50	3.5 BE	<0.50	< 0.50	<0.50	<0.50	0.52	4.1	<0.50	<0.50	< 0.50	89	1.5	<0.50	22	<0.50
	9/23/2010	<0.50	<0.50	1.7 BE	<0.50	< 0.50	0.86	0.94	<0.50	10	<0.50	<0.50	< 0.50	87	0.64	<0.50	17	<0.50
	3/10/2011	<0.50	<0.50	5.2	<0.50	< 0.50	<0.50	<0.50	<0.50	2.9	<0.50	<0.50	< 0.50	67	0.89	<0.50	13	<0.50
	9/16/2011	<0.50	<0.50	2.7	<0.50	<0.5	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	<0.5	75	0.69	<0.50	9.9	<0.50
	3/12/2012	<0.50	<0.50	4.4	<0.50	<0.50	<0.50	<0.50	<0.50	3	<0.50	<0.50	<0.50	52	0.68	<0.50	13	<0.50
	9/13/2012	<0.50	<0.50	1.7	<0.50	<0.50	<0.50	<0.50	<0.50	2.1	<0.50	<0.50	<0.50	60	0.58	<0.50	8.6	<0.50
S-1	8/10/1999	<1	<5	<0.50	<1	<1.0	<0.50	<0.50	<0.50	2.63	<0.50	<0.50	<0.50	7.81	1.3	--	20.6	<0.50
	2/29/2000	<1	<5	<0.50	<0.50	<0.50	0.761	<0.50	<0.50	2.21	<0.50	<0.50	<0.50	60.6	2.98	--	24.4	<0.50
	6/28/2000	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	2.7	58.2	<2.5	<2.5	<2.5	749	14.5	--	232	<2.5
	8/31/2000	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	4.98	<2.5	<2.5	<2.5	313	5.14	--	60.4	<2.5
	11/30/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.61	<0.50	<0.50	<0.50	9.78	1.95	--	29.8	<0.50
	2/27/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	0.551	1.66	<0.50	<0.50	<0.50	13.5	2.26	--	45.2	<0.50
	5/30/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.974	<0.50	<0.50	<0.50	7.38	<1	--	12.6	<0.50
	9/25/2001	<2.5	<2.5	<2.5	<2.5	<2.5	2.6	<2.5	4	2.7	<2.5	<2.5	<2.5	39	18	--	210	<2.5
	12/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/19/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.21	<0.50	--	3.73	<0.50
	5/30/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.45	<0.50	--	10.4	<0.50
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	2.34	<0.50	<0.50	<0.50	8.71	1.02	--	19.7	<0.50

Please refer to notes at end of table.

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NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
S-1 (continued)	1/23/2003	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	0.78	<0.50	<0.50	<0.50	6.15	0.56	--	13	<0.50
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.2	<0.500	--	8.67	<0.50
	11/11/2003	<1	<1	<1	<1	<1.0	<1	<1	<1	1.85	<1	<1	<1.0	4.22	<1	--	13.2	<1
	1/26/2004	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.57	0.67	--	15.5	<0.50
	5/4/2004	<1	<1	<1	<1	<1.0	<1	<1	<1	1.17	<1	<1	<1.0	4.07	<1	--	10.6	<1
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	2.8	<0.50	<0.50	<0.50	8.4	0.82	--	18	<0.50
	2/1/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	0.75	<0.50	<0.50	<0.50	1.89	<0.50	--	2.87	<0.50
	5/18/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	2.24	<0.50	<0.50	<0.50	3.73	<0.50	--	8.39	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/23/2007	<1	<1	<1	<1	< 1.00	<1	<1	<1	3.63	<1	<1	< 1.00	4.02	<1	--	6.85	<1
	12/13/2007	<1	<0.50	<0.50	<1	<1.00	<0.50	<0.50	<0.50	4.61	<0.50	<0.50	<0.50	4.87	<0.50	--	8.44	<0.50
	3/5/2008	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	5.15	<0.500	<0.500	<1.00	<0.500	4.14	<0.500	<0.500	<0.500
	6/25/2008	<1	<1	<1	<1	< 1.00	<1	<1	<1	1.67	<1	<1	< 1.00	<1	1.37	<1	<1	<1
	9/17/2008	<1	<0.500	<0.500	<1	< 0.500	<0.500	<0.500	<0.500	5.55	<0.500	<0.500	< 0.500	2.81	<0.500	<0.500	6.07	<0.500
	12/9/2008	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	< 0.50	0.62	<0.50	<0.50	1.4	<0.50
	3/25/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	2.3	<0.50	<0.50	< 0.50	1.4	<0.50	<0.50	2.7	<0.50
	6/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	0.91	<0.50	<0.50	< 0.50	0.81	<0.50	<0.50	1.8	<0.50
	9/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	2.4	<0.50	<0.50	< 0.50	1.7	<0.50	<0.50	5	<0.50
	12/16/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	2.4	<0.50	<0.50	< 0.50	1.7	<0.50	<0.50	6.1	<0.50
	3/17/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	1.2	<0.50	<0.50	1	<0.50
	7/2/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	9/22/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	0.66	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	1.5	<0.5
	12/8/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	< 0.5	0.77	<0.5	<0.5	3	<0.5
	3/9/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1.2	<0.50
	6/8/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	0.66	<0.5
	9/14/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	< 0.50	1.4	<0.50	<0.50	4	<0.50
	12/6/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	< 0.50	1.3	<0.50	<0.50	3.1	<0.50
	3/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.59	<0.50	<0.50	<0.50	0.74	<0.50	<0.50	1.8	<0.50
	06/21/2012	<0.5	<0.5	<0.5	<0.5	<0.50	<0.5	<0.5	<0.5	0.98	<0.5	<0.5	<0.50	0.94	<0.5	<0.5	3.5	<0.5
	9/14/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.88	<0.50	<0.50	<0.50	0.88	<0.50	<0.50	2.6	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.8	<0.50	<0.50	<0.50	0.96	<0.50	<0.50	3.8	<0.50
S-2	8/11/1999	<1	<5	<0.50	<0.50	<0.50	2.37	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.7	<1	--	0.843	<0.50
	11/15/2004	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	0.52	<0.50	<0.50	--	4.4	<0.50	--	1.6	<0.50
	12/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	<0.50	1.7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
TMP-1	8/10/1999	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	3.67	5.95	<2.5	<2.5	<2.5	168	24.6	--	476	<2.5
	3/22/2004	Well Abandoned																
TMP-2	8/11/1999	<5	<25	<2.5	<2.5	<2.5	8	<2.5	12.9	16.8	<2.5	<2.5	<2.5	231	42.9	--	936	<2.5
	3/22/2004	Well Abandoned																

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
IW-1	8/10/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	523	<50	<50	<50.0	13,600	153	--	1,920	<50
	8/12/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	<50	<50	<50	<50.0	2,030	<100	--	311	<50
	8/19/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	305	<50	<50	<50.0	7,530	<100	--	1,100	<50
	8/25/1999	<25	<125	<12.5	<12.5	<12.5	17.2	<12.5	18.7	388	<12.5	<12.5	<12.5	10,700	131	--	1,350	<12.5
	9/1/1999	<200	<1,000	<100	<100	<100	<100	<100	<100	486	<100	<100	<100	11,900	<200	--	2,030	<100
	9/8/1999	<200	<1,000	<100	<100	<100	<100	<100	<100	550	<100	<100	<100	9,320	<200	--	1,980	<100
	9/12/1999	<50	<250	<25	<25	<25.0	<25	<25	<25	<25	<25	<25	<25.0	<25	<50	--	<25	<25
	9/20/1999	131	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	11	--	<2.5	<2.5
	9/27/1999	153	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	13.4	--	<2.5	<2.5
	2/29/2000	<100	<500	<50	<50	<50.0	<50	<50	<50	68.8	<50	<50	<50.0	4,240	314	--	413	<50
MP-1	8/10/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	205	<50	<50	<50.0	12,700	132	--	1,330	<50
	8/12/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	<50	<50	<50	<50.0	2,770	<100	--	210	<50
	8/19/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	112	<50	<50	<50.0	9,880	<100	--	813	<50
	8/25/1999	<50	<250	<25	<25	<25.0	<25	<25	<25	131	<25	<25	<25.0	8,550	95	--	850	<25
	9/1/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	169	<50	<50	<50.0	10,500	<100	--	1,030	<50
	9/8/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	166	<50	<50	<50.0	12,200	121	--	1,100	<50
	9/12/1999	<50	<250	<25	<25	<25.0	<25	<25	<25	<25	<25	<25	<25.0	<25	<50	--	<25	<25
	9/20/1999	163	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	10	--	<2.5	<2.5
	9/27/1999	83.3	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	43.4	11.5	--	<2.5	<2.5
	11/16/1999	<20	<50	<10	<20	<20.0	<10	<10	<10	<10	<10	<10	<10.0	2,890	103	--	149	<10
	2/29/2000	<200	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	5,100	236	--	676	<100
	3/12/2003	<2	<1	<1	<2	<2.0	3.25	<1	<1	5	<1	<1	<1.0	378	5.7	--	38.2	<1
	5/29/2003	<2	<1	<1	<2	<2.0	9.72	<1	<1	10.4	<1	<1	<1.0	311	9.98	--	50.5	<1
	11/11/2003	<10	<10	<10	<10	<10.0	<10	<10	<10	<10	<10	<10	<10.0	900	13.8	--	59.3	<10
	3/23/2009	<4	<4	<4	<4	< 4.0	6	<4	<4	89	<4	<4	< 4.0	1,200	10	<4	180	<4
	6/18/2009	<4	<4	<4	<4	< 4.0	4.3	<4	<4	43	<4	<4	< 4.0	1,500	12	<4	180	<4
	9/18/2009	<4	<4	<4	<4	< 4.0	14	<4	<4	240	8.9	<4	< 4.0	1,100	8.2	<4	310	7.3
	12/18/2009	<4	<4	<4	<4	< 4.0	<4	<4	<4	58	<4	<4	< 4.0	1,000	7.1	<4	180	<4
	3/16/2010	<3	<3	<3	<3	< 3.0	22	<3	4.7	410	13	<3	< 3.0	1,500	8.6	<3	400	10
	6/17/2010	<3	<3	<3	<3	< 3.0	3.2	<3	<3	120	<3	<3	< 3.0	800	5.4	<3	140	<3
	9/23/2010	<3	<3	<3	<3	< 3	<3	<3	<3	41	<3	<3	< 3	730	4	<3	120	<3
	12/10/2010	<3	<3	<3	<3	< 3	<3	<3	<3	27	<3	<3	< 3	1,000	4.5	<3	150	<3
	3/14/2011	<3	<3	<3	<3	< 3.0	7.1	<3	<3	150	<3	<3	< 3.0	1,200	6.4	<3	180	5.9
	6/7/2011	<2.5	<2.5	<2.5	<2.5	<2.5	4.9	<2.5	<2.5	75	<2.5	<2.5	<2.5	640	3.3	<2.5	130	<2.5
	9/19/2011	<1.5	<1.5	<1.5	<1.5	<1.5	2.4	<1.5	<1.5	41	<1.5	<1.5	<1.5	300	1.9	<1.5	72	1.6
	12/7/2011	<2.5	<2.5	<2.5	<2.5	<2.5	2.6	<2.5	<2.5	49	3.1	<2.5	<2.5	640	3.1	<2.5	120	<2.5
	3/9/2012	<1.5	<1.5	<1.5	<1.5	<1.5	9.4	<1.5	2.8	440	6.3	<1.5	<1.5	490	3.5	<1.5	140	21
	06/22/2012	<2.5	<2.5	<2.5	<2.5	<2.5	5.6	<2.5	2.8	530	2.9	<2.5	<2.5	690	12	<2.5	120	48
	9/14/2012	<1.5	<1.5	<1.5	<1.5	<1.5	4	<1.5	<1.5	170	2.2	<1.5	<1.5	340	2	<1.5	83	4.5
	12/14/2012	<0.90	<0.90	<0.90	<0.90	<0.90	2	<0.90	<0.90	170	1.7	<0.90	<0.90	230	1	<0.90	48	1.8

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MP-2	8/10/1999	<200	<1,000	<100	<100	<100	<100	<100	<100	306	<100	<100	<100	7,680	<200	--	1,380	<100
	8/12/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	204	<50	<50	<50.0	7,000	<100	--	1,140	<50
	8/19/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	225	<50	<50	<50.0	8,140	<100	--	1,160	<50
	8/25/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	211	<50	<50	<50.0	7,840	109	--	1,120	<50
	9/1/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	272	<50	<50	<50.0	9,220	105	--	1,350	<50
	9/8/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	215	<50	<50	<50.0	8,990	114	--	1,230	<50
	9/12/1999	<50	<250	<25	<25	<25.0	<25	<25	<25	<25	<25	<25	<25.0	<25	<50	--	<25	<25
	9/20/1999	93.7	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	9.45	--	<2.5	<2.5
	9/27/1999	195	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	21	--	<2.5	<2.5
	11/16/1999	<20	<50	<10	<20	<20.0	<10	<10	<10	13	<10	<10	<10.0	1,990	56.2	--	124	<10
	2/29/2000	<200	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	6,840	308	--	634	<100
	3/12/2003	<5	<2.5	<2.5	<5	<5.0	5.25	<2.5	<1	21	<2.5	<2.5	<2.5	708	9.85	--	115	<1
	5/29/2003	<5	<2.5	<2.5	<5	<5.0	16	<2.5	3.35	61.2	<2.5	<2.5	<2.5	825	20	--	209	3.05
	11/11/2003	<20	<20	<20	<20	<20.0	<20	<20	<20	<20	<20	<20	<20.0	274	<20	--	33	<20
MP-3	8/10/1999	<500	<2,500	<250	<250	<250	<250	<250	<250	361	<250	<250	<250	14,300	<500	--	1,740	<250
	8/12/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	254	<50	<50	<50.0	9,840	138	--	1,300	<50
	8/19/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	334	<50	<50	<50.0	9,630	<100	--	1,340	<50
	8/25/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	213	<50	<50	<50.0	7,360	136	--	947	<50
	9/1/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	257	<50	<50	<50.0	8,930	<100	--	1,110	<50
	9/8/1999	<100	<500	<50	<50	<50.0	<50	<50	<50	334	<50	<50	<50.0	10,000	122	--	1,330	<50
	9/12/1999	<50	<250	<25	<25	<25.0	<25	<25	<25	<25	<25	<25	<25.0	<25	<50	--	<25	<25
	9/20/1999	114	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	23.7	--	<2.5	<2.5
	9/27/1999	143	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	25.3	--	<2.5	<2.5
	2/29/2000	<200	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	8,730	402	--	958	<100
	5/29/2003	<5	<2.5	<2.5	<5	<5.0	12.6	<2.5	<2.5	38.3	<2.5	<2.5	<2.5	714	14.7	--	141	<2.5
MP-4	8/10/1999	<2,000	<10,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	91,700	<2,000	--	9,000	<1,000
	8/12/1999	<5,000	<25,000	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	79,600	<5,000	--	5,000	<2,500
	8/19/1999	<1,000	<5,000	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	100,000	1,460	--	8,640	<500
	8/25/1999	<1,000	<5,000	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	67,900	1,070	--	4,090	<500
	9/1/1999	<1,000	<5,000	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	75,400	<1,000	--	3,890	<500
	9/8/1999	<1,000	<5,000	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	86,000	<1,000	--	4,680	<500
	9/12/1999	<50.0	<250	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	293	--	<25.0	<25.0
	9/20/1999	<100	<500	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	194	1,580	--	<50.0	<50.0
	9/27/1999	<100	<500	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	1,210	--	<50.0	<50.0
	2/29/2000	<2,000	<10,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	151,000	5,180	--	21,500	<1,000
	3/12/2003	--	--	--	--	--	--	--	--	17.6	<50	--	--	2,960	12	--	134	--

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS1-3(43)	6/28/2000	<50	<250	<25	<25	<25.0	278	<25	55.9	4,270	<25	<25	<25.0	734	<50	--	1,840	<25
	8/30/2000	<200	<1	<100	<100	<100	420	<100	116	8,850	<100	<100	<100	5,940	<200	--	3,040	<100
	11/29/2000	<100	<500	<50	<50	<50.0	249	<50	76.2	4,560	<50	<50	<50.0	1,210	<100	--	1,140	<50
	2/27/2001	<100	<500	<50	<50	<50.0	697	<50	164	14,000	<50	<50	<50.0	148	<100	--	1,390	133
	5/31/2001	<100	<500	<50	<50	<50.0	<50	<50	<50	5,870	<50	<50	<50.0	130	<100	--	599	<50
	9/24/2001	<13	<13	<13	<13	<13	150	<13	32	4,700	<13	<13	<13	310	<13	--	450	25
	12/18/2001	<50	<250	<25	<25	<25.0	153	<25	33.3	3,600	<25	<25	<25.0	276	<50	--	568	<25
	3/19/2002	<100	<50	<50	<100	<100	310	<50	103	6,700	<50	<50	<50.0	2,090	<50	--	1,720	86
	5/29/2002	<50	<25	<25	<50	<50.0	188	<25	39	4,700	<25	<25	<25.0	470	<25	--	624	37.5
	8/29/2002	<1	<0.50	<0.50	<1	<1.0	3.72	<0.50	0.84	94.7	0.54	<0.50	<0.50	34.9	0.75	--	35.7	1.46
	11/11/2002	<100	<50	<50	<100	<100	183	<50	<50	4,810	<50	<50	<50.0	757	<50	--	831	51
	1/23/2003	<100	<50	<50	<100	<100	378	<50	76	10,500	<50	<50	<50.0	782	<50	--	1,290	109
	5/28/2003	<100	<50	<50	<100	<100	402	<50	72	9,510	<50	<50	<50.0	270	<50	--	841	114
	11/11/2003	<50	<50	<50	<50	<50.0	252	<50	<50	9,710	<50	<50	<50.0	516	<50	--	1,020	58
	1/27/2004	<50	<25	<25	<50	<50.0	290	<25	54.5	8,160	53.5	<25	<25.0	393	<25	--	808	95
	5/3/2004	<100	<100	<100	<100	<100	370	<100	<100	12,300	<100	<100	<100	830	<100	--	1,520	111
	8/17/2004	<100	<50	<50	<100	<100	401	<50	114	12,700	109	<50	<50.0	1,540	<50	--	2,340	151
	11/15/2004	<120	<120	<120	<120	<120	270	<120	<120	9,600	<120	<120	<120	1,400	<120	--	1,600	<120
	3/24/2005	<100	<50	<50	<100	<100	481	<50	148	15,600	135	<50	<50.0	1,390	<50	--	2,090	266
	5/16/2005	<50	<25	<25	<50	<50.0	327	<25	89	9,670	83	<25	<25.0	802	<25	--	1,410	157
	5/17/2005	<100	<50	<50	<100	<100	353	<50	86	10,600	94	<50	<50.0	920	<50	--	1,660	173
	11/17/2005	<100	<50	<50	<100	<100	392	<50	121	13,400	133	<50	<50.0	1,310	<50	--	2,280	186
	6/6/2006	<100	<100	<100	<100	< 100	385	<100	<100	11,800	115	<100	< 100	628	<100	--	1,370	192
	12/6/2006	<100	<50	<50	<100	< 100	256	<50	72	9,960	92	<50	< 50.0	843	<50	--	1,260	155
	5/22/2007	<100	<100	<100	<100	< 100	439	<100	119	14,200	152	<100	< 100	910	<100	--	1,920	245
	9/11/2007	<100	<50	<50	<100	<100	303	<50	109	11,700	128	<50	<50.0	1,100	<50	--	2,060	189
	12/12/2007	<100	<50	<50	<100	<100	270	<50	75	8,740	93	<50	<50.0	1,010	<50	--	1,540	167
	3/5/2008	<50	<25	<25	<50	<50	370	<25	128	6,740	220	<25	<25.0	1,480	36	<25	2,350	234
	9/16/2008	<100	<50	<50	<100	< 50.0	302	<50	112	10,400	139	<50	< 50.0	2,700	<50	<50	2,500	171
	12/8/2008	<4	<4	<4	<4	< 4.0	190	<4	63	6,000	78	<4	< 4.0	1,300	19	<4	1,200	100
	3/25/2009	<15	<15	<15	<15	< 15	110	<15	66	3,500	34	<15	< 15	3,600	49	<15	2,100	49
	9/15/2009	<15	<15	<15	<15	< 15	140	<15	74	4,200	45	<15	< 15	4,300	44	<15	2,300	84
	12/14/2009	<15	<15	<15	<15	< 15	140	<15	46	4,000	55	<15	< 15	1,500	15	<15	1,100	67
	3/17/2010	<15	<15	<15	<15	< 15	160	<15	63	4,600	44	<15	< 15	2,800	32	<15	1,900	78
	6/14/2010	<25	<25	<25	<25	< 25	220	<25	46	5,400	69	<25	< 25	790	<25	<25	900	85
	9/21/2010	<15	<15	<15	<15	< 15	130	<15	55	3,800	43	<15	< 15	2,900	37	<15	1,900	68
	12/7/2010	<15	<15	<15	<15	< 15	190	<15	63	5,500	69	<15	< 15	2,500	23	<15	1,800	96
	3/8/2011	<20	<20	<20	<20	< 20	170	<20	52	4,600	56	<20	< 20	1,400	<20	<20	1,300	86
	6/6/2011	<15	<15	<15	<15	<15	190	<15	36	4,700	71	<15	<15	610	<15	<15	790	97
	9/13/2011	<20	<20	<20	<20	<20	290	<20	78	8,000	160	<20	<20	900	<20	<20	1,800	160
	3/8/2012	<4	<40	<40	<40	<40	340	<40	62	9,500	150	<40	<40	240	<40	<40	690	890
	06/21/2012	<20	<20	<20	<20	<20	220	<20	25	4,400	76	<20	<20	74	<20	<20	260	1,100
	9/12/2012	<20	<20	<20	<20	<20	280	<20	72	8,800	180	<20	<20	360	<20	<20	970	890
	12/11/2012	<20	<20	<20	<20	<20	220	<20	40	6100	110	<20	<20	160	<20	<20	430	680

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS1-2(60)	6/28/2000	<10	<50	<5	<5	<5.0	53.6	<5	<5	369	<5	<5	<5.0	658	19.7	--	240	<5
	8/30/2000	<20	<100	<10	<10	<10.0	21.7	<10	13.1	267	<10	<10	<10.0	2,590	108	--	586	<10
	11/29/2000	<2	<10	<1	<1	<1.0	1.58	<1	1.09	57.7	<1	<1	<1.0	121	4.58	--	40.3	<1
	2/27/2001	<1	<5	<0.5	<0.5	<0.5	0.838	<0.5	0.686	32.9	<0.5	<0.5	<0.5	54.6	2.06	--	24.7	<0.5
	5/31/2001	<1	<5	<0.50	<0.50	<0.50	0.662	<0.50	0.581	39	<0.50	<0.50	<0.50	69.4	<1	--	27.8	0.52
	9/24/2001	<13	<13	<13	<13	<13	<13	<13	<13	89	<13	<13	<13	830	14	--	150	<13
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	20.4	<0.50	<0.50	<0.50	12.8	<1	--	15.7	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	<1.0	2.52	<0.50	0.99	68	<0.50	<0.50	<0.50	62.9	1.2	--	34	3.48
	5/29/2002	<1	<0.50	<0.50	<1	<1.0	0.78	<0.50	<0.50	22.8	<0.50	<0.50	<0.50	23.4	<0.50	--	14.2	0.6
	8/29/2002	<10	<5	<5	<10	<10.0	30.6	<5	5.1	661	<5	<5	<5.0	138	<5	--	116	<5
	11/11/2002	<1	<0.50	<0.50	<1	<1.0	2.99	<0.50	0.83	86	<0.50	<0.50	<0.50	38.2	1.16	--	38.9	<0.50
	1/23/2003	<1	<0.50	<0.50	<1	<1.0	1.53	<0.50	0.74	42.6	<0.50	<0.50	<0.50	42.8	0.78	--	34.2	1.04
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	2.87	<0.50	1.21	72	<0.50	<0.50	<0.50	51.1	1.18	--	47.6	0.63
	11/11/2003	<1	<1	<1	<1	<1.0	1.84	<1	<1	48.8	<1	<1	<1.0	45.9	<1	--	36	<1
	1/27/2004	<1	<0.50	<0.50	<1	<1.0	2.06	<0.50	1.06	72.3	0.69	<0.50	<0.50	40.9	0.66	--	43.1	0.63
	5/3/2004	<1	<1	<1	<1	<1.0	4.07	<1	1.22	70.7	<1	<1	<1.0	54.8	1.36	--	43.5	2.53
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	<0.50	<0.50	<0.50	<0.50	<0.50	1.2	<0.50	0.68	39	<0.50	<0.50	<0.50	31	<0.50	--	28	0.67
	2/1/2005	<1	<0.50	<0.50	<1	<1.0	1.31	<0.50	<0.50	37.5	0.56	<0.50	<0.50	33.2	<0.50	--	21.7	1.3
	5/16/2005	<1	<0.50	<0.50	<1	<1.0	0.95	<0.50	<0.50	40.6	<0.50	<0.50	<0.50	21.7	<0.50	--	19.8	<0.50
	5/16/2005 (DUP)	<1	<0.50	<0.50	<1	<1.0	1.02	<0.50	<0.50	42.1	<0.50	<0.50	<0.50	21.4	<0.50	--	20.5	<0.50
	8/18/2005	<1	<0.500	<0.500	<1	<1.00	7.28	<0.500	2.41	145	1.2	<0.500	<0.500	76.5 B	1.46	--	65.6	5.16 B
	11/17/2005	<1	<0.500	<0.500	<1	<1.00	2.53	<0.500	0.99	87	0.59	<0.500	<0.500	34.8	<0.500	--	26.4	0.93
	2/20/2006	<1	<0.500	<0.500	<1	< 1.00	6.17	<0.500	1.93	136	1.1	<0.500	< 0.500	61.9	0.93	--	45.5	4.17
	6/6/2006	<1	<1	<1	<1	< 1.00	1.02	<1	<1	33.7	<1	<1	< 1.00	23.4	<1	--	18.7	<1
	9/5/2006	<1	<0.50	<0.50	<1	< 1.00	5.37	<0.50	1.75	115	0.84	<0.50	< 0.50	55.9	0.8	--	37.5	4.79
	12/6/2006	<1	<0.50	<0.50	<1	< 1.00	3.39	<0.50	1.12	90.9	0.62	<0.50	< 0.50	39.5	<0.50	--	28.3	2.15
	2/7/2007	<1	<0.50	<0.50	<1	< 1.00	4.37	<0.50	1.37	116	0.93	<0.50	< 0.50	55.9	0.58	--	40.7	3
	5/22/2007	<1	<1	<1	<1	< 1.00	1.18	<1	<1	38.5	<1	<1	< 1.00	31.6	<1	--	25.2	<1
	9/11/2007	<5	<2.50	<2.50	<5	<5.00	26.6	<2.50	8.75	711	7.2	<2.50	<2.50	81.4	2.95	--	216	11.9
	12/12/2007	<1	<0.50	<0.50	<1	<1.00	1.83	<0.50	0.79	64.9	0.65	<0.50	<0.50	28.1	<0.50	--	24.9	0.67
	3/4/2008	<1	<0.500	<0.500	<1	<1.00	6.65	<0.500	2.22	166	2.92	<0.500	<0.50	75.4	0.81	<0.500	60.5	2.79
	9/16/2008	<5	<2.50	<2.50	<2.50	< 2.50	5.5	<2.50	<2.50	160	<2.50	<2.50	< 2.50	38.8	<2.50	<2.50	65.5	<2.50
	12/8/2008	<0.50	<0.50	<0.50	<0.50	< 0.50	4.1	<0.50	1.2	88	1.1	<0.50	< 0.50	40	0.51	<0.50	38	1.3
	12/8/2008 DUP	<0.50	<0.50	<0.50	<0.50	< 0.50	3.9	<0.50	1.2	84	1.1	<0.50	< 0.50	42	0.52	<0.50	38	1.3
	3/25/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	3.1	<0.50	1.3	71	0.75	<0.50	< 0.50	40	0.65	<0.50	37	0.54
	6/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1	<0.50	0.8	47	0.9	<0.50	< 0.50	26	<0.50	<0.50	30	0.55
	9/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1.8	<0.50	0.82	44	0.58	<0.50	< 0.50	42	<0.50	<0.50	30	0.82

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS1-2(60) (continued)	12/14/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	17	<0.50	<0.50	< 0.50	18	<0.50	<0.50	16	<0.50
	3/17/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	2.4	<0.50	0.96	61	0.68	<0.50	< 0.50	40	0.51	<0.50	38	<0.50
	6/14/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	20	<0.50	<0.50	< 0.50	17	<0.50	<0.50	15	<0.50
	9/21/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	2.1	<0.5	0.57	46	<0.5	<0.5	< 0.5	42	<0.5	<0.5	32	0.8
	12/7/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	16	<0.5	<0.5	< 0.5	19	<0.5	<0.5	15	<0.5
	3/8/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.54	<0.50	<0.50	19	<0.50	<0.50	< 0.50	27	<0.50	<0.50	16	<0.50
	6/6/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	8.3	<0.5	<0.5	< 0.50	16	<0.5	<0.5	11	<0.5
	9/13/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	2.5	<0.50	0.73	42	0.5	<0.50	< 0.50	42	0.89	<0.50	30	0.74
	12/6/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	1	<0.50	<0.50	30	<0.50	<0.50	< 0.50	33	<0.50	<0.50	22	0.6
	3/8/2012	<0.50	<0.50	<0.50	<0.50	<0.50	1.6	<0.50	<0.50	32	<0.50	<0.50	<0.50	36	<0.50	<0.50	21	<0.50
	06/19/2012	<0.50	<0.50	<0.50	<0.50	<0.50	0.71	<0.50	<0.50	28	<0.50	<0.50	<0.50	22	<0.50	<0.50	16	<0.50
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	2.5	<0.50	0.66	36	<0.50	<0.50	<0.50	33	<0.50	<0.50	20	1.1
	12/11/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	20	<0.50	<0.50	<0.50	19	<0.50	<0.50	11	<0.50
MGMS1-1(110)	6/28/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.78	<0.50	<0.50	<0.50	3.9	<1	--	3.35	<0.50
	8/30/2000	<5	<25	<2.5	<2.5	<2.5	3.7	<2.5	3.32	55	<2.5	<2.5	<2.5	510	24	--	130	<2.5
	11/29/2000	<5	<25	<2.5	<2.5	<2.5	4.21	<2.5	4.59	51	<2.5	<2.5	<2.5	583	23.2	--	166	<2.5
	2/27/2001	<5	<25	<2.5	<2.5	<2.5	5.21	<2.5	3.39	47.5	<2.5	<2.5	<2.5	385	16.5	--	105	<2.5
	5/31/2001	<10	<50	<5	<5	<5.0	<5	<5	<5	55.8	<5	<5	<5.0	639	13.8	--	141	<5
	9/24/2001	<1.3	<1.3	<1.3	<1.3	<1.3	6.1	<1.3	2.9	57	<1.3	<1.3	<1.3	580	20	--	120	<1.3
	12/18/2001	<5	<25	<2.5	<2.5	<2.5	5.04	<2.5	2.68	54.8	<2.5	<2.5	<2.5	527	20.2	--	131	<2.5
	3/19/2002	<5	<2.5	<2.5	<5	<5.0	5.25	<2.5	<2.5	54	<2.5	<2.5	<2.5	454	10.8	--	98	<2.5
	5/29/2002	<5	<2.5	<2.5	<5	<5.0	4.9	<2.5	<2.5	62.3	<2.5	<2.5	<2.5	299	9.7	--	65.1	<2.5
	8/29/2002	<1	<0.50	<0.50	<1	<1.0	5.43	<0.50	1.32	110	0.8	<0.50	<0.50	60.2	3.62	--	47.8	<0.50
	11/11/2002	<2	<1	<1	<2	<2.0	4.74	<1	1.2	46.1	<1	<1	<1.0	208	7.84	--	66.1	<1
	1/23/2003	<2	<1	<1	<2	<2.0	4.44	<1	1.24	65.3	<1	<1	<1.0	210	6.54	--	74.1	<1
	5/28/1903	<2	<1	<1	<2	<2.0	3.96	<1	<1	69.2	<1	<1	<1.0	109	2.48	--	57.5	<1
	11/11/2003	<2	<2	<2	<2	<2.0	4.14	<2	<2	44.8	<2	<2	<2.0	256	3.6	--	60.2	<2
	1/27/2004	<2	<1	<1	<2	<2.0	4.22	<1	1.1	67.1	<1	<1	<1.0	167	4.16	--	69.7	<1
	5/3/2004	<1	<1	<1	<1	<1.0	3.66	<1	<1	47.2	<1	<1	<1.0	190	2.18	--	55.9	<1
	11/15/2004	<2.5	<2.5	<2.5	<2.5	<2.5	3.7	<2.5	<2.5	95	<2.5	<2.5	<2.5	76	<2.5	--	64	<2.5
	6/20/2005	<2	<1	<1	<2	<2.0	9.22	<1	2.58	283	1.8	<1	<1.0	23.6	1.62	--	70	1.24
	11/17/2005	<1	<0.500	<0.500	<1	<1.00	2.93	<0.500	<0.500	51.3	<0.500	<0.500	<0.500	102	1.95	--	76.1	<0.500
	6/6/2006	<1	<1	<1	<1	< 1.00	2.15	<1	<1	44	<1	<1	< 1.00	94.4	1.36	--	66.8	<1
	12/6/2006	<1	<0.50	<0.50	<1	< 1.00	5.81	<0.50	0.6	142	<0.50	<0.50	< 0.50	53.8	0.88	--	74.6	0.57
	9/11/2007	<2	<1	<1	<2	<2.00	3.78	<1	1.2	189	<1	<1	<1.00	31.6	<1	--	61.1	<1
	3/4/2008	<1	<0.500	<0.500	<1	<1.00	3.73	<0.500	0.91	242	2.37	<0.500	<0.50	32.7	0.64	<0.500	44.4	<0.500
	3/25/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	2.6	<0.50	0.87	160	0.9	<0.50	< 0.50	25	<0.50	<0.50	39	<0.50
	6/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	2.3	<0.50	0.74	130	1	<0.50	< 0.50	24	<0.50	<0.50	39	<0.50
	9/15/2009	<2.5	<2.5	<2.5	<2.5	< 2.5	20	<2.5	2.7	620	3.6	<2.5	< 2.5	24	<2.5	<2.5	75	<2.5
	3/17/2010	<2.5	<2.5	<2.5	<2.5	< 2.5	20	<2.5	4.3	720	3.7	<2.5	< 2.5	20	<2.5	<2.5	79	<2.5
	9/21/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	2.5	<0.5	1.1	150	1	<0.5	< 0.5	28	<0.5	<0.5	53	<0.5
	3/10/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	1.4	<0.50	0.57	83	0.52	<0.50	< 0.50	26	<0.50	<0.50	31	<0.50

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS1-1(110) (continued)	9/13/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	1.9	<0.50	1.2	110	0.96	<0.50	< 0.50	30	<0.50	<0.50	59	<0.50
	3/8/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	1	<0.50	<0.50	62	<0.50	<0.50	< 0.50	22	<0.50	<0.50	21	<0.50
	9/12/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	0.93	<0.50	0.53	60	<0.50	<0.50	< 0.50	22	<0.50	<0.50	25	<0.50
MGMS2-4(40)	6/28/2000	<50	<250	<25	<25	<25.0	44.9	<25	<25	1,210	<25	<25	<25.0	5,030	215	--	3,090	<25
	8/30/2000	<10	<50	<5	<5	<5.0	23.4	<5	31.3	644	7.28	<5	<5.0	2,980	152	--	1,850	<5
	11/29/2000	<100	<500	<50	<50	<50.0	51.3	<50	94	1,420	<50	<50	<50.0	8,740	424	--	3,980	<50
	2/27/2001	<50	<250	<25	<25	<25.0	35.6	<25	66.2	753	<25	<25	<25.0	7,360	280	--	3,360	<25
	5/31/2001	<50	<250	<25	<25	<25.0	<25	<25	<25	604	<25	<25	<25.0	3,610	94.4	--	2,050	<25
	9/24/2001	<5	<5	<5	<5	<5.0	28	<5	26	780	13	<5	<5.0	2,600	170	--	1,700	<5
	12/18/2001	<50	<250	<25	<25	<25.0	175	<25	77	1,350	<25	<25	<25.0	5,590	374	--	3,220	<25
	3/19/2002	<50	<25	<25	<50	<50.0	36	<25	36	868	<25	<25	<25.0	6,240	180	--	3,040	<25
	5/29/2002	<50	<25	<25	<50	<50.0	76	<25	53	1,330	<25	<25	<25.0	6,580	230	--	2,530	<25
	11/11/2002	<20	<10	<10	<20	<20.0	19.8	<10	13.6	639	<10	<10	<10.0	3,080	89.4	--	1,820	<10
	1/23/2003	<20	<10	<10	<20	<20.0	13.4	<10	<10	353	<10	<10	<10.0	2,290	52.6	--	1,480	<10
	5/28/2003	<10	<5	<5	<10	<10.0	5.4	<5	<5	110	<5	<5	<5.0	1,190	19.1	--	474	<5
	11/11/2003	<10	<10	<10	<10	<10.0	<10	<10	<10	54.1	<10	<10	<10.0	1,820	14	--	398	<10
	1/27/2004	<20	<10	<10	<20	<20.0	45.2	<10	10	397	<10	<10	<10.0	1,740	55.8	--	688	<10
	5/3/2004	<10	<10	<10	<10	<10.0	<10	<10	<10	41.2	<10	<10	<10.0	599	<10	--	200	<10
	8/17/2004	<10	<5	<5	<10	<10.0	9.7	<5	6.1	158	<5	<5	<5.0	1,530	30.7	--	705	<5
	11/15/2004	<25	<25	<25	<25	<25.0	<25	<25	<25	310	<25	<25	<25.0	2,900	<25	--	1,300	<25
	3/24/2005	<20	<10	<10	<20	<20.0	10.8	<10	<10	159	<10	<10	<10.0	1,900	25.8	--	834	<10
	5/16/2005	<20	<10	<10	<20	<20.0	34.2	<10	28.2	489	<10	<10	<10.0	2,540	52.2	--	1,150	<10
	11/16/2005	<50	<25	<25	<50	<50.0	43.5	<25	<25	396	<25	<25	<25.0	4,240	82.5	--	1,750	<25
	6/6/2006	<50	<50	<50	<50	< 50.0	62	<50	<50	917	<50	<50	< 50.0	4,820	55	--	1,770	<50
	12/5/2006	<50	<25	<25	<50	< 50.0	<25	<25	<25	370	<25	<25	< 25.0	3,090	31.5	--	1,200	<25
	5/21/2007	<20	<20	<20	<20	< 20.0	27.4	<20	<20	359	<20	<20	< 20.0	2,880	38.2	--	1,080	<20
	9/10/2007	<50	<25	<25	<50	<50.0	<25	<25	<25	402	<25	<25	<25.0	2,010.00	52.5	--	1,600.00	<25
	12/12/2007	<50	<25	<25	<50	<50.0	26	<25	<25	330	<25	<25	<25.0	2,080	35.5	--	914	<25
	3/4/2008[7.]	<1	<0.500	<0.500	<1	<1.00	20.4	<0.500	16.1	181	7.71	<0.500	<0.50	1,810	53.7	0.51	950	4.68
	9/16/2008	<50	<25	<25	<25	<25	<25	<25	<25	208	<25	<25	<25	2,330	32	<25	1,130	<25
	12/8/2008	Not sampled. Air leak in sampling point prohibited the collection of the sample.																
	3/24/2009	<2	<2	<2	<2	< 2.0	8.4	<2	3.6	100	2	<2	< 2.0	990	14	<2	430	<2
	9/15/2009	<1.5	<1.5	<1.5	<1.5	< 1.5	3.1	<1.5	<1.5	52	<1.5	<1.5	< 1.5	440	4.1	<1.5	200	<1.5
	12/14/2009	<1.5	<1.5	<1.5	<1.5	< 1.5	54	<1.5	16	360	6.9	<1.5	< 1.5	2,400	62	<1.5	1,000	2.6

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Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS2-4(40) (continued)	3/16/2010	<7	<7	<7	<7	< 7	16	<7	<7	140	<7	<7	< 7	1,800	19	<7	810	<7
	6/14/2010	<25	<25	<25	<25	< 25	72	<25	41	1,400	<25	<25	< 25	6,400	68	<25	1,500	43
	9/21/2010	<2.5	<2.5	<2.5	<2.5	< 2.5	35	<2.5	17	480	9	<2.5	< 2.5	3,500	48	<2.5	1,500	5.4
	12/7/2010	<15	<15	<15	<15	< 15	69	<15	26	700	<15	<15	< 15	4,100	83	<15	1,600	<15
	3/7/2011	<15	<15	<15	<15	< 15	88	<15	30	930	<15	<15	< 15	3,700	91	<15	1,600	<15
	6/7/2011	<15	<15	<15	<15	<15	65	<15	30	1,600	17	<15	<15	4,400	57	<15	1,400	48
	9/12/2011	<15	<15	<15	<15	<15	44	<15	28	7,400	20	<15	<15	790	48	<15	380	58
	12/7/2011	<15	<15	<15	<15	<15	35	<15	<15	5,300	<15	<15	<15	61	<15	<15	39	460
	3/8/2012	<2	<2	<2	<2	<2	38	<2	2.3	470	2.8	<2	<2	9.9	5.2	<2	5.4	260
	06/19/2012	<0.5	3.9	<0.5	<0.5	<0.5	53	<0.5	<0.5	20	1.3	<0.5	<0.5	7.2	<0.5	<0.5	2.5	63
	9/13/2012	<1.5	1.8	<1.5	<1.5	<1.5	39	<1.5	2.8	310	3.2	<1.5	<1.5	89	5	<1.5	80	440
	12/11/2012	<0.50	30.0	<0.50	<0.50	<0.50	5	<0.50	<0.50	33	1.3	<0.50	<0.50	10	<0.50	<0.50	3.4	4
MGMS2-3(60)	6/28/2000	<5	<25	<2.5	<2.5	<2.5	35.6	<2.5	8.3	433	<2.5	<2.5	<2.5	110	22.3	--	198	<2.5
	8/30/2000	<10	<50	<5	<5	<5.0	36	<5	13	1,120	<5	<5	<5.0	164	32	--	136	<5
	11/29/2000	<5	<25	<2.5	<2.5	<2.5	5.08	<2.5	3.88	279	<2.5	<2.5	<2.5	26.8	<5	--	38	<2.5
	2/27/2001	<2	<10	<1	<1	<1.0	40.2	<1	2.65	46.6	<1	<1	<1.0	20.7	12.4	--	27	173
	5/31/2001	<1	<5	<0.50	<0.50	<0.50	2.47	<0.50	2.3	39.1	<0.50	<0.50	<0.50	113	3.44	--	75.6	5.06
	9/24/2001	<2.5	<2.5	<2.5	<2.5	<2.5	14	<2.5	11	180	3.6	<2.5	<2.5	340	11	--	220	48
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	0.607	<0.50	1.01	15	<0.50	<0.50	<0.50	64.4	2.06	--	47.7	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	<1.0	5.4	<0.50	2.96	62.9	0.81	<0.50	<0.50	91.9	5.78	--	80.1	15.2
	5/29/2002	<1	<0.50	<0.50	<1	<1.0	2.55	<0.50	2.02	59.7	0.82	<0.50	<0.50	119	4.8	--	67.6	1.06
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	<1	<0.50	<0.50	<1	<1.0	10.1	<0.50	2.7	114	1.12	<0.50	<0.50	111	6.06	--	96	22.8
	5/28/2003	<2	<1	<1	<2	<2.0	15	<1	3.28	178	1.48	<1	<1.0	131	9.3	--	126	15.6
	11/11/2003	<2	<2	<2	<2	<2.0	21.3	<2	4.56	208	<2	<2	<2.0	223	9.06	--	139	20.6
	1/27/2004	<1	<0.50	<0.50	<1	<1.0	17.2	<0.50	2.83	117	1.57	<0.50	<0.50	96.3	5.38	--	92.2	17.7
	5/3/2004	<1	<1	<1	<1	<1.0	4.79	<1	1.96	86.4	<1	<1	<1.0	121	3.31	--	84	<1
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	13	4.4	220	2.8	<2.5	<2.5	170	6.4	--	140	11
	2/1/2005	<1	<0.50	<0.50	<1	<1.0	2.49	<0.50	1.47	92	2.46	<0.50	<0.50	97.7	2.41	--	73.9	0.6
	5/16/2005	<1	<0.50	<0.50	<1	<1.0	1.49	<0.50	1.51	45.2	0.59	<0.50	<0.50	74.1	1.61	--	41.5	<0.50
	8/18/2005	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	27.6 B	<0.500	<0.500	<0.500	23.5 B	<0.500	--	13 B	<0.500
	11/16/2005	<1	<0.500	<0.500	<1	<1.00	7.5	<0.500	2.05	90.9	1.16	<0.500	<0.500	107	3.1	--	78.3	2.68
	2/20/2006	<1	<0.500	<0.500	<1	< 1.00	3.35	<0.500	1.6	65	0.82	<0.500	< 0.500	99.5	1.55	--	62.3	1.27
	6/6/2006	<1	<1	<1	<1	< 1.00	<1	<1	<1	55	<1	<1	< 1.00	76.3	1.01	--	36.2	<1
	9/5/2006	<1	<0.50	<0.50	<1	< 1.00	2.85	<0.50	1.13	75.1	0.73	<0.50	< 0.50	73	1.11	--	45.6	0.83
	12/5/2006	<1	<0.50	<0.50	<1	< 1.00	2.58	<0.50	1.44	77	0.75	<0.50	< 0.50	98.7	1.27	--	61.2	0.79
	2/7/2007	<1	<0.50	<0.50	<1	< 1.00	3.36	<0.50	1.3	96.5	0.79	<0.50	< 0.50	76.3	1.64	--	55	1.51
	5/21/2007	<1	<1	<1	<1	< 1.00	2.45	<1	1.33	73.7	<1	<1	< 1.00	99.1	1.51	--	54.5	<1
	9/10/2007	<10	<5	<5	<10	<10.0	31.2	<5	8.2	559	<5	<5	<5.00	221	10.8	--	192	26.7
	12/12/2007	<1	<0.50	<0.50	<1	< 1.00	1.49	<0.50	0.88	78.6	0.56	<0.50	< 0.50	66.1	0.98	--	36.8	1.75

Please refer to notes at end of table.

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Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS2-3(60) (continued)	3/4/2008	<1	<0.500	<0.500	<1	< 1.00	4.46	<0.500	2.19	164	1.37	<0.500	<0.50	89.7	2.32	<0.500	72.2	6.88
	9/16/2008	<5	<2.50	<2.50	<5	< 2.50	10.4	<2.50	3.65	166	<2.50	<2.50	< 2.50	111	3.85	<2.50	96.4	7.15
	12/8/2008	<0.80	<0.80	<0.80	<0.80	< 0.80	11	<0.80	3	160	1.7	<0.80	< 0.80	110	3.2	<0.80	80	10
	3/24/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	5.8	<0.50	1.6	110	1	<0.50	< 0.50	84	2.2	<0.50	53	3.7
	9/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	6.4	<0.50	2.3	91	1.2	<0.50	< 0.50	110	2.4	<0.50	72	4.2
	12/14/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	2.1	<0.50	1.1	61	0.75	<0.50	< 0.50	84	1.1	<0.50	54	0.96
	3/16/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	15	<0.50	3.6	140	1.6	<0.50	< 0.50	160	8.2	<0.50	110	12
	6/14/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	1.2	<0.50	0.75	46	0.55	<0.50	< 0.50	73	0.86	<0.50	38	0.88
	9/21/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	11	<0.5	3	130	1.5	<0.5	< 0.5	150	5.8	<0.5	100	6.8
	12/7/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	4.1	<0.5	1.8	86	1.2	<0.5	< 0.5	120	1.7	<0.5	77	1.6
	3/7/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	1.5	<0.50	0.86	73	0.62	<0.50	< 0.50	61	1.2	<0.50	34	1.4
	6/6/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	0.64	<0.5	<0.5	22	<0.5	<0.5	< 0.50	64	0.54	<0.5	27	<0.5
	9/12/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	10	<0.50	3.2	110	1.4	<0.50	< 0.50	170	6	<0.50	100	2
	12/5/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	2.6	<0.50	0.95	51	0.54	<0.50	< 0.50	84	1	<0.50	41	<0.50
	3/8/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	10	<0.50	2.9	300	1.9	< 0.50	< 0.50	71	1.5	< 0.50	45	43
	06/19/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	2	<0.50	1	79	0.87	< 0.50	< 0.50	78	0.78	< 0.50	45	5.3
	9/12/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	1.5	<0.50	0.56	48	< 0.50	< 0.50	< 0.50	44	<0.50	< 0.50	20	2.7
	12/11/2012	<0.50	<0.50	<0.50	<0.50	<0.50	2.6	<0.50	2.50	59	1.50	<0.50	<0.50	57	0.62	<0.50	36	16.0
MGMS2-2(110)	6/28/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	12.2	<0.50	<0.50	<0.50	6.04	<1	--	17.1	<0.50
	8/30/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.41	<0.50	<0.50	<0.50	16.4	<1	--	14.7	<0.50
	11/29/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	0.717	8.23	<0.50	<0.50	<0.50	13	<1	--	19.3	<0.50
	2/27/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	0.756	7.31	<0.50	<0.50	<0.50	15.2	<1	--	21.6	<0.50
	5/31/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	0.938	10.7	<0.50	<0.50	<0.50	24.4	1.14	--	29.1	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.6	6.8	<0.50	<0.50	<0.50	37	1.1	--	34	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	0.62	4.91	<0.50	<0.50	<0.50	35.1	<1	--	27.5	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	0.61	9.97	<0.50	<0.50	<0.50	35.6	1.23	--	24.6	<0.50
	5/29/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	1.21	31.9	<0.50	<0.50	<0.50	114	2.39	--	51	0.61
	1/23/2003	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	1.01	57.1	<0.50	<0.50	<0.50	47.8	2.79	--	44.1	2.98
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	0.61	<0.50	0.73	63.9	<0.50	<0.50	<0.50	54.6	1.98	--	43.1	1.13
	11/11/2003	<1	<1	<1	<1	<1.0	1.14	<1	<1	76.7	1.07	<1	<1.0	32.4	2.19	--	30.8	2.03
	1/27/2004	<1	<0.50	<0.50	<1	<1.0	0.63	<0.50	<0.50	49	<0.50	<0.50	<0.50	67.9	1.17	--	30	1
	5/3/2004	<1	<1	<1	<1	<1.0	<1	<1	<1	14	<1	<1	<1.0	28	<1	--	13.6	<1
	11/15/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.7	0.62	60	<0.50	<0.50	<0.50	50	1.6	--	30	<0.50
	5/16/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	27.9	<0.50	<0.50	<0.50	21.5	0.52	--	10.9	<0.50
	11/16/2005	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	15.1	<0.500	<0.500	<0.500	18	<0.500	--	8.42	<0.500
	6/6/2006	<1	<1	<1	<1	< 1.00	<1	<1	<1	30.9	<1	<1	< 1.00	13.9	<1	--	6.59	<1
	12/5/2006	<1	<0.50	<0.50	<1	< 1.00	<0.50	<0.50	<0.50	36.2	<0.50	<0.50	< 0.50	17.9	<0.50	--	8.27	<0.50
	9/10/2007	<5	<2.50	<2.50	<5	<5.00	<2.50	<2.50	3.2	512	<2.50	<2.50	<2.50	146	5.65	--	94.4	14.9
	3/4/2008	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	59.5	<0.500	<0.500	<0.50	33.4	0.75	<0.500	16.7	2.82
	9/16/2008	<1	<0.500	<0.500	<1	< 0.500	<0.500	<0.500	0.71	77	<0.500	<0.500	< 0.500	44	1.18	<0.500	23.8	3.45

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS2-2(110) (continued)	3/24/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	40	<0.50	<0.50	< 0.50	27	<0.50	<0.50	11	2.5
	6/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	31	<0.50	<0.50	< 0.50	20	0.57	<0.50	8.9	2.3
	9/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	26	<0.50	<0.50	< 0.50	16	<0.50		6.7	1.8
	3/15/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	28	<0.50	<0.50	< 0.50	21	<0.50	<0.50	8.1	1.6
	9/21/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	33	<0.5	<0.5	< 0.5	34	0.6	<0.5	14	1.3
	3/7/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	24	<0.50	<0.50	< 0.50	26	<0.50	<0.50	8.6	1
	9/12/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	15	<0.50	<0.50	< 0.50	22	<0.50	<0.50	8.3	<0.50
	3/8/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	31	<0.50	<0.50	< 0.50	23	<0.50	<0.50	9.3	2.4
	9/12/2012	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	18	<0.50	<0.50	< 0.50	20	<0.50	<0.50	8.3	1.4
MGMS2-1(132)	6/28/2000	<1	<5	<0.50	<0.50	<0.50	1.25	<0.50	1.77	27.6	<0.50	<0.50	<0.50	27.5	2.06	--	54.3	<0.50
	8/30/2000	<1	<5	<0.50	<0.50	<0.50	0.903	<0.50	<0.50	23	<0.50	<0.50	<0.50	77.8	2.47	--	52.9	<0.50
	11/29/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	0.569	12.4	<0.50	<0.50	<0.50	25.3	<1	--	27.8	<0.50
	2/27/2001	<1	<5	<0.50	<0.50	<0.50	0.537	<0.50	0.605	11.4	<0.50	<0.50	<0.50	25.2	<1	--	24.4	2.6
	5/31/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8.86	<0.50	<0.50	<0.50	25.5	<1	--	24.4	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.76	7.6	<0.50	<0.50	<0.50	29	1.1	--	30	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	0.773	6.81	<0.50	<0.50	<0.50	26.8	1.36	--	23.8	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	0.53	8.62	<0.50	<0.50	<0.50	33.5	0.77	--	24.2	<0.50
	5/29/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	1.29	35.4	0.52	<0.50	<0.50	117	2.5	--	53.6	0.62
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	0.96	57.4	<0.50	<0.50	<0.50	49.9	2.35	--	46.2	3.19
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	0.53	27.2	<0.50	<0.50	<0.50	29.3	0.98	--	24	1.07
	11/11/2003	<1	<1	<1	<1	<1.0	<1	<1	<1	46.3	<1	<1	<1.0	28.8	1.56	--	29.7	1.49
	1/27/2004	<1	<0.50	<0.50	<1	<1.0	0.63	<0.50	0.56	37.6	<0.50	<0.50	<0.50	28	0.96	--	22.2	1.51
	5/4/2004	<1	<1	<1	<1	<1.0	<1	<1	<1	38.2	<1	<1	<1.0	7.55	<1	--	5.22	<1
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.58	62	<0.50	<0.50	<0.50	38	1.1	--	26	0.85
	3/23/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/16/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	29.5	<0.50	<0.50	<0.50	23.7	0.56	--	15.2	0.86
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/16/2005	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	8.85	<0.500	<0.500	<0.500	13	<0.500	--	6.06	<0.500
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
	6/6/2006	<1	<1	<1	<1	< 1.00	<1	<1	<1	23.1	<1	<1	< 1.00	14.8	<1	--	6.71	<1
	12/5/2006	<1	<0.50	<0.50	<1	< 1.00	<0.50	<0.50	<0.50	27.6	<0.50	<0.50	< 0.50	14.9	<0.50	--	7.89	<0.50
	9/10/2007	<5	<2.50	<2.50	<5	<5.00	4.55	<2.50	3	615	<2.50	<2.50	<2.50	93.2	5.5	--	61	21.5
	3/4/2008	<1	<0.500	<0.500	<1	<1	<0.500	<0.500	<0.500	37.3 J	<0.500	<0.500	<0.50	22.6 J	0.59	<0.500	12.9 J	2.4
	9/16/2008	<1	<0.500	<0.500	<1	< 0.500	0.53	<0.500	1	101	0.56	<0.500	< 0.500	38.3	1.37	<0.500	26.1	6.11
	3/24/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	32	<0.50	<0.50	< 0.50	24	0.57	<0.50	11	1.5
	6/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	32	<0.50	<0.50	< 0.50	24	<0.50	<0.50	12	1.6
	9/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	26	<0.50	<0.50	< 0.50	18	<0.50		8	1.5

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS2-1(132) (continued)	3/15/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	28	<0.50	<0.50	< 0.50	23	<0.50	<0.50	9.9	1.6
	9/21/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	28	<0.5	<0.5	< 0.5	31	<0.5	<0.5	12	1.1
	3/7/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	30	<0.50	<0.50	< 0.50	41	0.56	<0.50	13	0.97
	3/8/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	26	<0.50	<0.50	<0.50	24	<0.50	<0.50	9.4	1.8
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	22	<0.50	<0.50	<0.50	22	<0.50	<0.50	9	2
MGMS3-4(40)	8/30/2000	<10	<50	<5	<5	<5.0	13.2	<5	5.01	858	14.1	<5	<5.0	580	10.8	--	205	6.65
	11/29/2000	<20	<100	<10	<10	<10.0	<10	<10	<10	820	10.6	<10	<10.0	2,810	<20	--	395	<10
	2/27/2001	<50	<250	<25	<25	<25.0	39.4	<25	29.2	4,570	<25	<25	<25.0	2,970	<50	--	756	79.3
	5/31/2001	<50	<250	<25	<25	<25.0	<25	<25	<25	2,920	38.5	<25	<25.0	3,960	<50	--	716	<25
	9/24/2001	<2.5	<2.5	<2.5	<2.5	<2.5	5.8	<2.5	<2.5	730	5.4	<2.5	<2.5	1,400	9.2	--	230	3.5
	12/18/2001	<50	<250	<25	<25	<25.0	<25	<25	<25	2,550	<25	<25	<25.0	3,310	<50	--	631	31
	3/19/2002	<20	<10	<10	<20	<20.0	34.6	<10	15.4	3,370	30.2	<10	<10.0	3,560	23.8	--	707	57
	5/29/2002	<50	<25	<25	<50	<50.0	71.5	<25	26	5,180	38.5	<25	<25.0	2,470	33.5	--	728	86
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/11/2002	<50	<25	<25	<50	<50.0	<25	<25	<25	1,520	<25	<25	<25.0	2,750	<25	--	309	<25
	1/23/2003	<20	<10	<10	<20	<20.0	137	<10	38.4	3,530	32.6	<10	<10.0	2,380	118	--	1,400	83.6
	5/28/2003	<50	<25	<25	<50	<50.0	56	<25	28.5	1,720	<25	<25	<25.0	3,560	<25	--	1,470	<25
	11/11/2003	<10	<10	<10	<10	<10.0	<10	<10	<10	672	<10	<10	<10.0	58.3	<10	--	32.4	<10
	1/27/2004	<20	<10	<10	<20	<20.0	20	<10	<10	1,900	19.4	<10	<10.0	1,350	10	--	246	20
	5/3/2004	<20	<20	<20	<20	<20.0	50	<20	<20	1,420	<20	<20	<20.0	2,700	34.2	--	913	24.8
	8/17/2004	<20	<10	<10	<20	<20.0	71.6	<10	17	3,300	31	<10	<10.0	1,360	29.2	--	569	45.2
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	<25	<25	<25	<25	<25.0	<25	<25	<25	1,400	<25	<25	<25.0	1,600	<25	--	290	<25
	3/24/2005	<20	<10	<10	<20	<20.0	79.4	<10	30	3,440	34.2	<10	<10.0	2,330	43.8	--	1,080	60.2
	3/24/2005 (DUP)	<20	<10	<10	<20	<20.0	83.2	<10	29.2	3,450	34	<10	<10.0	2,150	44	--	1,040	58.6
	5/16/2005	<10	<5	<5	<10	<10.0	7	<5	<5	657	11.3	<5	<5.0	1,130	8.1	--	224	<5
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/16/2005	<10	<5	<5	<10	<10.0	5.8	<5	<5	794	8.4	<5	<5.00	1,180	7.6	--	210	<5
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/14/2006	<50	<50	<50	<50	< 50.0	51	<50	<50	4,130	<50	<50	< 50.0	1,410	<50	--	484	<50
	6/6/2006	<20	<20	<20	<20	< 20.0	20.4	<20	<20	2,290	32.2	<20	< 20.0	1,410	<20	--	401	23.6
	12/5/2006	<20	<10	<10	<20	< 20.0	29.8	<10	<10	3,570	29	<10	< 10.0	1,020	<10	--	360	95.4
	5/22/2007	<20	<20	<20	<20	< 20.0	20.8	<20	<20	2,640	20.2	<20	< 20.0	952	<20	--	349	22.6
	9/10/2007	<50	<25	<25	<50	<50.0	<25	<25	<25	2,340	<25	<25	<25.0	499	<25	--	215	25.5
	12/12/2007	<50	<25	<25	<50	<50.0	<25	<25	<25	723	<25	<25	<25.0	536	<25	--	133	<25
	3/4/2008	<1	<0.500	<0.500	<1	<1.00	32.4	3.08	22	2,280	25.4	3.86	<0.50	1,580	27.5	<0.500	972	85.1
	9/16/2008	<50	<25	<25	<50	< 25.0	64.5	<25	<25	2,700	<25	<25	< 25.0	714	<25	<25	462	47
	12/8/2008	<9	<9	<9	<9	< 9.0	24	<9	<9	1,800	20	<9	< 9.0	350	<9	<9	160	90
	3/24/2009	<7	<7	<7	<7	< 7.0	36	<7	7.9	1,600	12	<7	< 7.0	600	11	<7	280	33
	9/15/2009	<5	<5	<5	<5	< 5.0	15	<5	<5	1,500	13	<5	< 5.0	550	<5	<5	180	8.2
	9/15/2009 DUP	<5	<5	<5	<5	< 5.0	15	<5	<5	1,400	13	<5	< 5.0	540	<5	<5	170	9.8
	12/14/2009	<2.5	<2.5	<2.5	<2.5	< 2.5	8.1	<2.5	<2.5	750	5.3	<2.5	< 2.5	180	<2.5	<2.5	74	19
	3/17/2010	<2.5	<2.5	<2.5	<2.5	< 2.5	52	<2.5	14	1,800	18	2.9	< 2.5	810	16	<2.5	490	41
	3/17/2010 DUP	<5	<5	<5	<5	< 5.0	51	<5	14	1,600	18	<5	< 5.0	780	16	<5	470	39

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS3-4(40) (continued)	6/14/2010	<0.90	<0.90	<0.90	<0.90	< 0.90	2.4	<0.90	<0.90	230	2.3	<0.90	< 0.90	300	2.2	<0.90	88	1.5
	9/20/2010	<7	<7	<7	<7	< 7	32	<7	8.6	1,800	16	<7	< 7	530	7.9	<7	230	31
	9/20/2010 DUP	<6	<6	<6	<6	< 6	31	<6	7.4	1,700	15	<6	< 6	510	7.4	<6	220	29
	12/7/2010	<2	<2	<2	<2	< 2	5.3	<2	<2	460	3.9	<2	< 2	330	2.2	<2	95	3.2
	3/7/2011	<2	<2	<2	<2	< 2.0	20	<2	4.7	1,300	10	<2	< 2.0	330	4	<2	140	53
	03/07/2011 DUP	<4	<4	<4	<4	< 4.0	19	<4	4.9	1,200	10	<4	< 4.0	320	<4	<4	140	46
	6/6/2011	<3	<3	<3	<3	<3	6.5	<3	4.1	780	7	<3	<5	370	5.4	<3	150	8.5
	9/13/2011	<5	<5	<5	<5	<5	45	<5	13	1,800	19	<5	<5	560	15	<5	380	29
	9/13/2011 DUP	<7	<7	<7	<7	<7	40	<7	12	1,700	16	<7	<7	570	12	<7	330	23
	12/6/2011	<5	<5	<5	<5	<5	14	<5	<5	1,000	9.3	<5	<5	140	<5	<5	64	44
	3/8/2012	<5	<5	<5	<5	<5	33	<5	13	1,400	14	<5	<5	930	17	<5	450	28
	03/08/2012 DUP	<6	<6	<6	<6	<6	35	<6	14	1,400	14	<6	<6	990	18	<6	480	30
	06/21/2012	<5	<5	<5	<5	<5	22	<5	5.6	1,300	11	<5	<5	220	<5	<5	140	44
	9/12/2012	< 5	< 5	< 5	< 5	<5	23	< 5	6.2	1,400	13	< 5	<5	220	< 5	< 5	120	85
	9/12/2012 DUP	< 5	< 5	< 5	< 5	<5	23	< 5	5.3	1,400	13	< 5	<5	230	< 5	< 5	120	86
	12/11/2012	<2.0	<2.0	<2.0	<2.0	<2.0	7	<2.0	<2.0	510	7	<2.0	<2.0	180	<2.0	<2.0	72	7
MGMS3-3(60)	8/30/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	7.7	<0.50	<0.50	<0.50	7.03	<1	--	3.31	<0.50
	11/29/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.11	<0.50	<0.50	<0.50	2.8	<1	--	1.28	<0.50
	2/27/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	21.5	<0.50	<0.50	<0.50	14.9	<1	--	7.32	<0.50
	5/31/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10.1	<0.50	<0.50	<0.50	9.84	<1	--	4.76	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	7.1	<0.50	<0.50	<0.50	9.7	<0.50	--	3.7	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.26	<0.50	<0.50	<0.50	17	<1	--	3.84	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	<1.0	0.68	<0.50	<0.50	17.6	<0.50	<0.50	<0.50	32.3	0.5	--	14	<0.50
	5/29/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	40.5	<0.50	<0.50	<0.50	20.8	<0.50	--	7.92	<0.50
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	<1	<0.50	<0.50	<1	<1.0	0.5	<0.50	<0.50	33.9	<0.50	<0.50	<0.50	20.3	<0.50	--	12.7	<0.50
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	0.58	<0.50	<0.50	88.3	0.53	<0.50	<0.50	16.9	<0.50	--	11.9	0.7
	11/11/2003	<2	<2	<2	<2	<2.0	<2	<2	<2	298	<2	<2	<2.0	36.1	<2	--	23	<2
	1/27/2004	<2	<1	<1	<2	<2.0	1.2	<1	<1	274	1.24	<1	<1.0	25.2	<1	--	23.4	1.28
	5/3/2004	<2	<2	<2	<2	<2.0	<2	<2	<2	274	<2	<2	<2.0	46.6	<2	--	27	<2
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	43	<0.50	<0.50	<0.50	8.8	<0.50	--	3.4	<0.50
	2/1/2005	<2	<1	<1	<2	<2.0	<1	<1	<1	179	1.72	<1	<1.0	15.6	<1	--	7.9	<1
	5/16/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	33.8	<0.50	<0.50	<0.50	5.7	<0.50	--	2.39	<0.50
	8/18/2005	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	47.9	<0.500	<0.500	<0.500	4.39 B	<0.500	--	1.96 B	0.66 B
	11/16/2005	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	8.39	<0.500	<0.500	<0.500	2.59	<0.500	--	0.83	<0.500
	2/21/2006	<5	<2.50	<2.50	<5	< 5.00	2.65	<2.50	<2.50	558	<2.50	<2.50	< 2.50	25	<2.50	--	14.4	21.6
	3/14/2006	<1	<1	<1	<1	< 1.00	2.92	<1	1.37	97.1	<1	<1	< 1.00	50.6	<1	--	39.2	<1
	6/6/2006	<1	<1	<1	<1	< 1.00	<1	<1	<1	7.97	<1	<1	< 1.00	2.84	<1	--	1.04	<1
	9/5/2006	<1	<0.50	<0.50	<1	< 1.00	2.75	<0.50	1.17	108	0.78	<0.50	< 0.50	47.3	0.93	--	34.2	0.65

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Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS3-3(60) (continued)	12/5/2006	<1	<0.50	<0.50	<1	< 1.00	<0.50	<0.50	<0.50	19.8	<0.50	<0.50	< 0.50	10.5	<0.50	--	5.57	<0.50
	2/7/2007	<1	<0.50	<0.50	<1	< 1.00	1.08	<0.50	<0.50	44.3	<0.50	<0.50	< 0.50	21.5	<0.50	--	15.4	<0.50
	5/22/2007	<1	<1	<1	<1	< 1.00	<1	<1	<1	32.5	<1	<1	< 1.00	45.2	<1	--	18.2	<1
	9/10/2007	<2	<1	<1	<2	<2.00	2.98	<1	<1	148	<1	<1	<1.00	28.8	<1	--	31.6	1.67
	12/12/2007	<2	<1	<1	<2	<2.00	<1	<1	<1	11.5	<1	<1	<1.00	4.22	<1	--	1.9	1.18
	3/4/2008	<1	<0.500	<0.500	<1	<1.00	1.58	<0.500	0.68	72.1	0.6	<0.500	<0.50	27.2	0.5	<0.500	22.7	2.33
	12/8/2008	<0.50	<0.50	<0.50	<0.50	< 0.50	0.73	<0.50	<0.50	44	<0.50	<0.50	< 0.50	12	<0.50	<0.50	9.2	1.3
	3/24/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	1	<0.50	<0.50	42	<0.50	<0.50	< 0.50	21	<0.50	<0.50	14	0.91
	9/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	15	<0.50	<0.50	< 0.50	8.5	<0.50	<0.50	4.3	0.84
	12/14/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	3.8	<0.50	<0.50	< 0.50	2	<0.50	<0.50	0.85	<0.50
	3/17/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	0.69	<0.50	<0.50	25	<0.50	<0.50	< 0.50	17	<0.50	<0.50	10	0.57
	6/14/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	4.8	<0.50	<0.50	< 0.50	2.4	<0.50	<0.50	1.1	0.69
	9/20/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	0.81	<0.5	<0.5	28	<0.5	<0.5	< 0.5	18	<0.5	<0.5	11	0.52
	12/7/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	9	<0.5	<0.5	< 0.5	3.4	<0.5	<0.5	1.5	0.94
	3/7/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	17	<0.50	<0.50	< 0.50	10	<0.50	<0.50	4.6	0.67
	6/6/2011	<0.5	<0.5	<0.5	<0.5	< 0.50	<0.5	<0.5	<0.5	3.9	<0.5	<0.5	< 0.50	2	<0.5	<0.5	0.73	<0.5
	9/13/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.94	<0.50	<0.50	34	<0.50	<0.50	< 0.50	17	<0.50	<0.50	12	<0.50
	12/5/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	14	<0.50	<0.50	< 0.50	14	<0.50	<0.50	7.3	<0.50
	3/8/2012	<0.50	<0.50	<0.50	<0.50	<0.50	0.58	<0.50	<0.50	21	<0.50	<0.50	<0.50	15	<0.50	<0.50	9	<0.50
	06/21/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.9	<0.5	<0.5	<0.5	3	<0.5	<0.5	1.2	<0.5
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	39	<0.50	<0.50	<0.50	18	<0.50	<0.50	12	<0.50
	12/11/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3	<0.50	<0.50	<0.50	2	<0.50	<0.50	1	<0.50
MGMS3-2(101)	8/30/2000	<10	<50	<5	<5	<5.0	7.28	<5	<5	120	<5	<5	<5.0	154	12.1	--	98.2	<5
	11/29/2000	<5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	11.4	<2.5	<2.5	<2.5	11.5	<5	--	13	<2.5
	2/27/2001	<2	<10	<1	<1	<1.0	<1	<1	<1	2.4	<1	<1	<1.0	3.36	<2	--	1.98	<1
	5/31/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.24	<0.50	<0.50	<0.50	3.07	<1	--	1.85	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.6	<0.50	<0.50	<0.50	5.3	<0.50	--	2.4	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	0.864	<0.50	0.913	10.3	<0.50	<0.50	<0.50	50.9	2.98	--	23.9	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	4.02	<0.50	<0.50	<0.50	6.88	<0.50	--	2.54	<0.50
	5/29/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	8.19	<0.50	<0.50	<0.50	11.5	<0.50	--	3.9	<0.50
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	21.2	<0.50	<0.50	<0.50	17.2	<0.50	--	8.38	<0.50
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	28.6	<0.50	<0.50	<0.50	18.4	<0.50	--	8.76	<0.50
	11/11/2003	<1	<1	<1	<1	<1.0	<1	<1	<1	53.7	<1	<1	<1.0	18.3	<1	--	9.3	<1
	1/27/2004	<1	<0.50	<0.50	<1	<1.0	0.53	<0.50	<0.50	114	0.8	<0.50	<0.50	24	<0.50	--	15.1	<0.50
	5/3/2004	<1	<1	<1	<1	<1.0	<1	<1	<1	22.1	<1	<1	<1.0	6.74	<1	--	4.21	<1
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	<1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	47	<0.50	<0.50	<0.50	6.3	<0.50	--	2.9	<0.50
	3/23/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/16/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	66.5	<0.50	<0.50	<0.50	3.59	<0.50	--	1.48	0.77
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/16/2005	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	25.3	<0.500	<0.500	<0.500	4.93	<0.500	--	1.66	0.66

Please refer to notes at end of table.

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Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS3-2(101) (continued)	3/14/2006	<1	<1	<1	<1	< 1.00	<1	<1	<1	23.1	<1	<1	< 1.00	2.91	<1	--	1.14	1.06
	6/6/2006	<1	<1	<1	<1	< 1.00	<1	<1	<1	15.9	<1	<1	< 1.00	3.56	<1	--	1.88	1.06
	12/5/2006	<1	<0.50	<0.50	<1	< 1.00	<0.50	<0.50	<0.50	32.6	<0.50	<0.50	< 0.50	2.84	<0.50	--	1.17	2.85
	9/10/2007	<1	<0.50	<0.50	<1	<1.00	<0.50	<0.50	<0.50	40.4	<0.50	<0.50	<0.50	6.32	<0.50	--	3.7	13.2
	3/4/2008	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	18.1	<0.500	<0.500	<0.50	3.4	<0.500	<0.500	1.47	5.64
	9/16/2008	<1	<0.500	<0.500	<1	< 0.500	<0.500	<0.500	<0.500	20.4	<0.500	<0.500	< 0.500	6.34	<0.500	<0.500	3.5	4.24
	3/24/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	15	<0.50	<0.50	< 0.50	3	<0.50	<0.50	1.5	2.3
	6/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	5.8	<0.50	<0.50	< 0.50	2.4	<0.50	<0.50	1.2	2.2
	9/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	14	<0.50	<0.50	< 0.50	3.8	<0.50	<0.50	2.1	3.2
	3/17/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	7	<0.50	<0.50	< 0.50	3.1	<0.50	<0.50	1.8	1.2
	9/20/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	5.5	<0.5	<0.5	< 0.5	3	<0.5	<0.5	1.4	1.2
	3/7/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	5.8	<0.50	<0.50	< 0.50	3.7	<0.50	<0.50	2.2	0.86
	3/8/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.9	<0.50	<0.50	<0.50	5.9	<0.50	<0.50	4.5	<0.50
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.1	<0.50	<0.50	<0.50	2.7	<0.50	<0.50	1.3	<0.50
MGMS3-1(132)	8/30/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.53	<0.50	<0.50	<0.50	5.58	<1	--	0.746	<0.50
	11/29/2000	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.04	<0.50	<0.50	<0.50	0.754	<1	--	<0.50	<0.50
	2/27/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.08	<0.50	<0.50	<0.50	2.62	<1	--	0.722	<0.50
	5/31/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6.67	<0.50	<0.50	<0.50	3.13	<1	--	1.44	<0.50
	9/24/2001	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.8	<0.50	<0.50	<0.50	6.1	<0.50	--	1.9	<0.50
	12/18/2001	<1	<5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.11	<0.50	<0.50	<0.50	8.75	<1	--	2.24	<0.50
	3/19/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	4.88	<0.50	<0.50	<0.50	9.63	<0.50	--	3.02	<0.50
	5/29/2002	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	11.8	<0.50	<0.50	<0.50	14.6	<0.50	--	4.28	<0.50
	8/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	16.8	<0.50	<0.50	<0.50	11.4	<0.50	--	6.04	<0.50
	5/28/2003	<1	<0.50	<0.50	<1	<1.0	0.59	<0.50	<0.50	93.3	0.76	<0.50	<0.50	16.3	<0.50	--	10.1	0.83
	11/11/2003	<1	<1	<1	<1	<1.0	<1	<1	<1	72.4	<1	<1	<1.0	12.2	<1	--	8	<1
	1/27/2004	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	34.9	0.61	<0.50	<0.50	12.7	<0.50	--	9.47	<0.50
	5/3/2004	<1	<1	<1	<1	<1.0	<1	<1	<1	11.9	<1	<1	<1.0	<1	<1	--	14.2	<1
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2004	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	200	<2.5	<2.5	<2.5	6.2	<2.5	--	3.4	<2.5
	3/23/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/16/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	42.6	0.79	<0.50	<0.50	4.42	<0.50	--	2.23	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/16/2005	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	19.9	<0.500	<0.500	<0.500	2.41	<0.500	--	0.8	<0.500
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/14/2006	<1	<1	<1	<1	< 1.00	<1	<1	<1	20.3	<1	<1	< 1.00	2.13	<1	--	<1	<1
	6/6/2006	<1	<1	<1	<1	< 1.00	<1	<1	<1	18.6	<1	<1	< 1.00	1.57	<1	--	<1	1.36
	12/5/2006	<1	<0.50	<0.50	<1	< 1.00	<0.50	<0.50	<0.50	24.1	<0.50	<0.50	< 0.50	3.05	<0.50	--	1.08	4.68
	9/10/2007	<1	<0.50	<0.50	<1	<1.00	<0.50	<0.50	<0.50	36.5	<0.50	<0.50	<0.50	4.69	<0.50	--	3.17	16.8

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
MGMS3-1(132) (continued)	3/4/2008	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	21.8	<0.500	<0.500	<0.50	3.37	<0.500	<0.500	1.64	6.83
	9/16/2008	<1	<0.500	<0.500	<1	< 0.500	<0.500	<0.500	<0.500	26	<0.500	<0.500	< 0.500	4.86	<0.500	<0.500	3.52	4.96
	3/24/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	6.3	<0.50	<0.50	< 0.50	1.8	<0.50	<0.50	0.79	2.4
	3/24/2009 DUP	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	5.8	<0.50	<0.50	< 0.50	1.6	<0.50	<0.50	0.78	2.3
	6/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	12	<0.50	<0.50	< 0.50	4.3	<0.50	<0.50	1.9	1.6
	9/15/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	7.7	<0.50	<0.50	< 0.50	2.1	<0.50	<0.50	1.2	2
	3/17/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	7.2	<0.50	<0.50	< 0.50	2.6	<0.50	<0.50	1.9	0.92
	9/20/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	6.5	<0.5	<0.5	< 0.5	2.9	<0.5	<0.5	2.3	1.3
	3/7/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	0.64	<0.50	<0.50	18	<0.50	<0.50	< 0.50	4	<0.50	<0.50	3.8	4.3
	9/13/2011	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	5.6	<0.50	<0.50	< 0.50	3.8	<0.50	<0.50	3.4	0.55
	3/8/2012	<0.50	<0.50	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	9.3	<0.50	<0.50	<0.50	7	<0.50	<0.50	6.9	0.67
	9/12/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	4.9	<0.50	<0.50	4	<0.50
CMT1-1	11/11/2003	<1	<1	2.87	<1	<1.0	<1	<1	<1	<1	<1	<1	<1.0	<1	<1	--	<1	<1
	1/26/2004	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	5/3/2004	<1	<1	<1	<1	<1.0	<1	<1	<1	<1	<1	<1	<1.0	<1	<1	--	<1	<1
	8/19/2004	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/2004	<5	<5	<5	<5	<5.0	<5	<5	<5	<5	<5	<5	<5.0	<5	<5	--	<5	<5
	3/23/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	5/17/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/2005	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	--	<0.500	<0.500
	5/26/2006	Well Abandoned																
CMT1-2	11/11/2003	<1	<1	<1	<1	<1.0	<1	<1	<1	<1	<1	<1	<1.0	<1	<1	--	<1	<1
	1/26/2004	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.75	<0.50	--	1.03	<0.50
	5/3/2004	<1	<1	<1	<1	<1.0	<1	<1	<1	<1	<1	<1	<1.0	<1	<1	--	<1	<1
	8/19/2004	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/2004	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.7	<0.50	--	0.88	<0.50
	2/1/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.37	<0.50	--	0.99	<0.50
	5/16/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.77	<0.50	--	0.69	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/2005	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	0.6	<0.500	--	<0.500	<0.500
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/26/2006	Well Abandoned																
CMT1-3	11/11/2003	<2	<2	3.56	<2	<2.0	<2	<2	<2	<2	<2	<2	<2.0	<2	<2	--	<2	<2
	1/26/2004	<1	<0.50	1.1	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	5/3/2004	<1	<1	2.97	<1	<1.0	<1	<1	<1	<1	<1	<1	<1.0	<1	<1	--	<1	<1
	8/19/2004	<1	<0.50	2.16	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
CMT1-3 (continued)	11/17/2004	<25	<25	<25	<25	<25.0	<25	<25	<25	<25	<25	<25	<25.0	<25	<25	--	<25	<25
	3/23/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/16/2005	<1	<0.50	<0.50	<1	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.6	<0.50	--	<0.50	<0.50
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/2005	<1	<0.500	<0.500	<1	<1.00	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	--	<0.500	<0.500
	2/21/2006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/26/2006	Well Abandoned																
IRAM System Wells																		
IN-1	3/29/2005	<5	<2.5	<2.5	<5	<5.0	14.7	<2.5	4.7	259	7.65	<2.5	<2.5	460	11.4	--	655	34.8
IN-2	6/28/2000	<50	<250	<25	<25	<25.0	<25	<25	<25	30.3	<25	<25	<25.0	2,120	<50	--	327	<25
	3/29/2005	<2	<1	1.36 B	<2	<2.0	4.82	<1	<1	15.2	<1	<1	<1.0	320	9.68	--	139	<1
IN-3	6/28/2000	<100	<500	<50	<50	<50.0	<50	<50	<50	<50	<50	<50	<50.0	3,730	<100	--	471	<50
	3/29/2005	<2	<1	<1	<2	<2.0	3.22	<1	<1	9.12	<1	<1	<1.0	396	10.1	--	75.5	<1
IN-4	6/28/2000	<1,000	<1,000	<100	<100	<100	<100	<100	<100	108	<100	<100	<100	18,500	322	--	1,330	<100
IN-5	6/28/2000	<200	<1,000	<100	<100	<100	<100	<100	<100	206	<100	<100	<100	12,900	<200	--	1,280	<100
IN-7	3/24/2005	<10	16.3	<5	<10	<10.0	14.1	<5	<5	1,030	10	<5	<5	216	<5	--	57.1	129
IN-9	11/8/2002	<5	228	<2.5	<5	<5.0	20.5	<2.5	<2.5	420	<2.5	<2.5	<2.5	7.4	<2.5	--	<2.5	360
	3/24/2005	<5	208	<2.5	<5	<5.0	22.5	<2.5	<2.5	778	<2.5	<2.5	<2.5	<2.5	<2.5	--	2.6	405
EX	8/10/1999	<2,000	<10,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	92,500	3,380	--	14,500	<1,000
	8/12/1999	<50.0	<250	<25.0	<25.0	<25.0	<25.0	<25.0	89.5	223	<25.0	<25.0	<25.0	122,000	2,500	--	9,090	<25.0
	8/19/1999	<1000	<5,000	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	131,000	3,560	--	18,700	<500
	8/25/1999	<1,000	<5,000	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	50,800	1,140	--	8,550	<500
	9/1/1999	<1,000	<5,000	<500	<500	<500	<500	<500	<500	514	<500	<500	<500	70,600	1,370	--	10,400	<500
	9/8/1999	<1,000	<5,000	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	41,700	1,100	--	5,160	<500
	9/12/1999	<50.0	<250	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	987	--	<25.0	<25.0
	9/20/1999	<100	<500	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	1,550	--	<50.0	<50.0
	9/27/1999	<100	<500	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	1,960	--	<50.0	<50.0
	11/16/1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/2000	<1,000	<5,000	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	74,300	1,420	--	5,740	<500
	6/27/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/30/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2001	<500	<2,500.0	<250	<250	<250	<250	<250	<250	1,440	<250	<250	<250	47,600	<500	--	8,190	<500
	9/25/2001	<25.0	<25.0	<25.0	<25.0	--	<25.0	<25.0	<25.0	270	<25.0	<25.0	<25.0	21,000	140	--	2,300	<25.0
	12/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/7/2002	<100	<500	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	376	<50.0	<50.0	<50.0	10,800	148	--	1,750	<100
	3/19/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/30/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/29/2002	<100	<50.0	<50.0	<100	<50.0	<50.0	<50.0	<50.0	149	<50.0	<50.0	<50.0	11,000	134	--	1,640	<50.0
	11/7/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/23/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

Table 3
Groundwater Analytical Summary Table – VOCs
NuStar Vancouver Facility
Vancouver, Washington

Well Number	Sample Date	Concentrations in µg/L (ppb)																
		Bromo-form	Chloro-ethane	Chloro-form	Dibromo-chloro-methane	1,2-Dibromo-ethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	1,2-Dichloro-propane	cis-1,3-Dichloro-propene	Tetra-chloro-ethene	1,1,1-Trichloro-ethane	1,1,2-Trichloro-ethane	Trichloro-ethene	Vinyl Chloride
EX (continued)	3/12/2003	--	--	--	--	--	--	--	--	37.2	--	--	--	2700	98.4	--	560	--
	5/30/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/10/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/26/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/4/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/17/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--
	11/15/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/23/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/17/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/18/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/14/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/11/2007	< 1.00	<0.50	<0.50	< 0.50	< 1.00	<0.50	< 0.50	<0.50	4.26	<0.50	<0.50	<0.50	2.15 J	<0.50	--	4.58 J	< 0.50
	12/13/2007	<1.00	<0.50	<0.50	<0.50	<1.00	<0.50	<0.50	<0.50	4.61	<0.50	<0.50	<0.50	4.87	<0.50	--	8.44	<0.50
	3/23/2009	<5	<5	<5	<5	< 5.0	<5	<5	<5	50	<5	<5	< 5.0	1,400	43	< 5.0	<5	420
	6/18/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	4.2	<0.50	<0.50	< 0.50	24	1.1	< 0.50	<0.50	11
	9/18/2009	<0.50	<0.50	<0.50	<0.50	< 0.50	4.1	<0.50	3.3	120	0.76	<0.50	< 0.50	2,100	38	< 0.50	<0.50	380
	12/18/2009	<2.5	<2.5	<2.5	<2.5	< 2.5	<2.5	<2.5	<2.5	5.6	<2.5	<2.5	< 2.5	700	3.7	< 2.5	<2.5	56
	3/16/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	<0.50	<0.50	<0.50	20	<0.50	<0.50	< 0.50	150	3.2	< 0.50	<0.50	33
	6/17/2010	<0.50	<0.50	<0.50	<0.50	< 0.50	0.97	<0.50	<0.50	92	<0.50	<0.50	< 0.50	150	2.3	< 0.50	<0.50	39
	9/23/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	1.5	<0.5	1.6	90	0.53	<0.5	< 0.5	2,400	20	< 0.5	<0.5	220
	12/21/2010	<0.5	<0.5	<0.5	<0.5	< 0.5	0.83	<0.5	0.59	30	<0.50	<0.5	< 0.5	900	6.7	< 0.5	<0.5	99
	3/31/2011	<4	<4	<4	<4	< 4	8.2	<4	8.1	240	<4	<4	< 4	6,800	110	< 4	<4	910
	6/7/2011	<4	<4	<4	<4	<4	<4	<4	<4	140	<4	<4	<4	1,400	15	< 4	<4	170
	9/19/2011	<5	<5	<5	<5	<5	7.9	<5	11	290	<5	<5	<5	4,100	73	< 5.0	<5	460
	12/7/2011	<5	<5	<5	<5	<5	16	<5	19	12,000	9.3	<5	<5	<50	17	< 5.0	<5	<50
	3/9/2012	<4	<4	<4	<4	<4	5	<4	<4	1,400	8.6	<4	<4	33	<4	< 4.0	<4	10
	06/22/2012	<0.5	5.5	<0.5	<0.5	<0.5	3.4	<0.5	0.68	170	1.3	<0.5	<0.5	3	0.59	< 0.5	<0.5	1.1
	9/14/2012	<1.5	2.7	<1.5	<1.5	<1.5	1.5	<1.5	<1.5	320	<1.5	<1.5	<1.5	3	<1.5	<1.5	<1.5	<1.5
	12/14/2012	<0.50	1.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	26	<0.50	<0.50	<0.50	0.87	<0.50	<0.50	<0.50	12
EX-3	6/28/2000	<100	<500	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	435	<50.0	<50.0	<50.0	3,730	<100	--	1,120	<100
EX-4	6/28/2000	<500	<2,500	<250	<250	<250	<250	<250	<250	295	<250	<250	<250	26,900	<500	--	2,900	<250
	*09/25/2001	<0.50	<0.50	0.61	<0.50	--	33	<0.50	22	380	7.7	<0.50	<0.50	150	150	--	1,600	2
	8/29/2002	<50.0	<25.0	<25.0	<50.0	<25.0	<25.0	<25.0	<25.0	66	<25.0	<25.0	<25.0	5,410	122	--	696	<25.0
EX-5	6/28/2000	<500	<2,500	<250	<250	<250	<250	<250	<250	2040	<250	<250	<250	25,600	1,900	--	9,600	<500

Notes:

1. mg/L (ppm) = Milligrams per liter (parts per million).
2. -- = Not applicable or not analyzed.
3. B = Estimated concentration based on data quality review - similar detection in associated equipment blank (less than 5x difference).
4. J = Estimated concentration based on data quality review - similar detection in field blank (less than 5x difference).
5. ND = Not detected and no reporting limit specified.
6. E = Concentration was five times or less than the maximum detection in the equipment blank.

* = MW-32s (Port of Vancouver data through 2/7/2007 and NuStar data afterwards)

Table 4
Groundwater Analytical Summary Table - Natural Attenuation and Bioremediation Parameters
NuStar Vancouver Facility
Vancouver, Washington

Well Number:	CB-3 (35)	EX																	
Sample Date:	9/21/2010	2/6/2007	12/16/2008	3/23/2009	6/18/2009	9/18/2009	12/18/2009	3/16/2010	6/17/2010	9/23/2010	12/21/2010	3/31/2011	6/7/2011	9/19/2011	12/9/2011	3/9/2012	6/22/2012	9/14/2012	12/14/2012
Analyte	Concentrations in mg/L (ppm)																		
Total Metals																			
Iron	320	1.97	--	1.5	--	--	--	1.2	--	-	--	--	--	--	--	--	--	--	--
Manganese	5.8	0.759	--	5.7	--	--	--	1.4	--	-	--	--	--	--	--	--	--	--	--
Potassium	61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Attenuation Chemistry																			
Total Organic Carbon	4.8	1.45	3.30	3.0	--	4.9	1.8	2.4	3.3	3.6	<0.50	1.9	3.5	560	320	89	110	77	59
Ammonia (as N)	89	26.7	--	14	--	--	--	3.4	--	-	--	--	--	--	--	--	--	--	--
Nitrate-Nitrogen	580	108	--	43	--	--	--	89	--	-	--	--	150	--	<0.50	--	--	--	--
Nitrite-Nitrogen	2	0.49	--	0.54	--	--	--	0.71	--	-	--	--	<0.10	--	<0.10	--	--	--	--
Sulfate	80	52.6	--	24	--	--	--	11	--	-	--	--	92	--	1.8	--	--	--	--
Sulfide	--	<0.200	--	4.6	--	--	--	<0.050	--	-	--	--	--	--	--	--	--	--	--
Total Phosphorus	--	0.538	--	0.36	--	--	--	0.36	--	-	--	--	--	--	--	--	--	--	--
Orthophosphate (as P)	<0.10		--	--	--	--	--	--	--	-	--	--	0.53	--	<0.15	--	--	--	--
Chloride	8.6	10	--	4.6	--	--	--	1.8	--	-	--	--	--	--	--	--	--	--	--
Total Alkalinity (as CaCO3)	--	77.4	--	38.0	--	--	--	<1	--	-	--	--	--	--	--	--	--	--	--
Methane	2.1	0.067	--	0.346	--	--	--	0.0868	--	0.0913	--	--	--	--	--	--	--	6.37	5.32
Ethane	<0.001	<0.010	--	--	--	--	--	--	--	<0.001	--	--	<0.001	--	<0.001	--	--	<0.001	0.0146
Ethene	<0.001	<0.010	--	--	--	<0.001	0.0556	<0.0005	<0.0010	<0.001	<0.001	0.00191	<0.001	--	0.0114	0.0242	0.15	0.0472	0.00592
CO2	38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Field Parameters																			
Dissolved Oxygen	--	0.24	0.74	0.47	0.37	0.60	2.13	0.88	0.84	0.93	0.91	--	0.70	0.63	1.23	0.14	1.23	0.15	0.25
Oxidation Reduction Potential (mV)	--	164.8	-174.5	68.8	-9.3	109.0	170.1	102.6	239.5	-521.6	131.7	--	115.2	907.9	-68.3	-33.6	-68.3	-29.5	3.3
Organic Acids																			
Acetic Acid	940	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Butyric Acid	240	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lactic Acid	220	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propionic Acid	<4.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

Table 4
Groundwater Analytical Summary Table - MNA and Enhanced Bioremediation Parameters
NuStar Vancouver Facility
Vancouver, Washington

Well Number:	MW-7																			
Sample Date:	2/6/2007	5/22/2007	6/10/2008	12/16/2008	3/23/2009	6/18/2009	9/18/2009	12/18/2009	3/16/2010	6/17/2010	9/23/2010	12/10/2010	3/11/2011	6/7/2011	9/19/2011	12/9/2011	3/12/2012	06/22/2012	9/14/2012	12/14/2012
Analyte	Concentrations in mg/L (ppm)																			
Total Metals																				
Iron	0.233	--	<0.100	--	<0.10	--	--	--	0.16	--	--	--	--	--	--	--	--	--	--	--
Manganese	2.37	--	--	--	2.5	--	--	--	0.63	--	--	--	--	--	--	--	--	--	--	--
Potassium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Attenuation Chemistry																				
Total Organic Carbon	< 1.00	--	1.32	2.40	6.7	--	4.10	2.50	2.6	2.8	8.2	0.84	1.10	4.7	3,400	1,600	1,000	790	790	550
Ammonia (as N)	3.00	--	4.89	--	11	--	--	--	2.4	--	--	--	--	--	--	--	--	--	--	--
Nitrate-Nitrogen	60.7	--	67.5	--	56	--	--	--	99	--	--	--	--	140	--	<0.50	--	--	--	--
Nitrite-Nitrogen	< 0.100	--	0.1	--	<0.10	--	--	--	<0.50	--	--	--	--	<0.10	--	<0.10	--	--	--	--
Sulfate	73.7	--	78.6	--	59	--	--	--	19	--	--	--	--	66	--	<0.50	--	--	--	--
Sulfide	< 0.200	--	<1.00	--	--	--	--	--	<0.050	--	--	--	--	--	--	--	--	--	--	--
Total Phosphorus	0.0855	--	--	--	0.10	--	--	--	<0.10	--	--	--	--	--	--	--	--	--	--	--
Orthophosphate (as P)	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.15	--	0.78	--	--	--	--
Chloride	3.24	--	4.93	--	5.9	--	--	--	3.1	--	--	--	--	--	--	--	--	--	--	--
Total Alkalinity (as CaCO3)	15.0	--	--	--	130	--	--	--	26	--	--	--	--	--	--	--	--	--	--	--
Methane	< 0.0012	< 0.0012	0.00158	--	0.312	--	--	--	0.149	--	0.28	--	--	--	--	--	--	--	4.34	6.7
Ethane	< 0.010	< 0.010	<0.010	--	--	--	--	--	--	--	<0.001	--	--	<0.001	--	0.00325	--	--	<0.001	<0.001
Ethene	< 0.010	< 0.010	<0.010	--	--	--	<0.001	<0.001	<0.001	<0.0010	0.003	0.00119	0.00776	0.00393	--	0.0387	0.071	0.13	0.047	0.0195
CO2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Field Parameters																				
Dissolved Oxygen	1.20	1.09	1.33	0.72	0.69	6.97	0.59	1.23	1.37	1.86	0.64	6.29	6.65	0.45	4.53	1.19	2.97	6.28	2.29	0.34
Oxidation Reduction Potential (mV)	245.7	167.4	71.8	-103.2	-614.5	-16.4	121.7	162.1	147.7	240.0	-483.4	111.6	132.3	108.6	695.8	-117.5	96.8	-137.9	93.3	-24.1
Organic Acids																				
Acetic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Butyric Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lactic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propionic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

Table 4
Groundwater Analytical Summary Table - MNA and Enhanced Bioremediation Parameters
NuStar Vancouver Facility
Vancouver, Washington

Well Number:	MW-8			MW-9			MW-12								MW-18i			MW-19			
Sample Date:	6/10/2008	9/12/2012	12/12/2012	9/21/2010	9/14/2012	12/13/2012	10/19/2010	6/7/2011	9/19/2011	12/7/2011	3/12/2012	6/22/2012	9/14/2012	12/13/2012	6/10/2008	9/13/2012	12/13/2012	05/22/07	10/19/2010	9/13/2012	12/14/2012
Analyte	Concentrations in mg/L (ppm)																				
Total Metals																					
Iron	0.419	--	--	<0.10	--	--	--	--	--	--	--	--	--	--	33.6	--	--	--	--	--	--
Manganese	--	--	--	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	--	--	--	9.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Attenuation Chemistry																					
Total Organic Carbon	6.99	--	--	2.1	--	--	--	0.94	8.3	59	65	56	100	5	5.32	--	--	--	--	--	--
Ammonia (as N)	<0.0500	--	--	1.4	--	--	--	--	--	--	--	--	--	--	<0.0500	--	--	--	--	--	--
Nitrate-Nitrogen	167	--	--	89	--	--	59	1.1	--	67	--	--	--	--	0.35	--	--	--	19	--	--
Nitrite-Nitrogen	<0.1	--	--	<0.10	--	--	--	<0.10	--	<0.10	--	--	--	--	<0.1	--	--	--	--	--	--
Sulfate	668	--	--	49	--	--	--	15	--	200	--	--	--	--	14.9	--	--	--	--	--	--
Sulfide	<1.00	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.00	--	--	--	--	--	--
Total Phosphorus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Orthophosphate (as P)	--	--	--	<0.10	--	--	--	0.18	--	0.27	--	--	--	--	--	--	--	--	--	--	--
Chloride	19.2	--	--	5.9	--	--	--	--	--	--	--	--	--	--	3.66	--	--	--	--	--	--
Total Alkalinity (as CaCO3)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methane	0.00162	--	--	--	--	--	--	--	--	--	--	--	0.881	<0.001	<0.00120	--	--	0.747	--	--	--
Ethane	<0.010	--	--	--	--	--	--	<0.001	--	0.00615	--	--	0.0107	<0.001	<0.010	--	--	<0.010	--	--	--
Ethene	<0.010	--	--	--	--	--	--	<0.001	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	--	--	<0.010	--	--	--
CO2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Field Parameters																					
Dissolved Oxygen	0.41	1.18	0.3	0.51	0.25	6.96	--	3.16	0.84	1.00	1	0.66	0.43	1.07	7.11	6.12	7.13	3.47	0.67	0.81	0.62
Oxidation Reduction Potential (mV)	2.8	131.5	78.7	115.1	104.4	95.4	--	110.4	906.3	109.0	45.3	117.1	140.7	128.6	8.0	121.6	34.4	171.8	64.8	146.5	18.8
Organic Acids																					
Acetic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Butyric Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lactic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propionic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

Table 4
Groundwater Analytical Summary Table - MNA and Enhanced Bioremediation Parameters
NuStar Vancouver Facility
Vancouver, Washington

Well Number:	MW-21i-40			MW-21i-105			MW-23i			MW-24i							MGMS1-3(43)		
Sample Date:	6/10/2008	9/12/2012	12/12/2012	6/10/2008	9/12/2012	12/12/2012	6/10/2008	9/11/2012	12/12/2012	6/7/2011	9/16/2011	12/7/2011	3/12/2012	6/22/2012	9/14/2012	12/14/2012	10/19/2010	9/12/2012	12/11/2012
Analyte	Concentrations in mg/L (ppm)																		
Total Metals																			
Iron	10.8	--	--	6.60	--	--	4.95	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Attenuation Chemistry																			
Total Organic Carbon	--	--	--	--	--	--	--	--	--	1.2	7.0	290	33	44	15	16	--	--	--
Ammonia (as N)	0.0594	--	--	0.0645	--	--	<0.0500	--	--	--	--	--	--	--	--	--	--	--	--
Nitrate-Nitrogen	<0.100	--	--	<0.100	--	--	0.440	--	--	0.50	--	1.6	--	--	--	--	390	--	--
Nitrite-Nitrogen	<0.100	--	--	<0.100	--	--	<0.100	--	--	<0.10	--	<0.10	--	--	--	--	--	--	--
Sulfate	65.5	--	--	176	--	--	12.5	--	--	8.6	--	14	--	--	--	--	--	--	--
Sulfide	<1.00	--	--	<1.00	--	--	<1.00	--	--	--	--	--	--	--	--	--	--	--	--
Total Phosphorus	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Orthophosphate (as P)	--	--	--	--	--	--	--	--	--	<0.15	--	<0.15	--	--	--	--	--	--	--
Chloride	4.71	--	--	5.26	--	--	3.83	--	--	--	--	--	--	--	--	--	--	--	--
Total Alkalinity (as CaCO3)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methane	0.00452	--	--	0.0307	--	--	0.0012	--	--	--	--	--	--	--	0.122	0.303	--	--	--
Ethane	<0.010	--	--	0.0194	--	--	<0.010	--	--	<0.001	--	<0.001	--	--	<0.001	<0.001	--	--	--
Ethene	<0.010	--	--	<0.010	--	--	<0.010	--	--	<0.001	--	0.00229	0.00203	0.00152	<0.001	<0.001	--	--	--
CO2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Field Parameters																			
Dissolved Oxygen	0.23	0.34	0.75	0.5	1.85	1.32	1.9	5.11	5.23	6.40	0.61	3.50	2.11	3.50	0.4	2.11	0.73	1.64	0.35
Oxidation Reduction Potential (mV)	-101.9	-65.2	-42.5	-321.1	68.3	57.5	-27.4	217.7	31.8	59.0	646.9	-147.5	-1.2	-147.5	-54.0	6.3	76.5	-36.6	-25.8
Organic Acids																			
Acetic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Butyric Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lactic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propionic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Please refer to notes at end of table.

Table 4
Groundwater Analytical Summary Table - MNA and Enhanced Bioremediation Parameters
NuStar Vancouver Facility
Vancouver, Washington

Well Number:	MGMS2-4(40)								MP-1																	
Sample Date:	9/21/2010	6/7/2011	9/12/2011	12/7/2011	3/8/2012	6/19/2012	9/13/2012	12/11/2012	2/6/2007	12/16/2008	3/23/2009	6/18/2009	9/18/2009	12/18/2009	3/16/2010	6/17/2010	9/23/2010	12/10/2010	3/14/2011	6/7/2011	9/19/2011	12/9/2011	3/9/2012	6/22/2012	9/14/2012	12/14/2012
Analyte	Concentrations in mg/L (ppm)																									
Total Metals																										
Iron	1.3	--	--	--	--	--	--	--	<0.100	--	<0.10	--	--	--	<0.10	--	--	--	--	--	--	--	--	--	--	--
Manganese	1.6	--	--	--	--	--	--	--	0.665	--	3.2	--	--	--	0.99	--	--	--	--	--	--	--	--	--	--	--
Potassium	20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Attenuation Chemistry																										
Total Organic Carbon	3.7	2.2	110	300	290	500	140	280	< 1.00	1.80	2.0	N/A	1.50	1.60	2.4	2.4	2.0	1.0	0.96	1.6	3.7	8.3	16	26	23	18
Ammonia (as N)	130	--	--	--	--	--	--	--	42.4	--	35	--	--	--	37	--	--	--	--	--	--	--	--	--	--	--
Nitrate-Nitrogen	560	200	--	8.0	--	--	--	--	247	--	210	--	--	--	990	--	--	--	--	160	--	120	--	--	--	--
Nitrite-Nitrogen	<0.10	<0.10	--	<0.10	--	--	--	--	0.18	--	1.2	--	--	--	0.76	--	--	--	--	<0.10	--	0.91	--	--	--	--
Sulfate	110	140	--	19	--	--	--	--	89.7	--	91	--	--	--	87	--	--	--	--	99	--	62	--	--	--	--
Sulfide	--	--	--	--	--	--	--	--	<0.200	--	--	--	--	--	<0.050	--	--	--	--	--	--	--	--	--	--	--
Total Phosphorus	--	--	--	--	--	--	--	--	0.0332	--	<0.050	--	--	--	<0.10	--	--	--	--	--	--	--	--	--	--	--
Orthophosphate (as P)	<0.10	<0.15	--	<0.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.15	--	<0.15	--	--	--	--
Chloride	20	--	--	--	--	--	--	--	17.7	--	6.7	--	--	--	14	--	--	--	--	--	--	--	--	--	--	--
Total Alkalinity (as CaCO3)	--	--	--	--	--	--	--	--	118	--	96.0	--	--	--	134	--	--	--	--	--	--	--	--	--	--	--
Methane	--	--	--	--	--	--	4.19	7.18	0.00695	--	0.0111	--	--	--	0.412	--	0.825	--	--	--	--	--	--	--	6.92	5.92
Ethane	--	<0.001	--	<0.001	--	--	<0.001	<0.001	<0.010	--	--	--	--	--	--	--	<0.001	--	--	<0.001	--	<0.001	--	--	<0.001	<0.001
Ethene	--	<0.001	--	0.0145	0.368	0.566	0.264	0.11	<0.010	--	--	--	<0.001	<0.001	0.00247	<0.0010	<0.001	<0.001	<0.000001	<0.001	--	0.003280	0.0159	0.0666	0.016	0.0211
CO2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Field Parameters																										
Dissolved Oxygen	2.05	0.86	2.63	6.28	1.22	6.28	1.16	0.55	0.39	1.37	1.05	3.65	0.48	0.78	0.89	3.22	0.53	0.52	1.35	0.52	0.69	0.83	0.23	0.83	0.43	0.28
Oxidation Reduction Potential (mV)	80.1	49.5	338.9	-137.9	-73.6	-137.9	-40.1	-82.3	208.9	-78.5	127.3	-43.7	99.7	155.3	83.2	228.3	-464.0	-4.6	159.6	48.9	913.5	-51.7	77.7	-51.7	98.2	-15.2
Organic Acids																										
Acetic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Butyric Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lactic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propionic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

1. mg/L (ppm) = Milligrams per liter (parts per million).
2. Ethene is analyzed by EPA Method RSK-175M. All other VOCs were analyzed by EPA Method 8260.
3. **Boldface** value represents detected concentration of listed analyte.
4. -- = Not sampled or not analyzed.
5. < = Not detected at or above the specified laboratory method reporting limit (MRL).
6. mV= millivolts

Table 5
Depth-Discrete Groundwater Samples - Analytical Summary Tables
NuStar Vancouver Facility
Vancouver, Washington

Sample	Date Collected	Depth (fbgs)	Analyte Concentration in µg/L (ppb)															
			Benzene	2-Butanone (MEK)	Chlorobenzene	Chloroethane	Chloroform	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	1,2-DCP	PCE	Toluene	1,1,1-TCA	TCE	Vinyl chloride
A-(32-35)	08/10/2011	32 - 35	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50
A-(51-54)	08/10/2011	51 - 54	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50
AGP-01-35	5/10/2006	35	--	--	--	<0.50	0.73	1.78	8.44	1.59	97.2	1.09	<0.50	28.8	--	<0.50	23.2	62.6
AGP-01-45	5/10/2006	45	--	--	--	0.56	<0.50	0.53	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50
AGP-02-35	5/11/2006	35	--	--	--	<0.50	<0.50	1.63	2.78	<0.50	12.6	<0.50	<0.50	73.2	--	<0.50	19.8	0.82
AGP-02-45	5/11/2006	45	--	--	--	7.15	<0.50	2.29	<0.50	<0.50	0.75	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50
AGP-03-35	5/10/2006	35	--	--	--	0.80	0.85	6.37	33.6	<0.50	85.2	1.91	0.93	33.5	--	1.77	16.1	1.83
AGP-03-45	5/10/2006	45	--	--	--	21.2	0.69	1.91	1.58	<0.50	9.59	<0.50	<0.50	33.5	--	0.97	10.7	<0.50
AGP-04-35	5/5/2006	35	--	--	--	0.71	2.19	10.0	5.07	0.58	183	3.40	2.61	78.6	--	7.13	90.5	2.30
AGP-04-45	5/5/2006	45	--	--	--	41.6	4.30	28.7	7.10	<1.0	231	4.60	3.58	18.8	--	3.90	10.3	7.26
AGP-05-35	5/5/2006	35	--	--	--	<0.50	<0.50	9.12	<0.50	<0.50	26.3	<0.50	1.48	1.98	--	<0.50	1.88	13.5
AGP-05-45	5/5/2006	45	--	--	--	12.6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50
AGP-06-35	5/2/2006	35	--	--	--	<5.0	<5.0	29.1	<5.0	10.2	910	10.5	<5.0	1,490	--	17.2	519	5.20
AGP-06-45	5/2/2006	45	--	--	--	<50	<50	58.0	<50	<50	1,390	<50	<50	9,710	--	90.0	3,160	<50
AGP-07-25	4/25/2006	25	--	--	--	<5.0	<5.0	7.80	<5.0	<5.0	105	<5.0	<5.0	1,380	--	21.7	398	16.5
AGP-07-35	4/25/2006	35	--	--	--	<25	<25	102	<25	43.0	1,350	<25	<25	3,520	--	73.5	1,450	108
AGP-07-45	4/25/2006	45	--	--	--	<25	<25	132	<25	71.0	994	<25	<25	9,820	--	248	4,080	<25
AGP-08-25	4/24/2006	25	--	--	--	<2.5	<2.5	<2.5	<2.5	<2.5	19.4	<2.5	<2.5	470	--	11.2	277	<2.5
AGP-08-35	4/24/2006	35	--	--	--	<25	<25	61.0	<25	29.5	928	<25	<25	3,920	--	63.0	1,380	76.5
AGP-08-45	4/24/2006	45	--	--	--	<25	<25	104	<25	57.0	1,290	<25	<25	6,800	--	142	2,980	<25
AGP-09-25	4/24/2006	25	--	--	--	<0.50	<0.50	0.53	<0.50	<0.50	0.68	<0.50	<0.50	55.1	--	5.31	59.7	<0.50
AGP-09-35	4/24/2006	35	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0	61.9	<5.0	<5.0	1,200	--	9.50	201	<5.0
AGP-09-45	4/25/2006	45	--	--	--	<25	<25	159	<25	85.5	2,610	27.0	<25	5,850	--	206	3,010	<25
AGP-10-35	4/26/2006	35	--	--	--	<2.5	<2.5	7.80	<2.5	3.70	161	<2.5	<2.5	841	--	8.05	186	15.4
AGP-10-45	4/26/2006	45	--	--	--	<50	<50	540	<50	130	10,600	57.0	<50	3,280	--	102	2,410	587
AGP-11-35	4/26/2006	35	--	--	--	<10	<10	12.0	<10	<10	160	<10	<10	2,380	--	25.2	511	28.4
AGP-11-45	4/26/2006	45	--	--	--	102	<25	462	<25	126	8,100	51.5	<25	2,400	--	155	2,660	400
AGP-12-35	4/25/2006	35	--	--	--	<25	<25	99.5	<25	51.0	1,320	<25	<25	5,440	--	95.5	1,920	38.0
AGP-12-45	4/25/2006	45	--	--	--	<50	<50	728	<50	162	15,500	214	<50	1,480	--	159	1,980	231
AGP-13-35	5/1/2006	35	--	--	--	<25	<25	<25	<25	<25	246	<25	<25	3,950	--	81.5	745	<25
AGP-13-45	5/1/2006	45	--	--	--	7.55	<2.5	121	<2.5	15.8	974	5.85	<2.5	198	--	11.2	331	77.8
AGP-14-35	4/27/2006	35	--	--	--	<25	<25	25.5	<25	<25	142	<25	<25	4,920	--	81.5	950	<25
AGP-14-45	4/27/2006	45	--	--	--	<10	<10	201	<10	28.4	2,750	10.4	<10	54.2	--	<10	101	198
AGP-14-55	4/27/2006	55	--	--	--	<2.5	<2.5	15.2	<2.5	4.80	401	3.35	<2.5	46.3	--	<2.5	30.8	5.35
AGP-15-35	4/26/2006	35	--	--	--	<25	<25	<25	<25	<25	104	<25	<25	6,200	--	62.0	1,300	<25
AGP-15-45	4/26/2006	45	--	--	--	<10	<10	194	<10	39.2	3,690	10.0	<10	10.4	--	<10	<10	380
AGP-16-35	4/27/2006	35	--	--	--	<10	<10	20.8	<10	15.2	132	<10	<10	3,610	--	57.2	768	<10
AGP-16-45	4/27/2006	45	--	--	--	<25	<25	444	<25	94.5	9,510	86.0	<25	28.5	--	<25	30.0	57.5
AGP-17-35	4/28/2006	35	--	--	--	<10	<10	13.0	<10	<10	148	<10	<10	2,550	--	<10	464	<10
AGP-17-45	4/28/2006	45	--	--	--	<25	<25	378	<25	62.0	8,910	62.5	<25	78.5	--	<25	408	107
AGP-18-35	4/28/2006	35	--	--	--	<10	<10	17.8	<10	<10	208	<10	<10	2,630	--	11.0	725	<10
AGP-18-45	4/28/2006	45	--	--	--	13.6	<5.0	105	<5.0	8.00	1,310	<5.0	<5.0	35.4	--	<5.0	46.3	17.4
AGP-19-35	4/28/2006	35	--	--	--	<25	<25	32.5	<25	<25	542	<25	<25	3,550	--	<25	920	<25
AGP-19-45	4/28/2006	45	--	--	--	<50	<50	702	<50	96.0	13,600	348	<50	56.0	--	<50	259	206
AGP-20-35	5/1/2006	35	--	--	--	<10	<10	<10	<10	<10	37.0	<10	<10	2,480	--	28.6	287	<10
AGP-20-45	5/1/2006	45	--	--	--	<50	<50	803	<50	163	13,700	100	<50	590	--	54.0	2,520	138

Please refer to notes at end of table.

Table 5
Depth-Discrete Groundwater Samples - Analytical Summary Tables
NuStar Vancouver Facility
Vancouver, Washington

Sample	Date Collected	Depth (fbgs)	Analyte Concentration in µg/L (ppb)															
			Benzene	2-Butanone (MEK)	Chlorobenzene	Chloroethane	Chloroform	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	1,2-DCP	PCE	Toluene	1,1,1-TCA	TCE	Vinyl chloride
AGP-21-35	5/1/2006	35	--	--	--	<10	<10	<10	<10	<10	36.4	<10	<10	3,510	--	16.0	551	<10
AGP-21-45	5/1/2006	45	--	--	--	<25	<25	141	<25	40.0	2,550	211	<25	5,650	--	32.0	2,840	1,330
AGP-22-35	5/2/2006	35	--	--	--	<10	<10	10.0	<10	<10	102	<10	<10	2,050	--	40.4	328	<10
AGP-22-45	5/2/2006	45	--	--	--	<250	<250	<250	<250	<250	1,360	<250	<250	31,200	--	3,600	11,500	<250
AGP-23-35	5/9/2006	35	--	--	--	<25	<25	<25	<25	<25	112	<25	<25	4,690	--	56.0	718	<25
AGP-23-45	5/9/2006	45	--	--	--	<10	<10	46.4	<10	21.2	415	<10	<10	2,700	--	58.2	1,320	60.0
AGP-24-35	5/8/2006	35	--	--	--	<10	<10	<10	<10	<10	115	<10	<10	3,430	--	22.2	514	<10
AGP-24-45	5/8/2006	45	--	--	--	<25	<25	143	<25	59.0	656	<25	<25	5,480	--	199	2,690	<25
AGP-25-35	5/4/2006	35	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0	21.8	<5.0	<5.0	1,620	--	10.2	251	<5.0
AGP-25-45	5/4/2006	45	--	--	--	<25	<25	117	<25	68.5	2,850	60.0	<25	8,270	--	140	4,120	210
AGP-26-35	5/3/2006	35	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0	12.8	<5.0	<5.0	1,000	--	11.1	138	<5.0
AGP-26-45	5/3/2006	45	--	--	--	<25	<25	644	<25	121	9,070	148	<25	2,970	--	84.5	3,100	298
AGP-27-35	5/2/2006	35	--	--	--	<2.5	<2.5	24.5	<2.5	3.95	40.0	<2.5	<2.5	821	--	22.4	276	<2.5
AGP-27-45	5/2/2006	45	--	--	--	<10	<10	55.4	<10	32.4	464	11.6	<10	3,710	--	90.8	1,930	<10
AGP-28-25	5/3/2006	25	--	--	--	<25	<25	<25	<25	<25	<25	<25	<25	9,140	--	61.0	670	<25
AGP-28-35	5/3/2006	35	--	--	--	<5.0	<5.0	9.00	<5.0	<5.0	26.1	<5.0	<5.0	1,590	--	19.4	288	<5.0
AGP-28-45	5/3/2006	45	--	--	--	<25	<25	367	<25	75.5	2,570	34.0	<25	4,360	--	234	2,710	88.0
AGP-29-25	5/4/2006	25	--	--	--	<100	<100	<100	<100	<100	<100	<100	<100	31,600	--	<100	490	<100
AGP-29-35	5/4/2006	35	--	--	--	<10	<10	<10	<10	<10	93.6	<10	<10	3,070	--	20.4	571	<10
AGP-29-45	5/4/2006	45	--	--	--	<10	<10	284	<10	96.6	1,640	19.0	<10	3,030	--	434	3,210	<10
AGP-30-35	5/9/2006	35	--	--	--	<5.0	<5.0	28.0	<5.0	<5.0	1,210	10.2	<5.0	71.9	--	<5.0	85.5	375
AGP-31-35	5/8/2006	35	--	--	--	361	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0
AGP-31-45	5/8/2006	45	--	--	--	1.40	<1.0	7.10	<1.0	1.04	263	1.06	<1.0	<1.0	--	<1.0	<1.0	99.5
AGP-32-35	5/9/2006	35	--	--	--	0.76	<0.50	<0.50	<0.50	<0.50	22.1	<0.50	<0.50	<1.0	--	<0.50	<0.50	19.3
AGP-32-45	5/10/2006	45	--	--	--	<2.5	<2.5	8.00	<2.5	<2.5	439	<2.5	<2.5	<2.5	--	<2.5	<2.5	125
AGP-33-35	5/12/2006	35	--	--	--	3.69	<0.50	1.16	<0.50	<0.50	30.5	<0.50	<0.50	15.4	--	<0.50	3.94	1.51
AGP-33-45	5/12/2006	45	--	--	--	10.0	<0.50	8.67	<0.50	<0.50	13.7	<0.50	0.55	1.61	--	<0.50	<0.50	13.7
AGP-34-35	5/15/2006	35	--	--	--	<2.5	<2.5	4.95	<2.5	<2.5	992	7.55	<2.5	11.3	--	<2.5	29.0	105
AGP-34-45	5/15/2006	45	--	--	--	<5.0	<5.0	17.9	<5.0	<5.0	1,290	9.80	<5.0	144	--	<5.0	72.6	103
AGP-35-35	5/15/2006	35	--	--	--	1.82	<0.50	9.79	<0.50	<0.50	41.4	1.19	2.55	0.66	--	<0.50	1.93	29.2
AGP-35-45	5/15/2006	45	--	--	--	<5.0	<5.0	24.8	<5.0	<5.0	1,180	11.2	<5.0	43.0	--	<5.0	27.1	99.7
AGP-36-25	5/16/2006	25	--	--	--	<1.0	<1.0	4.58	<1.0	<1.0	299	6.54	1.66	155	--	1.12	58.6	3.96
AGP-36-35	5/16/2006	35	--	--	--	<1.0	<1.0	8.98	<1.0	<1.0	120	<1.0	1.72	1.48	--	<1.0	1.68	150
AGP-36-45	5/16/2006	45	--	--	--	73.2	<0.50	0.58	<0.50	<0.50	2.37	<0.50	<0.50	<0.50	--	<0.50	<0.50	0.58
AGP-37-35	5/12/2006	35	--	--	--	<10	<10	10.8	<10	<10	2,140	20.2	<10	376	--	<10	116	146
AGP-37-45	5/12/2006	45	--	--	--	<10	<10	37.0	<10	11.0	3,850	37.4	<10	105	--	<10	87.0	620
AGP-38-35	5/11/2006	35	--	--	--	<5.0	<5.0	7.10	<5.0	<5.0	586	8.30	<5.0	1,120	--	7.10	201	<5.0
AGP-38-45	5/11/2006	45	--	--	--	<10	<10	42.2	<10	16.8	552	13.2	<10	3,350	--	33.2	887	11.6
AGP-39-35	5/16/2006	35	--	--	--	<2.5	<2.5	9.60	<2.5	<2.5	119	<2.5	<2.5	409	--	3.35	98.1	<2.5
AGP-39-45	5/16/2006	45	--	--	--	<10	<10	134	<10	52.0	3,510	84.6	<10	3,280	--	81.2	1,700	60.4
AGP-40-56	6/15/2006	56	--	--	--	<1.0	<1.0	16.3	<1.0	5.64	314	6.00	<1.0	201	--	3.12	138	1.44
AGP-40-66	6/15/2006	66	--	--	--	<1.0	<1.0	11.3	<1.0	3.64	211	2.08	<1.0	176	--	4.24	115	1.56
AGP-41-55	6/19/2006	55	--	--	--	<10	<10	211	<10	39.8	3,260	25.0	<10	129	--	<10	97.2	252
AGP-41-65	6/19/2006	65	--	--	--	<0.50	<0.50	1.08	<0.50	<0.50	19.9	1.48	<0.50	74.2	--	0.89	20.6	<0.50
AGP-41-75	6/19/2006	75	--	--	--	<0.50	<0.50	1.88	<0.50	0.54	33.9	0.88	<0.50	103	--	1.41	24.9	1.93
AGP-42-25	6/19/2006	25	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	9.02	<1.0	<1.0	160	--	1.42	52.5	<1.0
AGP-42-35	6/19/2006	35	--	--	--	<5.0	<5.0	22.9	<5.0	8.90	198	5.50	<5.0	1,040	--	19.3	645	<5.0

Please refer to notes at end of table.

Table 5
Depth-Discrete Groundwater Samples - Analytical Summary Tables
NuStar Vancouver Facility
Vancouver, Washington

Sample	Date Collected	Depth (fbgs)	Analyte Concentration in µg/L (ppb)															
			Benzene	2-Butanone (MEK)	Chlorobenzene	Chloroethane	Chloroform	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	1,2-DCP	PCE	Toluene	1,1,1-TCA	TCE	Vinyl chloride
AGP-42-45	6/19/2006	45	--	--	--	<10	<10	33.0	<10	27.0	334	<10	<10	1,580	--	33.4	1,170	<10
AGP-42-51	6/19/2006	51	--	--	--	<1.0	<1.0	11.8	<1.0	6.20	141	2.38	<1.0	244	--	5.48	239	<1.0
AGP-42-61	6/19/2006	61	--	--	--	<1.0	<1.0	19.7	<1.0	9.88	231	2.22	<1.0	341	--	9.54	318	<1.0
AGP-42-71	6/20/2006	71	--	--	--	<0.50	<0.50	<0.50	<0.50	1.44	41.0	<0.50	<0.50	70.4	--	1.47	60.4	<0.50
AGP-43-25	6/20/2006	25	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	4.31	<0.50	<0.50	32.8	--	<0.50	15.7	<0.50
AGP-43-35	6/20/2006	35	--	--	--	<25	<25	<25	<25	<25	142	<25	<25	3,840	--	<25	1,440	<25
AGP-43-45	6/20/2006	45	--	--	--	<50	<50	114	<50	72.0	2,410	56.0	<50	2,420	--	101	12,100	<50
AGP-43-55	6/21/2006	55	--	--	--	<0.50	<0.50	5.88	<0.50	1.89	141	2.32	<0.50	178	--	1.15	101	0.74
AGP-43-65	6/21/2006	65	--	--	--	<0.50	<0.50	0.51	<0.50	<0.50	9.64	<0.50	<0.50	30.0	--	<0.50	13.9	<0.50
AGP-43-75	6/21/2006	75	--	--	--	<0.50	<0.50	0.70	<0.50	<0.50	11.1	<0.50	<0.50	69.9	--	<0.50	25.5	<0.50
AGP-44-25	6/22/2006	25	--	--	--	<2.5	<2.5	2.6	<2.5	<2.5	117	3.55	<2.5	498	--	6.30	116	<2.5
AGP-44-35	6/22/2006	35	--	--	--	<5.0	<5.0	5.2	<5.0	<5.0	462	12.7	<5.0	802	--	7.30	167	<5.0
AGP-44-45	6/23/2006	45	--	--	--	<10	<10	36.6	<10	18.4	580	10.0	<10	3,330	--	29.8	818	<10
AGP-44-54	6/23/2006	54	--	--	--	<5.0	<5.0	26.7	<5.0	24.4	450	6.40	<5.0	1,780	--	19.5	805	<5.0
AGP-44-64	6/23/2006	64	--	--	--	<0.50	<0.50	3.26	<0.50	1.69	65.2	0.99	<0.50	103	--	1.56	65.6	<0.50
AGP-45-25	6/26/2006	25	--	--	--	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	449	--	<2.5	13.1	<0.50
AGP-45-35	6/26/2006	35	--	--	--	<10	<10	13.0	<10	<10	105	<10	<10	2,580	--	13.0	786	<10
AGP-45-45	6/26/2006	45	--	--	--	<5.0	<5.0	148	<5.0	36.1	1,550	37.1	<5.0	1,350	--	68.7	1,120	44.4
AGP-45-51	6/26/2006	51	--	--	--	<2.5	<2.5	56.8	<2.5	24.2	783	14.3	<2.5	860	--	30.2	764	6.30
AGP-47-25	6/27/2006	25	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	99.1	--	2.26	19.2	<0.50
AGP-47-35	6/27/2006	35	--	--	--	<2.5	<2.5	<2.5	<2.5	<2.5	8.05	<2.5	<2.5	580	--	5.20	106	<2.5
AGP-47-45	6/27/2006	45	--	--	--	<25	<25	342	<25	65.0	8,440	208	<25	1,750	--	41.0	1,860	337
AGP-47-55	6/28/2006	55	--	--	--	<5.0	<5.0	30.7	<5.0	9.80	1,120	9.00	<5.0	49.2	--	<5.0	133	53.5
AGP-48-25	6/28/2006	25	--	--	--	<0.50	<0.50	1.45	<0.50	<0.50	26.7	1.13	<0.50	78.2	--	1.40	55.0	<0.50
AGP-48-35	6/28/2006	35	--	--	--	<0.50	<0.50	4.02	<0.50	<0.50	0.81	<0.50	<0.50	0.77	--	0.53	0.93	<0.50
AGP-48-45	6/28/2006	45	--	--	--	<5.0	<5.0	36.4	<5.0	21.1	1,600	9.20	<5.0	<5.0	--	<5.0	29.4	<5.0
AGP-48-50	6/28/2006	50	--	--	--	<10	<10	57.0	<10	34.2	2,320	17.6	<10	77.8	--	<10	293	<10
AGP-49-30	6/29/2006	30	--	--	--	<1.0	<1.0	2.64	<1.0	1.14	7.92	<1.0	<1.0	246	--	2.10	192	<1.0
AGP-49-35	6/29/2006	35	--	--	--	<5.0	<5.0	9.60	<5.0	7.20	57.2	<5.0	<5.0	1,550	--	15.7	1,070	<5.0
AGP-49-45	6/29/2006	45	--	--	--	82.4	<10	807	<10	89.4	<10	<10	<10	<10	--	466	3,240	<10
AGP-49-55	6/29/2006	55	--	--	--	<0.50	<0.50	3.77	<0.50	1.25	101	3.29	<0.50	62.2	--	0.92	64.3	<0.50
AGP-50-25	6/29/2006	25	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	18.1	--	0.75	44.8	<0.50
AGP-50-35	6/29/2006	35	--	--	--	<1.0	<1.0	1.04	<1.0	<1.0	7.92	<1.0	<1.0	255	--	3.08	176	<1.0
AGP-50-45	6/29/2006	45	--	--	--	<25	<25	37.5	<25	<25	324	<25	<25	2,590	--	80.0	4,360	<25
AGP-50-55	6/29/2006	55	--	--	--	<1.0	<1.0	5.10	<1.0	1.84	228	7.04	<1.0	49.0	--	<1.0	84.1	<1.0
AGP-51-35	6/13/2007	35	<1.0	74.2	--	<1.0	<1.0	<1.0	<1.0	<1.0	1.78	<1.0	<1.0	105	<1.0	2.77	82.9	<1.0
AGP-51-45	6/13/2007	45	<1.0	<10	--	<1.0	<1.0	109	<1.0	<1.0	5310	104	<50	200	<1.0	<1.0	2050	128
AGP-51-55	6/13/2007	55	<1.0	<10	--	<1.0	<1.0	13.8	<1.0	<1.0	716	28.4	<5.0	75.7	<1.0	<1.0	324	11.2
AGP-52-35	6/13/2007	35	<1.0	<10	--	<1.0	7.12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.52	<1.0	<1.0	<1.0	<1.0
AGP-52-45	6/13/2007	45	<1.0	<10	--	<1.0	<1.0	170	<1.0	<1.0	8730	202	<50	367	<1.0	<1.0	1750	372
AGP-52-55	6/13/2007	55	<1.0	<10	--	<1.0	<1.0	3.48	<1.0	<1.0	132	1.55	<1.0	17.1	<1.0	<1.0	35.3	1.41
AGP-53-35	6/14/2007	35	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	15.1	<1.0	<1.0	5.72	<1.0
AGP-53-45	6/14/2007	45	<1.0	<10	--	<1.0	<1.0	117	<1.0	<1.0	3260	83.20	<20	775	<1.0	21.20	1890	39.6
AGP-53-55	6/14/2007	55	<1.0	<10	--	<1.0	<1.0	1.05	<1.0	<1.0	24.1	<1.0	<1.0	11.5	<1.0	<1.0	21.8	<1.0
AGP-54-35	6/15/2007	35	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	8.75	<1.0	<5.0	339	<1.0	5.2	344	<1.0
AGP-54-35 DUP	6/15/2007	35	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	7.8	<1.0	<5.0	328	<1.0	5.05	327	<1.0
AGP-54-45	6/18/2007	45	<1.0	<10	--	24.9	<1.0	84.6	<1.0	1.59	54.8	<1.0	<1.0	<1.0	<1.0	15.9	8.95	1.13

Please refer to notes at end of table.

Table 5
Depth-Discrete Groundwater Samples - Analytical Summary Tables
NuStar Vancouver Facility
Vancouver, Washington

Sample	Date Collected	Depth (fbgs)	Analyte Concentration in µg/L (ppb)															
			Benzene	2-Butanone (MEK)	Chlorobenzene	Chloroethane	Chloroform	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	1,2-DCP	PCE	Toluene	1,1,1-TCA	TCE	Vinyl chloride
AGP-54-55	6/18/2007	55	<1.0	<10	--	<1.0	<1.0	4.02	<1.0	<1.0	98.8	<1.0	<1.0	14.2	<1.0	<1.0	25.8	1.78
AGP-55-35	6/18/2007	35	<1.0	<10	--	<1.0	<1.0	13.60	<1.0	<1.0	276	<1.0	<10	704	<1.0	18	1200	<1.0
AGP-56-35	6/19/2007	35	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
AGP-57-35	6/19/2007	35	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
AGP-57-35 DUP	6/19/2007	35	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
AGP-57-45	6/20/2007	45	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
AGP-57-55	6/21/2007	55	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
AGP-58-35	6/21/2007	35	<1.0	<10	--	<1.0	<1.0	6.30	<1.0	5.40	25.2	<1.0	<5.0	151	<1.0	9.15	493	<1.0
AGP-58-45	6/22/2007	45	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
AGP-59-45	6/22/2007	45	<1.0	<10	--	<1.0	<1.0	1.31	<1.0	<1.0	28.7	<1.0	<1.0	13.6	<1.0	<1.0	34.0	<1.0
AGP-59-55	6/22/2007	55	<1.0	<10	--	<1.0	<1.0	1.06	<1.0	<1.0	26.4	<1.0	<1.0	14.0	<1.0	<1.0	26.9	<1.0
AGP-59-65	6/22/2007	65	<1.0	<10	--	<1.0	<1.0	1.61	<1.0	<1.0	60.6	<1.0	<1.0	15.4	<1.0	<1.0	22.7	<1.0
AGP-60-45	6/25/2007	45	<1.0	<10	--	<1.0	<1.0	<1.0	1.19	<1.0	11.8	<1.0	<1.0	<1.0	<1.0	<1.0	1.60	<1.0
AGP-60-55	6/25/2007	55	<1.0	<10	--	<1.0	<1.0	2.85	<1.0	<1.0	47.6	<1.0	<1.0	2.83	<1.0	<1.0	8.10	<1.0
AGP-60-65	6/26/2007	65	<1.0	<10	--	<1.0	<1.0	1.76	<1.0	<1.0	25.2	<1.0	<1.0	4.09	<1.0	<1.0	5.76	<1.0
AGP-61-45	6/26/2007	45	<1.0	<10	--	<1.0	<1.0	1.72	<1.0	<1.0	18.5	<1.0	<1.0	<1.0	<1.0	<1.0	1.25	<1.0
AGP-61-55	6/26/2007	55	<1.0	<10	--	<1.0	<1.0	1.15	<1.0	<1.0	16.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.02	<1.0
AGP-61-55 DUP	6/26/2007	55	<1.0	<10	--	<1.0	<1.0	1.07	<1.0	<1.0	14.7	<1.0	<1.0	<1.0	<1.0	<1.0	1.92	<1.0
AGP-61-65	6/26/2007	65	<1.0	<10	--	<1.0	<1.0	1.00	<1.0	<1.0	12.7	<1.0	<1.0	<1.0	<1.0	<1.0	2.09	<1.0
AGP-62-35	7/18/2007	35	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	4.43	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
AGP-62-55	7/18/2007	55	4.09	<10	--	<1.0	<1.0	4.12	<1.0	2.05	68.8	<1.0	<1.0	37.4	4.04	1.18	49.1	<1.0
AGP-62-65	7/18/2007	65	7.97	<10	--	<1.0	<1.0	3.52	<1.0	1.77	54.6	<1.0	<1.0	42.0	6.89	1.29	49.3	<1.0
AGP-62-75	7/18/2007	75	<1.0	<10	--	<1.0	<1.0	1.55	<1.0	<1.0	23.7	<1.0	<1.0	4.11	<1.0	<1.0	10.6	<1.0
AGP-62-85	7/18/2007	85	4.72	<10	--	<1.0	<1.0	1.44	<1.0	<1.0	20.8	<1.0	<1.0	18.3	3.66	<1.0	19.6	<1.0
AGP-63-35	7/19/2007	35	8.02	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7.10	<1.0	<1.0	<1.0
AGP-63-55	7/19/2007	55	4.29	<10	--	<1.0	<1.0	4.81	<1.0	2.23	96.2	<1.0	<1.0	31.6	4.95	1.10	45.9	<1.0
AGP-63-65	7/19/2007	65	5.32	<10	--	<1.0	<1.0	2.90	<1.0	1.41	64.2	<1.0	<1.0	36.9	4.88	<1.0	33.7	<1.0
AGP-63-75	7/19/2007	75	6.49	<10	--	<1.0	<1.0	2.28	<1.0	1.06	44.5	<1.0	<1.0	20.1	6.91	<1.0	24.3	<1.0
AGP-63-85	7/19/2007	85	4.42	<10	--	<1.0	<1.0	1.17	<1.0	<1.0	18.7	<1.0	<1.0	16.4	4.33	<1.0	15.6	<1.0
AGP-63-85 DUP	7/19/2007	85	2.62	<10	--	<1.0	<1.0	1.20	<1.0	<1.0	19.9	<1.0	<1.0	16.3	2.75	<1.0	15.6	<1.0
AGP-64-45	7/19/2007	45	7.07	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6.36	<1.0	<1.0	<1.0
AGP-64-55	7/19/2007	55	2.62	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.05	<1.0	<1.0	<1.0
AGP-64-65	7/19/2007	65	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.21	<1.0	<1.0	<1.0
B-(32-35)	08/09/2011	32 - 35	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50
B-(52-55)	08/09/2011	52 - 55	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50
C-(32-35)	08/08/2011	32 - 35	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50
C-(41-44)	08/08/2011	41 - 44	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50
C-(52-55)	08/10/2011	52 - 55	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50
CB-1 (35)	9/20/2010	35	--	--	--	--	--	--	--	<2.5	**46**	<2.5	--	**650**	--	--	**170**	<2.5
CB-1 (45)	9/20/2010	45	--	--	--	--	--	--	--	**53**	**1,400**	**20**	--	**1,400**	--	--	**1,700**	**40**
CB-2 (35)	9/20/2010	35	--	--	--	--	--	--	--	<0.5	**35**	<0.50	--	**62**	--	--	**16**	**0.66**
CB-2 (45)	9/21/2010	45	--	--	--	--	--	--	--	**23**	**770**	**8.2**	--	**500**	--	--	**1,000**	**39**
CB-2 (45) Dup	9/21/2010	45	--	--	--	--	--	--	--	**36**	**950**	**11**	--	**1,400**	--	--	**1,800**	**61**
CB-3 (35)	9/21/2010	35	--	--	--	--	--	--	--	<4.0	**220**	<4.0	--	**940**	--	--	**240**	<4.0
CB-3 (45)	9/21/2010	45	--	--	--	--	--	--	--	**4.5**	**280**	**5.8**	--	**690**	--	--	**270**	**26**
CB-4 (35)	9/21/2010	35	--	--	--	--	--	--	--	<4.0	**110**	**6.4**	--	**680**	--	--	**170**	<4.0
CB-4(45)	9/21/2010	45	--	--	--	--	--	--	--	<15	**1,200**	**22**	--	**3,300**	--	--	**820**	**100**
D - (42-45)	08/11/11	42 - 45	--	--	< 0.90	< 0.90	< 0.90	12	< 0.90	1.8	40	< 0.90	< 0.90	39	--	4	180	< 0.90
DEEP WELL (184-190)	08/24/11	184 - 190	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50

Please refer to notes at end of table.

Table 5
Depth-Discrete Groundwater Samples - Analytical Summary Tables
NuStar Vancouver Facility
Vancouver, Washington

Sample	Date Collected	Depth (fbgs)	Analyte Concentration in µg/L (ppb)															
			Benzene	2-Butanone (MEK)	Chlorobenzene	Chloroethane	Chloroform	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	1,2-DCP	PCE	Toluene	1,1,1-TCA	TCE	Vinyl chloride
MGMS-1	3/6/2000	35	--	--	--	--	--	130	<1	19	2,300	10	--	6,000	--	75	2,000	<5
	3/6/2000	45	--	--	--	--	--	110	<2	6	810	2.8	--	49	--	<2	320	<10
	3/6/2000	53	--	--	--	--	--	100	<1	4.3	890	1.1	--	29	--	<1	7	<5
	3/23/2000	70	--	--	--	--	--	1.2	<1	<1	16	<1	--	14	--	<1	14	<5
	3/23/2000	90	--	--	--	--	--	<1	<1	<1	1.2	<1	--	1.6	--	<1	1.7	<5
	3/23/2000	110	--	--	--	--	--	<1	<1	<1	<1	<1	--	<1	--	<1	<1	<5
	3/23/2000	116	--	--	--	--	--	<1	<1	<1	<1	<1	--	<1	--	<1	<1	<5
MGMS-2	3/6/2000	35	--	--	--	--	--	50	<1	89	640	<1	--	6,900	--	520	2,300	<5
	3/7/2000	45	--	--	--	--	--	210	<1	100	880	14	--	2,200	--	290	1,400	<5
	3/7/2000	52	--	--	--	--	--	63	<1	37	1,100	15	--	450	--	29	750	<5
	3/9/2000	70	--	--	--	--	--	<1	<1	1.1	9.8	4.4	--	23	--	<1	10	<5
	3/9/2000	90	--	--	--	--	--	<1	2.1	<1	6.6	<1	--	11	--	<1	6.6	<5
	3/9/2000	110	--	--	--	--	--	<1	1.1	<1	5.1	<1	--	36	--	<1	11	<5
	3/9/2000	120	--	--	--	--	--	<1	<1	<1	3.5	<1	--	15	--	<1	4.8	<5
	3/9/2000	140	--	--	--	--	--	<1	<1	<1	<1	<1	--	1.1	--	<1	<1	<5
MGMS-3	3/7/2000	35	--	--	--	--	--	30	6.5	10	2,300	19	--	850	--	20	480	<5
	3/7/2000	45	--	--	--	--	--	120	9.4	80	880	7.1	--	2,500	--	250	1,800	<5
	3/7/2000	50	--	--	--	--	--	240	<1	160	2,200	7.9	--	5,500	--	340	3,200	<5
	3/13/2000	60	--	--	--	--	--	2.3	<1	<1	36	<1	--	31	--	<1	29	<5
	3/13/2000	70	--	--	--	--	--	<1	<1	<1	4.9	<1	--	2.6	--	<1	1.9	<5
	3/13/2000	80	--	--	--	--	--	<1	<1	<1	3.8	<1	--	3.2	--	<1	2.1	<5
	3/13/2000	110	--	--	--	--	--	<1	<1	<1	27	<1	--	14	--	<1	5.5	<5
	3/13/2000	120	--	--	--	--	--	1.1	<1	<1	68	<1	--	5.2	--	<1	3.8	<5
	3/13/2000	130	--	--	--	--	--	<1	<1	<1	46	<1	--	6.4	--	<1	5.2	<5
	3/13/2000	140	--	--	--	--	--	<1	<1	<1	31	<1	--	7.5	--	<1	7.5	<5
MW-04i	3/29/1999	20	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	3/29/1999	40	--	--	--	--	<0.50	<0.50	<0.50	0.57	2.45	<0.50	--	1.6	<0.50	<0.50	2.47	<0.50
	3/30/1999	60	--	--	--	--	<0.50	0.55	<0.50	<0.50	5.98	<0.50	--	2.73	<0.50	0.75	5.76	<0.50
	3/31/1999	80	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	3/31/1999	80	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	4/28/1999	95	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<1.0	1.77	<0.50
	4/1/1999	100	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	4/2/1999	120	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	4/5/1999	140	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
MW-04d	12/4/1998	25	--	--	--	--	<0.50	<0.50	<0.50	<0.50	1.92	<0.50	--	1.3	<0.50	<0.50	9.78	<0.50
	12/7/1998	40	--	--	--	--	<0.50	<0.50	<0.50	<0.50	3.36	<0.50	--	3.54	<0.50	<0.50	3.26	<0.50
	12/8/1998	60	--	--	--	--	<0.50	1.73	<0.50	0.82	16.8	<0.50	--	10.2	<0.50	1.82	19.1	<0.50
	12/9/1998	80	--	--	--	--	<0.50	0.79	<0.50	0.7	4.17	<0.50	--	1.22	<0.50	2.24	10.9	<0.50
	12/10/1998	100	--	--	--	--	<0.50	2.03	<0.50	1.38	6.86	<0.50	--	<0.50	<0.50	3.76	7.04	<0.50
	12/14/1998	120	--	--	--	--	<0.50	1.22	<0.50	0.83	3.99	<0.50	--	<0.50	0.87	1.57	2.85	<0.50
	12/14/1998	140	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	12/15/1998	160	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	12/15/1998	160	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	12/15/1998	180	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	12/18/1998	200	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	12/23/1998	220	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	4/28/1999	227	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<1.0	<0.50	<0.50
	1/5/1999	240	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
MW-7	11/4/1996	45	--	--	<25	<100	--	95	<10	95	950	<10	<25	10,000	--	610	3,300	<50
	11/4/1996	60	--	--	<25	<100	--	38	<10	18	610	<10	<25	2,300	--	130	1,300	<50
	11/4/1996	76	--	--	<2.5	<10	--	6.3	<1.0	2.4	92	<10	<2.5	410	--	16	230	<5.0

Please refer to notes at end of table.

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Vancouver, Washington

Sample	Date Collected	Depth (fbgs)	Analyte Concentration in µg/L (ppb)															
			Benzene	2-Butanone (MEK)	Chlorobenzene	Chloroethane	Chloroform	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	1,2-DCP	PCE	Toluene	1,1,1-TCA	TCE	Vinyl chloride
MW-12	11/6/1996	40	--	--	5.2	2.7	--	140	3.7	32	4,200	8.6	<0.5	7,700	--	400	2,400	7
	11/6/1996	55	--	--	<25	<100	--	120	<10	22	3,700	<10	<25	920	--	43	310	<50
	11/6/1996	80	--	--	<2.5	<10	--	3.9	<1.0	<1.0	140	<1.0	<2.5	230	--	4.2	34	<5.0
MW-24D	09/14/11	--	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50
MW-24D (167-169)	08/23/11	167 - 169	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50
MW-24D (204-210)	08/25/11	204 - 210	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50
MW-24D(@150')	08/22/11	147-150	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.51	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50
MW-24D(110')	08/16/11	107-110	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.83	< 0.50	< 0.50	3.7	--	< 0.50	1.3	< 0.50
MW-24D(90')	08/15/11	87- 90	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3.9	< 0.50	< 0.50	3.6	--	< 0.50	2.3	< 0.50
MW-24D-130	08/18/11	127-130	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.7	< 0.50	< 0.50	0.77	--	< 0.50	1	< 0.50
MW-25i	09/16/11	Note 4	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50
MW-26	09/16/11	Note 4	--	--	< 2.0	< 2.0	< 2.0	7	< 2.0	2.2	120	2.6	< 2.0	250	--	5.7	490	< 2.0
MW-29i	3/6/2001	30	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	3/7/2001	50	--	--	<0.50	--	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	3/8/2001	70	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	3/8/2001	90	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	3/12/2001	110	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	3/14/2001	130	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
MW-30i	2/6/2003	29	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	1.67	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	2/6/2003	45	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	4.91	<0.50	--	1.67	<0.50	<0.50	1.19	<0.50
	2/7/2003	65	--	--	<0.50	--	<0.50	0.7	<0.50	<0.50	6.42	<0.50	--	10.5	<0.50	<0.50	4.17	<0.50
	2/7/2003	65	--	--	<0.50	--	<0.50	0.74	<0.50	<0.50	6.47	<0.50	--	10.5	<0.50	<0.50	4.27	<0.50
	2/10/2003	85	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	2.83	<0.50	--	8.35	<0.50	<0.50	2.91	<0.50
	2/10/2003	105	--	--	<0.50	--	<0.50	0.65	<0.50	<0.50	6.12	<0.50	--	15.7	<0.50	<0.50	6.42	<0.50
	2/13/2003	125	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	1.74	<0.50	--	4.56	<0.50	<0.50	2.53	<0.50
	2/14/2003	145	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	1.1	<0.50	--	1.44	<0.50	<0.50	2.01	<0.50
	2/17/2003	165	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	0.65	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	2/19/2003	185	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
MW-31i	1/10/2003	28	--	--	<0.50	--	<0.50	9.1	<0.50	6.55	105	0.58	--	94.5	<0.50	4.38	167	<0.50
	1/10/2003	45	--	--	<0.50	--	<0.50	4.53	<0.50	3.34	59	0.62	--	72.1	<0.50	2.8	121	<0.50
	1/13/2003	65	--	--	<0.50	--	<0.50	2.41	<0.50	1.69	35.5	<0.50	--	72.5	<0.50	1.79	63.6	<0.50
	1/14/2003	85	--	--	<0.50	--	<0.50	2.25	<0.50	1.42	30.7	<0.50	--	108	<0.50	2.27	54	<0.50
	1/14/2003	85	--	--	<0.50	--	<0.50	2.29	<0.50	1.37	31.7	<0.50	--	109	<0.50	2.33	54.4	<0.50
	1/15/2003	105	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	3.18	<0.50	--	9.94	<0.50	<0.50	5.94	<0.50
	1/20/2003	125	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	0.53	<0.50	<0.50	<0.50	<0.50
	1/22/2003	145	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
MW-32i	7/8/2004	39	--	--	<0.50	--	<0.50	4.08	<0.50	2.27	56.5	1.3	--	129	<0.50	2.48	114	<0.50
	7/9/2004	60	--	--	<0.50	--	<0.50	5.91	<0.50	2.82	86.9	2.46	--	170	<0.50	3.52	133	<0.50
	7/9/2004	80	--	--	<0.50	--	<0.50	1.7	<0.50	0.74	22.6	<0.50	--	62.4	<0.50	1.29	37.7	<0.50
	7/12/2004	100	--	--	<0.50	--	<0.50	1.37	<0.50	0.64	16.8	<0.50	--	48.5	<0.50	1.08	31.4	<0.50
	7/12/2004	100	--	--	<0.50	--	<0.50	1.4	<0.50	0.66	16.3	<0.50	--	49.7	<0.50	1.18	31.2	<0.50
	7/14/2004	120	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	7/15/2004	140	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
MW-33i	7/26/2004	35	--	--	<0.50	--	<1.12	<0.50	<0.50	<0.50	<0.50	<0.50	--	0.67	<0.50	<0.50	0.56	<0.50
	7/27/2004	55	--	--	<0.50	--	<0.50	1.85	<0.50	0.84	21	<0.50	--	34.8	<0.50	0.65	25.5	<0.50
	7/27/2004	75	--	--	<0.50	--	<0.50	1.03	<0.50	0.50	12.4	<0.50	--	31.4	<0.50	0.82	19.7	<0.50
	7/27/2004	75	--	--	<0.50	--	<0.50	1.02	<0.50	<0.50	12.4	<0.50	--	31.9	<0.50	0.86	19.4	<0.50
	7/28/2004	95	--	--	<0.50	--	<0.50	0.81	<0.50	<0.50	9.29	<0.50	--	28	<0.50	0.85	18.5	<0.50
	7/28/2004	115	--	--	<0.50	--	<0.50	1.46	<0.50	0.64	13.8	<0.50	--	18.4	<0.50	1.01	20.1	<0.50
	7/29/2004	135	--	--	<0.50	--	<0.50	0.86	<0.50	0.51	8.64	<0.50	--	13.6	<0.50	0.73	15.5	<0.50
	8/3/2004	155	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	8/4/2004	175	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50

Please refer to notes at end of table.

Table 5
Depth-Discrete Groundwater Samples - Analytical Summary Tables
NuStar Vancouver Facility
Vancouver, Washington

Sample	Date Collected	Depth (fbgs)	Analyte Concentration in µg/L (ppb)															
			Benzene	2-Butanone (MEK)	Chlorobenzene	Chloroethane	Chloroform	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	1,2-DCP	PCE	Toluene	1,1,1-TCA	TCE	Vinyl chloride
MW-34i	9/17/2004	40	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
	9/21/2004	60	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	1.48	<0.50	--	6.21	<0.50	<0.50	2.1	<0.50
	9/22/2004	78	--	--	<0.50	--	<0.50	0.51	<0.50	<0.50	3.61	<0.50	--	11.2	<0.50	<0.50	4.6	<0.50
	9/28/2004	100	--	--	<0.50	--	<0.50	0.66	<0.50	<0.50	4.35	<0.50	--	11.4	<0.50	<0.50	5.13	<0.50
	9/28/2004	100	--	--	<0.50	--	<0.50	0.62	<0.50	<0.50	3.86	<0.50	--	11.3	<0.50	<0.50	5.06	<0.50
	9/30/2004	120	--	--	<0.50	--	<0.50	0.53	<0.50	<0.50	2.97	<0.50	--	6.94	<0.50	<0.50	3.51	<0.50
	10/4/2004	140	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	2.28	<0.50	<0.50	2.05	<0.50
	10/5/2004	160	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	0.65	<0.50	0.51	2.13	<0.50
	10/7/2004	180	--	--	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50	<0.50	<0.50	<0.50
SB-A-65	5/16/2008	66	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	1.45	<1.0	<1.0	5.48	1.09	<1.0	10.9	<1.0
SB-A-75	5/16/2008	76	10.2	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.40	9.35	<1.0	4.92	<1.0
SB-A-85	5/16/2008	86	3.99	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.57	<1.0	1.44	<1.0
SB-A-DUP	5/16/2008	76	10.2	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.65	9.17	<1.0	4.86	<1.0
SB-B-76	5/15/2008	76	6.72	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	13.7	<1.0	<1.0	8.87	7.55	<1.0	9.58	<1.0
SB-B-86	5/15/2008	86	6.68	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	26.4	<1.0	<1.0	6.68	6.34	<1.0	12.7	<1.0
SB-C-96	5/14/2008	96	3.32	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	12.0	<1.0	<2.0	15.7	3.58	<1.0	7.68	<2.0
SB-C-106	5/14/2008	106	12.8	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	9.92	<1.0	<2.0	7.22	11.2	<1.0	4.98	<2.0

Notes:

1. < = Not detected at or above the specified laboratory method reporting limit (MRL).
2. -- = Not Applicable or Not Analyzed.
3. DCA = Dichloroethane; DCE = Dichloroethene; DCP = Dichloropropane; PCE = Tetrachloroethene; TCA = Trichloroethane; TCE = Trichloroethene.
4. **Bold** values represent detected values above the method detection limit (MDL).
5. Screened interval for MW-26 is 27 to 42 fbgs; screened interval for MW-25i is 50 to 60 fbgs.
6. µg/L = micrograms per liter.
7. fbgs = feet below ground surface.

Table 6
Sediment Analytical Summary Table - VOCs
NuStar Vancouver Facility
Vancouver, Washington

Location ID	Sample Interval (below mudline)*	Date	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	Methylene Chloride	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	1,4-Dioxane	Total Organic Carbon
			Concentrations in mg/kg											
SS1(0-1)	0-1	11/7/2011	< 0.0050	< 0.00050	< 0.0050	0.0099	0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	1200
SS1(1-3.5)	1-3.5	11/7/2011	< 0.0050	< 0.00050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	31000
SS1(3.5-6)	3.5-6	11/7/2011	< 0.0050	0.01	< 0.0050	0.78	< 0.0050	2.0	< 0.0050	0.0072	0.17	0.13	NA	16000
SS2(0-1)	0-1	11/7/2011	< 0.030	< 0.030	< 0.030	0.29	< 0.030	5.4	< 0.030	< 0.030	0.56	< 0.030	NA	12000
SS2(1-3)	1-3	11/7/2011	< 0.0050	0.0019	< 0.0050	0.09	< 0.0050	1.1	< 0.0050	< 0.0050	0.12	< 0.0050	NA	870
SS2(3-5.5)	3-5.5	11/7/2011	< 0.0050	0.00063	< 0.0050	0.028	< 0.0050	0.14	< 0.0050	< 0.0050	0.026	< 0.0050	NA	3100
SS3(0-1)	0-1	11/7/2011	< 0.050	0.084	< 0.050	2.8	< 0.050	9.2	< 0.050	< 0.050	1.9	< 0.050	NA	9300
SS3(1-3)	1-3	11/7/2011	0.015	0.027	0.011	0.04	< 0.0050	1.1	< 0.0050	0.007	0.078	0.046	NA	2400
SS3(3-5.5)	3-5.5	11/7/2011	0.016	0.047	0.015	0.78	< 0.0050	0.33	< 0.0050	0.01	0.2	0.083	NA	ND
SS4 (0-1)	0-1	11/08/2011	< 0.0050	0.013	< 0.0050	0.14	< 0.0050	0.034	< 0.0050	< 0.0050	0.018	0.038	NA	2800
SS4 (1-3.5)	1-3.5	11/08/2011	0.005	0.017	0.0082	1.00	< 0.0050	0.88	< 0.0050	< 0.0050	0.28	0.0069	NA	770
SS4 (3.5-5.5)	3.5-5.5	11/08/2011	0.01	0.018	0.014	0.42	< 0.0050	1.3	< 0.0050	0.019	0.32	0.018	NA	1300
SS6 (0-1)	0-1	11/08/2011	< 0.0050	< 0.0050	< 0.0050	0.043	< 0.0050	1.0	< 0.0050	< 0.0050	0.27	< 0.0050	NA	8900
SS6 (1-2.5)	1-2.5	11/08/2011	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	930
SS6 (1-2.5) DUP	1-2.5	11/8/2011	< 0.0050	< 0.0050	< 0.0050	< 0.0050	0.0057	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	--
SS7(0-1)	0-1	11/7/2011	< 0.0050	0.0013	< 0.0050	0.024	< 0.0050	1.8	0.0058	< 0.0050	0.35	< 0.0050	NA	8300
SS7(1-2.0)	1-2	11/7/2011	< 0.0050	< 0.00050	< 0.0050	< 0.0050	< 0.0050	0.007	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	730
SS7(1-2.0) DUP	1-2	11/7/2011	< 0.0050	< 0.00050	< 0.0050	< 0.0050	< 0.0050	0.009	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	--
			Concentrations in mg/kg (reported as dry weight)											
Loc A-Mudline	0-0.5	7/23/2012	<0.0050	<0.0050	<0.0050	0.0054	<0.0050	0.42	NA	<0.0050	0.14	<0.0050	NA	5,800
Loc A-1.5'	1-2	7/23/2012	<0.030	<0.030	<0.030	0.16	<0.030	3.3	NA	<0.030	3.4	<0.030	NA	9,900
Loc A-3'	2.5-3.5	7/23/2012	<0.030	<0.030	<0.030	0.062	<0.030	3.2	NA	<0.030	1.5	<0.030	NA	5,200
Loc B-Mudline	0-0.5	7/24/2012	<0.020	<0.020	<0.020	<0.020	<0.020	0.47	NA	<0.020	0.045	<0.020	NA	8,200
Loc B-1.5'	1-2	7/24/2012	<0.020	<0.020	<0.020	<0.020	<0.020	0.88	NA	<0.020	0.088	<0.020	NA	1,100
Loc C-Mudline	0-0.5	7/24/2012	<0.040	<0.040	<0.040	0.11	<0.040	11	NA	<0.040	0.52	<0.040	<0.25	24,000
Loc C-1.5'	1-2	7/24/2012	<0.0050	<0.0050	<0.0050	0.012	<0.0050	0.094	NA	<0.0050	0.014	<0.0050	<0.0057	<580
Loc C-3.5'	3-4	7/24/2012	<0.020	<0.020	<0.020	0.11	<0.020	0.54	NA	<0.020	0.092	<0.020	<0.15	<620
Loc C-5'	4.5-5.5	7/24/2012	<0.20	1.0	1.2	75	<0.20	<0.20	NA	0.66	<0.20	0.62	<0.90	11,000

Please refer to notes at end of table.

Table 6
Sediment Analytical Summary Table - VOCs
NuStar Vancouver Facility
Vancouver, Washington

Location ID	Sample Interval (below mudline)*	Date	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	Methylene Chloride	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	1,4-Dioxane	Total Organic Carbon
			Concentrations in mg/kg											
Loc D-Mudline	0-0.5	7/25/2012	<0.060	<0.060	<0.060	0.3	<0.060	13	NA	<0.060	2.0	<0.060	NA	2,400
Loc D-1.5'	1-2	7/25/2012	<0.020	<0.020	<0.020	0.21	<0.020	4.9	NA	<0.020	0.94	<0.020	NA	3,300
Loc D-1.5' DUP	1-2	7/25/2012 DUP	<0.020	<0.020	<0.020	0.12	<0.020	2.2	NA	<0.020	0.47	<0.020	NA	3,500
Loc D-3.5'	3-4	7/25/2012	<0.020	<0.020	<0.020	0.10	<0.020	2.7	NA	<0.020	0.42	<0.020	NA	3,700
Loc E-Mudline	0-0.5	7/25/2012	< 0.0050	<0.0050	< 0.0050	<0.0050	< 0.0050	<0.0050	NA	< 0.0050	<0.0050	< 0.0050	NA	18,000
Loc E-2'	1.5-2.5	7/25/2012	< 0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	NA	<0.0050	<0.0050	<0.0050	NA	16,000
Loc E-4'	3.5-4.5	7/25/2012	<0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	NA	<0.0050	<0.0050	<0.0050	NA	25,000
Loc E-6'	5.5-6.5	7/25/2012	< 0.0050	<0.0050	< 0.0050	<0.0050	< 0.0050	<0.0050	NA	< 0.0050	<0.0050	< 0.0050	NA	44,000
Loc F-Mudline	0-0.5	7/24/2012	< 0.0050	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	NA	<0.0050	<0.0050	< 0.0050	NA	18,000
Loc F-2'	1.5-2.5	7/24/2012	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	NA	<0.0050	<0.0050	<0.0050	NA	4,100
Loc F-3.5'	3-4	7/24/2012	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	NA	<0.0050	<0.0050	<0.0050	NA	3,000
Loc G-Mudline	0-0.5	7/23/2012	< 0.0050	0.0057	< 0.0050	0.14	< 0.0050	0.058	NA	< 0.0050	0.11	< 0.0050	NA	8,300
Log G-1.5'	1-2	7/23/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	0.0051	< 0.0050	NA	620
Loc H-Mudline	0-0.5	7/23/2012	< 0.0050	< 0.0050	< 0.0050	0.0091	< 0.0050	0.0067	NA	< 0.0050	< 0.0050	< 0.0050	NA	1,300
Loc H-Mudline DUP	0-0.5	7/23/2012 DUP	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	< 0.0050	< 0.0050	NA	1,500
Loc H-1.5	1-2	7/23/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	< 0.0050	< 0.0050	NA	1,000
Loc H-3.5	3-4	7/23/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	< 0.0050	< 0.0050	NA	<570
Loc H-5.5	5-6	7/23/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	< 0.0050	< 0.0050	NA	<520
Loc I-Mudline	0-0.5	7/26/2012	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	NA	<0.0050	<0.0050	<0.0050	NA	5,300
Loc I-2'	1-5-2.5	7/26/2012	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	NA	<0.0050	<0.0050	<0.0050	NA	4,800
Loc. 8 - Mudline	0-0.5	11/12/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	0.01	< 0.0050	NA	28,000
Loc. 8 - (1.5')	1-2	11/12/2002	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	< 0.0050	< 0.0050	NA	1,200
Loc. 8 - (4')	3.5-'4.5	11/12/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	< 0.0050	< 0.0050	NA	750
Loc. 9 - Mudline	0-0.5	11/12/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	0.048	NA	< 0.0050	0.096	< 0.0050	NA	4,900
Loc. 9 - (1.5)'	1-2	11/12/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	0.016	NA	< 0.0050	0.036	< 0.0050	NA	1,400
Loc. 9 - (1.5)' Duplicate	1'-2	11/12/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	< 0.0050	< 0.0050	NA	980
Loc. 9 - (3.5')	3-4	11/12/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	0.024	NA	< 0.0050	0.049	< 0.0050	NA	870
Loc. 9 - (6.0')	5.5-6.5	11/12/2012	< 0.0050	0.0075	< 0.0050	0.02	< 0.0050	< 0.0050	NA	< 0.0050	0.03	< 0.0050	NA	13,000

Please refer to notes at end of table.

Table 6
Sediment Analytical Summary Table - VOCs
NuStar Vancouver Facility
Vancouver, Washington

Location ID	Sample Interval (below mudline)*	Date	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	Methylene Chloride	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	1,4-Dioxane	Total Organic Carbon
			Concentrations in mg/kg											
Loc. 12 - Mudline	0-0.5	11/15/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	< 0.0050	< 0.0050	NA	870
Loc. 12 - (1')	1-1.75	11/15/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	< 0.0050	< 0.0050	NA	5,700
"No Effects" Level - Minimum of Benchmarks			0.03	0.02	0.02	0.2	0.018	0.5	NA	0.7	0.1	0.01	NA	NA
"Minor Effects" Level - Maximum of benchmarks			0.2	15	0.03	1	3.9	1	NA	1.1	1.6	0.1	NA	NA

Notes:

1. NA = Not applicable or not available.
2. mg/ kg = Milligrams per kilogram.
3. VOCs = Volatile Organic Compounds
4. * = During July and November 2012 sampling events, the sample depth was logged as a discrete point.
   The tabulated sample interval includes the one foot of core surrounding the sample point and is determined by the required sample volume for analysis.

Table 7
Vault Area Soil Analytical Results: TPH and VOCs
NuStar Vancouver Terminal
Vancouver, Washington

Analyte	Sample
	Soil@JP-8 Vault-E (11/01/2011)
	Concentration in mg/Kg
Diesel Range Organics (DRO)	**3,100**
Residual Range Organics (RRO)	<1,100
Volatile Organic Compounds (VOCS)	
1,1,1,2-Tetrachloroethane	<0.0053
1,1,1-Trichloroethane (TCA)	<0.0053
1,1,2,2-Tetrachloroethane	<0.0053
1,1,2-Trichloroethane	<0.0053
1,1-Dichloroethane	<0.0053
1,1-Dichloroethene	<0.0053
1,1-Dichloropropene	<0.0053
1,2,3-Trichlorobenzene	<0.022
1,2,3-Trichloropropane	<0.0053
1,2,4-Trichlorobenzene	<0.022
1,2,4-Trimethylbenzene	<0.022
1,2-Dibromo-3-chloropropane	<0.022
1,2-Dibromoethane (EDB)	<0.022
1,2-Dichlorobenzene	<0.0053
1,2-Dichloroethane (EDC)	<0.0053
1,2-Dichloropropane	<0.0053
1,3,5-Trimethylbenzene	<0.022
1,3-Dichlorobenzene	<0.0053
1,3-Dichloropropane	<0.0053
1,4-Dichlorobenzene	<0.0053
2-Butanone (MEK)	<0.022
2-Chlorotoluene	<0.022
2-Hexanone	<0.022
2,2-Dichloropropane	<0.0053
4-Chlorotoluene	<0.022
4-Isopropyltoluene	<0.022
4-Methyl-2-pentanone (MIBK)	<0.022
Acetone	<0.022
Benzene	<0.0053
Bromobenzene	<0.0053
Bromochloromethane	<0.0053
Bromodichloromethane	<0.0053
Bromoform	<0.0053
Bromomethane	<0.0053
Carbon Disulfide	<0.0053
Carbon Tetrachloride	<0.0053
Chlorobenzene	<0.0053
Chloroethane	<0.0053
Chloroform	<0.0053
Chloromethane	<0.0053
cis-1,2-Dichloroethene	<0.0053
cis-1,3-Dichloropropene	<0.0053
Dibromochloromethane	<0.0053
Dibromomethane	<0.0053
Dichlorodifluoromethane	<0.0053
Ethylbenzene	<0.0053
Hexachlorobutadiene	<0.022
Isopropylbenzene	<0.022
Methylene Chloride	<0.011
Naphthalene	<0.022
n-Butylbenzene	<0.022
n-Propylbenzene	<0.022
o-Xylene	<0.0053
m,p-Xylene	<0.0053
sec-Butylbenzene	<0.022
Styrene	<0.0053
tert-Butylbenzene	<0.022
Tetrachloroethene (PCE)	<0.0053
Toluene	<0.0053
trans-1,2-Dichloroethene	<0.0053
trans-1,3-Dichloropropene	<0.0053
Trichloroethene (TCE)	<0.0053
Trichlorofluoromethane	<0.0053
Vinyl Chloride	<0.0053

Notes:
1. **Bold** = Detected concentration.
2. mg/kg (ppm) = Milligrams per kilogram (parts per million).

Table 8
Vault Area Soil Analytical Results: PAHs and TTEC Evaluation
NuStar Vancouver Terminal
Vancouver, Washington

Analyte	Sample
	Soil@JP-8 Vault-E (11/01/2011)
	Concentration in mg/Kg
Polycyclic Aromatic Hydrocarbons (PAHs)	
Acenaphthene	0.190
Acenaphthylene	0.028
Anthracene	0.590
Benzo(a)anthracene	1.400
Benzo(b)fluoranthene	1.400
Benzo(k)fluoranthene	0.590
Benzo(a)pyrene	1.300
Benzo(g,h,i)perylene	1.100
Chrysene	1.900
Dibenz(a,h)anthracene	0.160
Fluoranthene	2.400
Fluorene	0.200
Indeno(1,2,3-c,d)pyrene	0.980
Naphthalene	0.042
Phenanthrene	1.300
Pyrene	2.700
2-Methylnapthalene	0.054
Dibenzofuran	0.072

Notes:

1. mg/kg (ppm) = Milligrams per kilogram (parts per million).
2. TEF = Toxic Equivalency Factor
3. TTEC = Total toxicity equivalent concentration.

PAH	Concentration (mg/kg)	TEF (unitless)	Toxicity Equivalent Soil Concentration (mg/kg)
Benzo(a)pyrene	1.3	1	1.3
Benzo(a)anthracene	1.4	0.1	0.14
Benzo(b)fluoranthene	1.4	0.1	0.14
Benzo(k)fluoranthene	0.59	0.1	0.059
Chrysene	1.9	0.01	0.019
Dibenzo(a,h)anthracene	0.16	0.1	0.016
Indeno(1,2,3-cd)pyrene	0.98	0.1	0.098
		TTEC=	1.772

The Method A Cleanup value for the reference chemical benzo(a) pyrene is 2.0 mg/kg.

Table 9
Vault Area - Groundwater Analytical Results
NuStar Vancouver Facility
Vancouver, Washington

Well Number:	MW-2		MW-6		EW-1	
Sample Date:	7/24/2012	9/13/2012	7/24/2012	9/13/2012	7/24/2012	9/13/2012
Analyte	Concentrations in µg/L (ppb)					
PAHs by EPA 8270C SIM						
1-Methylnaphthalene	<0.20	--	<0.20	--	<0.20	--
2-Methylnaphthalene	<0.20	--	<0.20	--	<0.20	--
Acenaphthene	<0.20	--	0.22	--	<0.20	--
Acenaphthylene	<0.20	--	<0.20	--	<0.20	--
Anthracene	<0.20	--	<0.20	--	<0.20	--
Benzo(a)anthracene	<0.20	--	<0.20	--	<0.20	--
Benzo(a)pyrene	<0.20	--	<0.20	--	<0.20	--
Benzo(b)fluoranthene	<0.20	--	<0.20	--	<0.20	--
Benzo(g,h,i)perylene	<0.20	--	<0.20	--	<0.20	--
Benzo(k)fluoranthene	<0.20	--	<0.20	--	<0.20	--
Chrysene	<0.20	--	<0.20	--	<0.20	--
Dibenzo(a,h)anthracene	<0.20	--	<0.20	--	<0.20	--
Fluoranthene	<0.20	--	<0.20	--	<0.20	--
Fluorene	<0.20	--	<0.20	--	<0.20	--
Indeno(1,2,3-cd)pyrene	<0.20	--	<0.20	--	<0.20	--
Naphthalene	<0.20	--	<0.20	--	<0.20	--
Phenanthrene	<0.20	--	<0.20	--	<0.20	--
Pyrene	<0.20	--	<0.20	--	<0.20	--
Petroleum Hydrocarbons by NWTPH-Dx						
Diesel Range Organics (Silica Gel)	950 x	730 x	<250	<250	<250	<250
Motor Oil Range Organics (Silica Gel)	1000 x	770x	<500	<500	<500	<500

Notes:

1. µg/L (ppb) = Micrograms per liter (parts per billion).
2. x = The chromatographic pattern is consistent with lubrication range hydrocarbons and not of jet fuel range hydrocarbons.
3. -- = Not analyzed.

Table 10
Screening for Chemicals of Potential Concern
NuStar Terminals Services, Inc. Vancouver Facility

Chemicals of Interest	Detection Frequency			Detection Limit Range		COPC Screening					COPCs	Comments
	Det.	/ Total	%	Min.	Max.	SL	Max.	Risk Ratio	Risk Ratio > 1?	% Potential Risk		
Volatile Organic Compounds	Detected in Soil (mg/Kg; Human Health Comparison)											
cis-1,2-Dichloroethene	4	/ 100	4%	0.0005	4.78	8.0E+02	1.3E-01	1.7E-04	No	0.00%	Y	Retained because COPC in gw
Tetrachloroethene (PCE)	64	/ 100	64%	0.0005	0.228	1.9E+00	1.3E+03	6.9E+02	Yes	99.73%	Y	
1,1,1-Trichloroethane	65	/ 121	54%	0.0005	4.78	7.2E+04	2.0E-01	2.8E-06	No	0.00%	N	Low % risk
Trichloroethene (TCE)	81	/ 122	66%	0.0005	4.78	2.5E+00	4.7E+00	1.9E+00	Yes	0.27%	Y	
							Sum Risk Ratio	7.0E+02				
Volatile Organic Compounds	Detected in Groundwater (µg/L; Human Health Comparison)											
Benzene	18	/ 53	34%	1	1	8.0E-01	1.3E+01	1.6E+01	Yes	0.02%	N	Not detected in wells; low % risk
Bromoform	13	/ 1702	1%	0.5	5000	5.5E+00	2.0E+02	3.5E+01	Yes	0.04%	N	Low detect. frequency; low % risk
2-Butanone (MEK)	1	/ 53	2%	10	10	4.8E+03	7.4E+01	1.5E-02	No	0.00%	N	Low detect. frequency; low % risk
Chlorobenzene	1	/ 69	1%	0.5	25	1.6E+02	5.2E+00	3.3E-02	No	0.00%	N	Low detect. frequency; low % risk
Chloroethane	101	/ 1751	6%	0.5	25000	2.1E+04	1.9E+03	9.0E-02	No	0.00%	N	Low % risk
Chloroform	62	/ 1975	3%	0.2	2500	8.0E+01	1.4E+01	1.8E-01	No	0.00%	N	Low detect. frequency; low % risk
Dibromochloromethane	3	/ 1719	0%	0.2	2500	5.2E-01	3.9E+01	7.5E+01	Yes	0.08%	N	Low detect. frequency; low % risk
1,2-Dibromoethane	3	/ 1593	0%	0.2	2500	2.2E-02	5.9E+01	2.7E+03	Yes	2.78%	N	Low detect. Frequency
1,1-Dichloroethane	1133	/ 2023	56%	0.2	2500	1.6E+03	8.1E+02	5.0E-01	No	0.00%	N	Low % risk
1,2-Dichloroethane	110	/ 2009	5%	0.2	2500	4.8E-01	6.5E+01	1.4E+02	Yes	0.14%	Y	
1,1-Dichloroethene	611	/ 2018	30%	0.2	2500	4.0E+02	1.6E+02	4.1E-01	No	0.00%	N	Low % risk
cis-1,2-Dichloroethene	1724	/ 2048	84%	0.2	2500	1.6E+01	1.6E+04	9.8E+02	Yes	1.01%	Y	
trans-1,2-Dichloroethene	511	/ 2027	25%	0.2	2500	1.6E+02	3.5E+02	2.2E+00	Yes	0.00%	N	Low % risk
1,2-Dichloropropane	53	/ 1740	3%	0.2	2500	3.8E-01	1.7E+01	4.5E+01	Yes	0.05%	N	Low detect. frequency; low % risk
cis-1,3-Dichloropropene	1	/ 1525	0%	0.2	2500	4.4E-01	1.1E+00	2.5E+00	Yes	0.00%	N	Low detect. frequency; low % risk
Tetrachloroethene (PCE)	1761	/ 2036	86%	0.2	50	2.1E+01	1.5E+05	7.3E+03	Yes	7.49%	Y	
Toluene	21	/ 125	17%	0.5	1	6.4E+02	1.1E+01	1.8E-02	No	0.00%	N	Low % risk
1,1,1-Trichloroethane	926	/ 2027	46%	0.5	5000	1.6E+04	5.2E+03	3.2E-01	No	0.00%	N	Low % risk
Trichloroethene (TCE)	1757	/ 2045	86%	0.2	50	5.4E-01	2.2E+04	4.0E+04	Yes	41.08%	Y	
Trichlorofluoromethane	3	/ 887	0%	0.2	2500	2.4E+03	5.7E+00	2.4E-03	No	0.00%	N	Low detect. frequency; low % risk
Vinyl chloride	553	/ 1884	29%	0.1	2500	2.9E-02	1.3E+03	4.6E+04	Yes	47.32%	Y	
							Sum Risk Ratio	9.7E+04				

Notes:

1. SL = Screening Level. Human health: Method B Standard Formula Value from CLARC database.
2. COPC = Chemical of Potential Concern.
3. Risk Ratio = Max./SL
4. % Potential Risk = Individual chemical risk ratio divided by sum of the risk ratios.
5. Total number of samplese for trichlorofluromethane not updated since 2008 RI Report submittal; however, the compound has not been detected in samples since that time and the % risk for that compound is negligable.

Table 11
Revisions to PCE and TCE Human Health Cleanup Levels
NuStar Vancouver Main Terminal

Changes in Cancer Potency Factors

	Cancer Potency Factors			
	Oral		Inhalation	
	BRA	Revised	BRA	Revised
Tetrachloroethene	0.54	0.0021	0.021	0.00091
Trichloroethene	0.4	0.046	0.4	0.0144

Changes in Cleanup Levels

	PCE Cleanup Level			TCE Cleanup Level		
	BRA	Revised	Change Ratio (Revised:BRA)	BRA	Revised	Change Ratio (Revised:BRA)
Industrial - Soil Direct Contact (mg/kg)[1]	100	26,000	260	140	1,200	8.7
Construction Worker - Soil Direct Contact (mg/kg)[2]	2,000	520,000	260	2,700	24,000	8.7
Excavation Worker - Soil Direct Contact (mg/kg)[3]	20,000	5,200,000	260	27,000	240,000	8.7
Industrial - Air (µg/m3)[4]	4.2	96	23	0.22	6.1	28
Construction Worker - Air (µg/m3)[5]	125	2,900	23	6.6	180	28
Excavation Worker - Air (µg/m3)[6]	1,250	29,000	23	66	1,800	28
Industrial - Potable Use of Groundwater (µg/L)[7]	2.3	600	260	3.1	27	8.7
Residential - Potable Use of Groundwater (µg/L)[8]	0.081	21	260	0.11	0.95	8.7

Notes:

1. Method C modified to include dermal contact, Eqns 745-4 and 745-5, WAC 173-340-745(5)(c)(iii).
2. Method C modified to include dermal contact, Eqns 745-4 and 745-5, WAC 173-340-745(5)(c)(iii), except that exposure duration (ED) reduced from 20 years to 1 year.
3. Method C modified to include dermal contact, Eqns 745-4 and 745-5, WAC 173-340-745(5)(c)(iii), except that exposure duration (ED) reduced from 20 years to 0.1 year.
4. Method C, standard formula, Ecology CLARC database.
5. Method C, standard formula, except that exposure duration (ED) reduced from 6 years to 1 year for noncarcinogens and from 30 years to 1 year for carcinogens.
6. Method C, standard formula, except that exposure duration (ED) reduced from 6 years to 0.1 year for noncarcinogens and from 30 years to 0.1 year for carcinogens.
7. Method C, standard formula, except that: noncarcinogen body weight increased from 16 to 70 kg and intake reduced from 1L/day to 0.7 L/day; carcinogen intake reduced from 2 L/day to 0.7 L/day.
8. Method B, standard formula, Ecology CLARC database. Leaching to groundwater pathway assessed to protect potable use of groundwater.
9. mg/kg = Milligrams per kilogram.
10. µg/L = Micrograms per liter.
11. $\mu g/m^3$ = Micrograms per cubic meter.

Table 12
Comparison of Co-Located Soil Samples in SVE Treatment Area
NuStar Vancouver Facility
Vancouver, Washington

Location	Sample ID	Collection Date	Sample Depth (feet)	Concentration in µg/kg	
				Tetrachloroethene	Trichloroethene
AGP-22/CB-4	AGP-22-18	5/2/2006	18	41,700	2180
	CB-4 (18)	9/21/2010	18	2,000	<5
		Concentration Change		-95%	-100%
AGP-28/CB-1	AGP-28-9	5/3/2006	9	59,300	536
	CB-1(9)	9/20/2010	9	6,700,000	<4,000
		Concentration Change		11000%	--
	AGP-28-17.5	5/3/2006	17.5	65,200	1870
	CB-1(17.5)	9/20/2010	17.5	10,000	93
		Concentration Change		-85%	-95%
AGP-29/CB-2	AGP-29-9.5	5/4/2006	9.5	1,320,000	<4780
	CB-2 (9.5)	9/20/2010	9.5	130,000	<40
		Concentration Change		-90%	--
	AGP-29-18	5/4/2006	18	14,900	<93
	CB-2 (18)	9/20/2010	18	19	<5
		Concentration Change		-100%	--

Notes:

1. Concentrations in micrograms per kilogram (µg/kg), parts per billion (ppb).
2. < = Not detected at corresponding numerical limit.
3. -- = One of more values non-detect preventing accurate calculation.

Table 13
Summary of Groundwater EPCs
NuStar Vancouver Main Terminal

Location	Chemical	Baseline Risk Assessment (November 2005 through June 2008)[1] Concentration (µg/L) Mean	Maximum	95% UCL	EPC CT	EPC RME	Updated Risk Evaluation (March 2010 through December 2012)[2] Non-Parametric Data Distribution	Concentration (µg/L) Mean of Detects	Maximum	95% UCL	EPC CT	EPC RME	RME EPC Reduction Factor (Ratio of Baseline:Update)
On-Property, Shallow	cis-1,2-Dichloroethene	1200	14000	25000	1200	14,000	97.5%KM(Cheb)	940	12,000	1,600	940	1,600	8.8
	Tetrachloroethene (PCE)	2500	32000	8700	2600	8,700	97.5%KM(Cheb)	610	6,800	1,000	610	1,000	8.7
	Trichloroethene (TCE)	400	2400	520	400	520	97.5%KM(Cheb)	270	1,900	410	270	410	1.3
	Vinyl chloride	48	620	150	48	150	97.5%KM(Cheb)	97	1,100	120	97	120	1.3
Off-Property, Shallow	Tetrachloroethene (PCE)	50	550	330	50	330	97.5%KM(Cheb)	110	320	150	110	150	2.2
	Tricholroethene (TCE)	180	1800	430	180	430	97.5%KM(Cheb)	310	1,300	400	310	400	1.1
On-Property, Shallow and Intermediate	1,2-Dichloroethane	7.6	16	19	7.6	16	95%KM(t)	1.1	2.6	0.57	1.1	0.57	28
	cis-1,2-Dichloroethene	760	14000	2300	760	2,300	97.5%KM(Cheb)	540	12,000	980	540	980	2.3
	Tetrachloroethene (PCE)	1500	32000	4700	1500	4,700	97.5%KM(Cheb)	370	6,800	630	370	630	7.5
	Trichloroethene (TCE)	250	2400	600	250	600	97.5%KM(Cheb)	158	1,900	260	158	260	2.3
	Vinyl chloride	29	620	92	29	92	95%KM(Cheb)	71	1,100	58	71	58	1.6
Off-Property, Shallow and Intermediate	Tetrachloroethene (PCE)	42	550	190	42	190	97.5%KM(Cheb)	63	320	87	63	87	2.2
	Trichloroethene (TCE)	100	1800	600	100	600	97.5%KM(Cheb)	170	1,300	230	170	230	2.6

Notes:

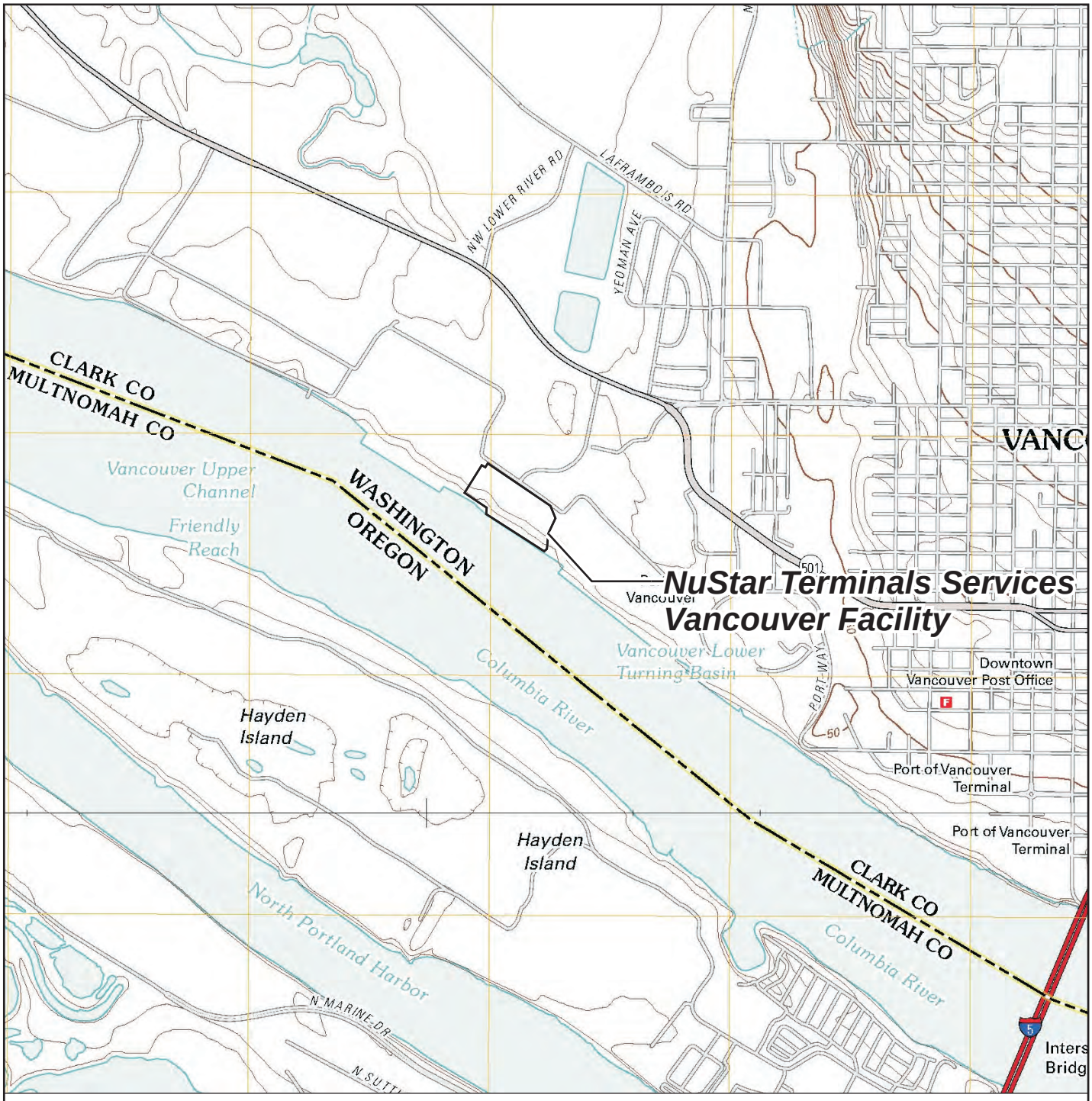
1. From Baseline Risk Assessment (Ash Creek, 2008).
2. See Appendix AD for list of data used and UCL statistical calculations.
3. EPC = Exposure Point Concentration.
4. UCL = Upper Confidence Limit of the mean.
5. CT = Central Tendency.
6. RME = Reasonable Maximum Exposure.
7. µg/L = Micrograms per liter.
8. na = Not applicable.
9. On-Property, shallow wells: MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, MW-8, MW-9, MW-10, MW-12, MW-13, MW-15, MW-16, MW-19, EW-1, EX, IW, MP-1, MP-2, MP-3, MP-4, MGMS1-43, MGMS2-40, and MGMS3-40.
10. Off-Property, shallow wells: S-2, MW-C, MW-F, MW-2, MW-6, MW-10, MW-14, MW-15, MW-17, MW-26, and MW-32s
11. On-Property, all wells: MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, MW-8, MW-9, MW-10, MW-12, MW-13, MW-15, MW-16, MW-18i, MW-19, MW-19i, MW-20i, MW-21i-40, MW-21i-105, MW-22i, MW-24i, EW-1, EX, IW, MP-1, MP-2, MP-3, MP-4, MGMS1-43, MGMS1-60, MGMS1-110, MGMS2-40, MGMS2-60, MGMS2-110, MGMS2-132, MGMS3-40, MGMS3-60, MGMS3-101, and MGMS3-132.
12. Off-Property, all wells: S-1, S-2, MW-C, MW-F, MW-2, MW-6, MW-10, MW-14, MW-15, MW-17, MW-23i, MW-25i, MW-26, MW-30i, MW-31i, MW-32s, and MW-32

Table 14
Surface Sediment Ecological Screening
NuStar Vancouver Facility
Vancouver, Washington

Location ID	Sample Interval (below mudline)	Date	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	Methylene Chloride	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	Trichloroethene	Vinyl Chloride	Total Organic Carbon
			Concentrations in mg/kg (wet weight)										
SS1(0-1)	0-1	11/7/2011	< 0.0050	< 0.00050	< 0.0050	0.0099	0.005	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	1200
SS2(0-1)	0-1	11/7/2011	< 0.030	< 0.030	< 0.030	0.29	< 0.030	5.4	< 0.030	< 0.030	0.56	< 0.030	12000
SS3(0-1)	0-1	11/7/2011	< 0.050	0.084	< 0.050	2.8	< 0.050	9.2	< 0.050	< 0.050	1.9	< 0.050	9300
SS4 (0-1)	0-1	11/08/2011	< 0.0050	0.013	< 0.0050	0.14	< 0.0050	0.034	< 0.0050	< 0.0050	0.018	0.038	2800
SS6 (0-1)	0-1	11/08/2011	< 0.0050	< 0.0050	< 0.0050	0.043	< 0.0050	1.0	< 0.0050	< 0.0050	0.27	< 0.0050	8900
SS7(0-1)	0-1	11/7/2011	< 0.0050	0.0013	< 0.0050	0.024	< 0.0050	1.8	0.0058	< 0.0050	0.35	< 0.0050	8300
			Concentrations in mg/kg (dry weight)										
Loc A-Mudline	0-0.5	7/23/2012	<0.0050	<0.0050	<0.0050	0.0054	<0.0050	0.42	NA	<0.0050	0.14	<0.0050	5,800
Loc B-Mudline	0-0.5	7/24/2012	<0.020	<0.020	<0.020	<0.020	<0.020	0.47	NA	<0.020	0.045	<0.020	8,200
Loc C-Mudline	0-0.5	7/24/2012	<0.040	<0.040	<0.040	0.11	<0.040	11	NA	<0.040	0.52	<0.040	24,000
Loc D-Mudline	0-0.5	7/25/2012	<0.060	<0.060	<0.060	0.3	<0.060	13	NA	<0.060	2.0	<0.060	2,400
Loc E-Mudline	0-0.5	7/25/2012	< 0.0050	<0.0050	< 0.0050	<0.0050	< 0.0050	<0.0050	NA	< 0.0050	<0.0050	< 0.0050	18,000
Loc F-Mudline	0-0.5	7/24/2012	< 0.0050	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	NA	<0.0050	<0.0050	< 0.0050	18,000
Loc G-Mudline	0-0.5	7/23/2012	< 0.0050	0.0057	< 0.0050	0.14	< 0.0050	0.058	NA	< 0.0050	0.11	< 0.0050	8,300
Loc H-Mudline	0-0.5	7/23/2012	< 0.0050	< 0.0050	< 0.0050	0.0091	< 0.0050	0.0067	NA	< 0.0050	< 0.0050	< 0.0050	1,300
Loc I-Mudline	0-0.5	7/26/2012	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	NA	<0.0050	<0.0050	<0.0050	5,300
Loc. 8 - Mudline	0-0.5	11/12/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	0.01	< 0.0050	28,000
Loc. 9 - Mudline	0-0.5	11/12/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	0.048	NA	< 0.0050	0.096	< 0.0050	4,900
Loc. 12 - Mudline	0-0.5	11/15/2012	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	< 0.0050	< 0.0050	< 0.0050	870
"No Effects" Level - Minimum of Benchmarks			0.03	0.02	0.02	0.2	0.018	0.5	0.01	0.7	0.1	0.01	NA
"Minor Effects" Level - Maximum of benchmarks			0.2	15	0.03	1	3.9	1	1.22	1.1	1.6	0.1	NA

Notes:

1. NA = Not analyzed or not applicable
2. Bold = Detected
   Box = Above No-Effects Level
   Box/Shade = Above Minor-Effects Level
3. mg/ kg = Milligrams per kilogram
4. VOCs = Volatile organic compounds



Note: Base map prepared from USGS 7.5-minute quadrangles of Vancouver, WA-OR and Portland, OR-WA, dated 2011 as provided by USGS.gov.

0 2,000 4,000

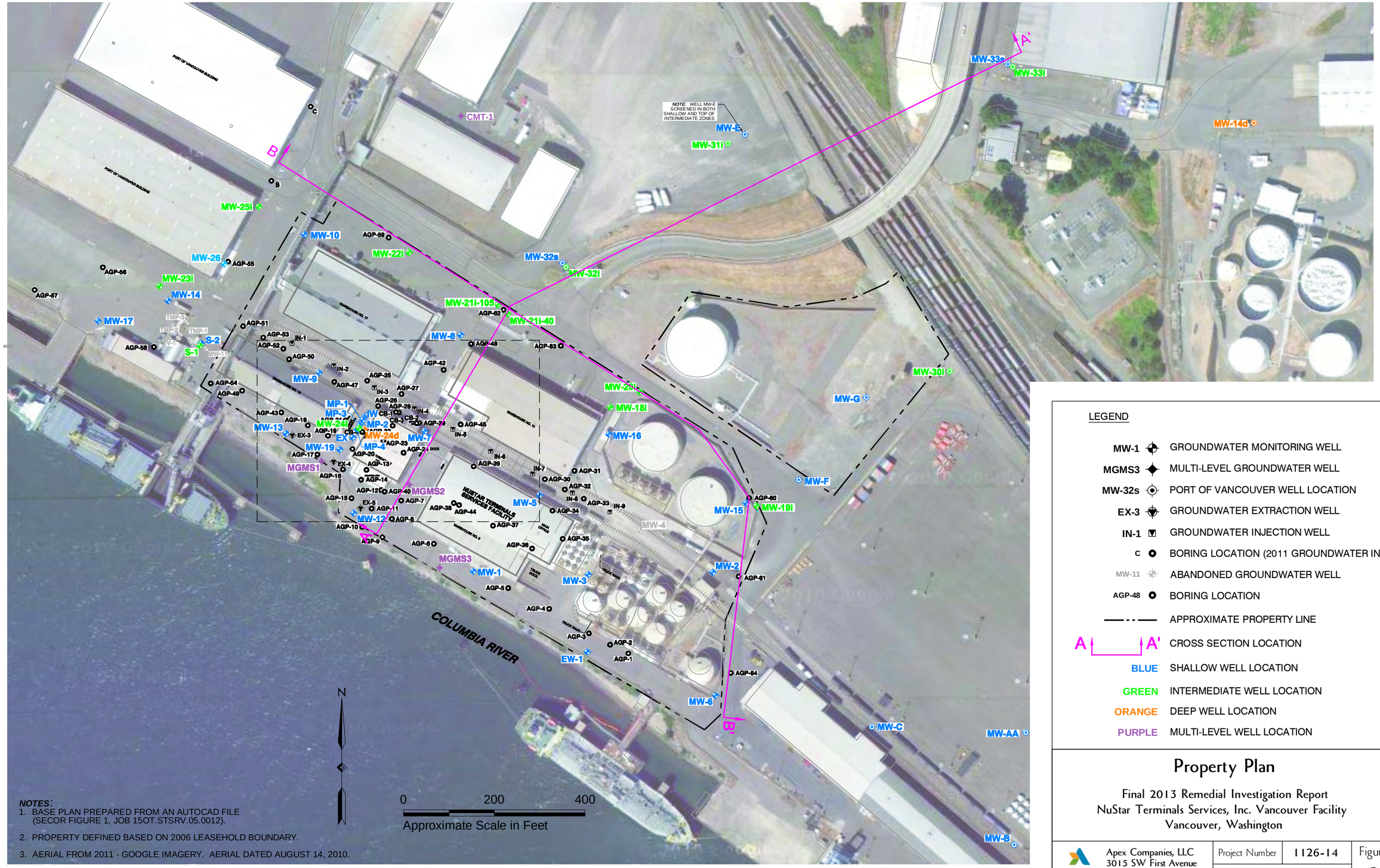
Approximate Scale in Feet

N

Property Location Map

Final 2013 Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Apex Companies, LLC 3015 SW First Avenue Portland, Oregon 97201	Project Number	1126-14	Figure 1
	August 2013		



NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. AERIAL FROM 2011 - GOOGLE IMAGERY. AERIAL DATED AUGUST 14, 2010.

LEGEND

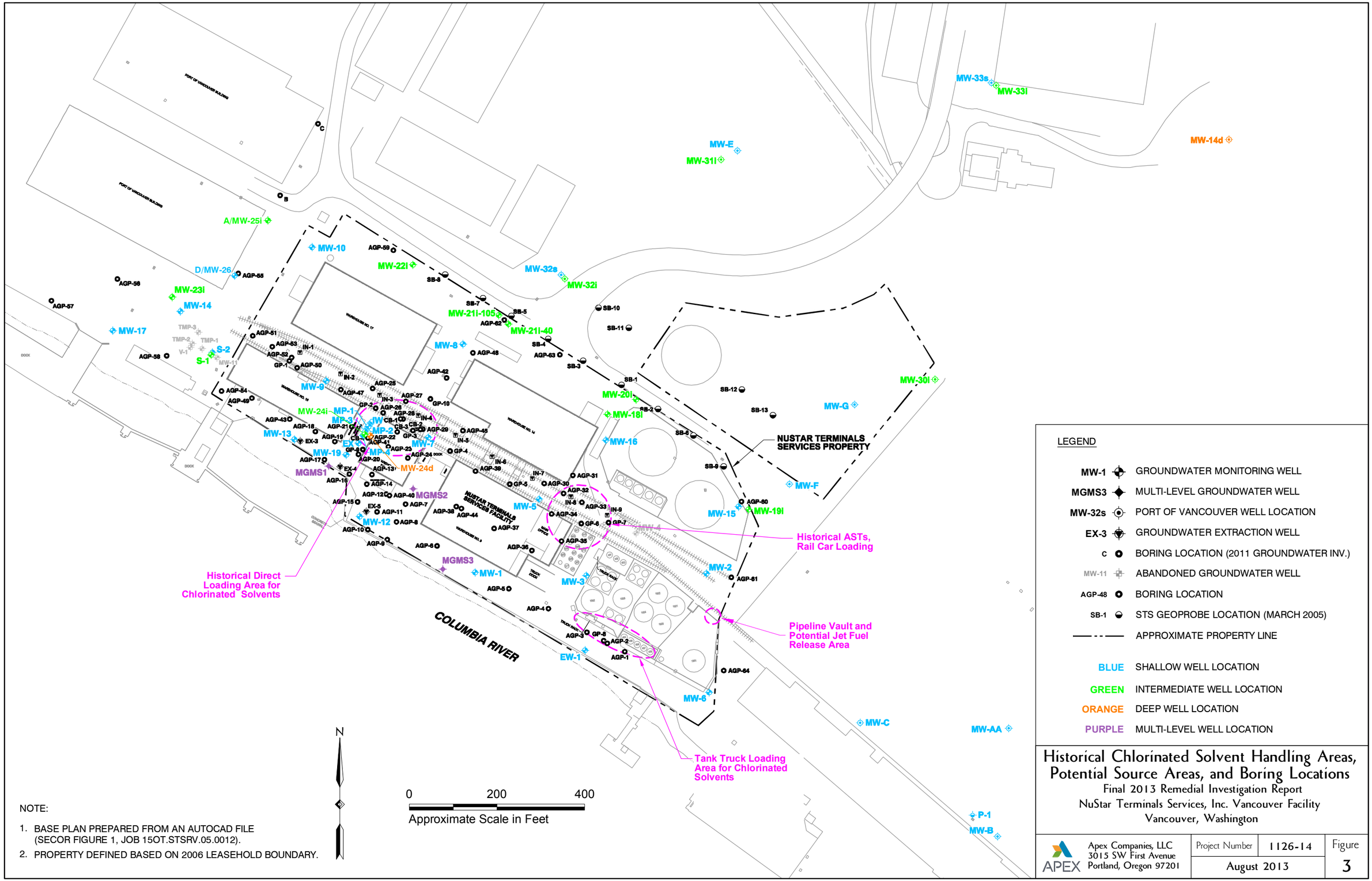
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
EX-3	GROUNDWATER EXTRACTION WELL
IN-1	GROUNDWATER INJECTION WELL
C	BORING LOCATION (2011 GROUNDWATER INV.)
MW-11	ABANDONED GROUNDWATER WELL
AGP-48	BORING LOCATION
	APPROXIMATE PROPERTY LINE
A A'	CROSS SECTION LOCATION
BLUE	SHALLOW WELL LOCATION
GREEN	INTERMEDIATE WELL LOCATION
ORANGE	DEEP WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

Property Plan

Final 2013 Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	1126-14	Figure
August 2013		2



NOTE:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.

LEGEND

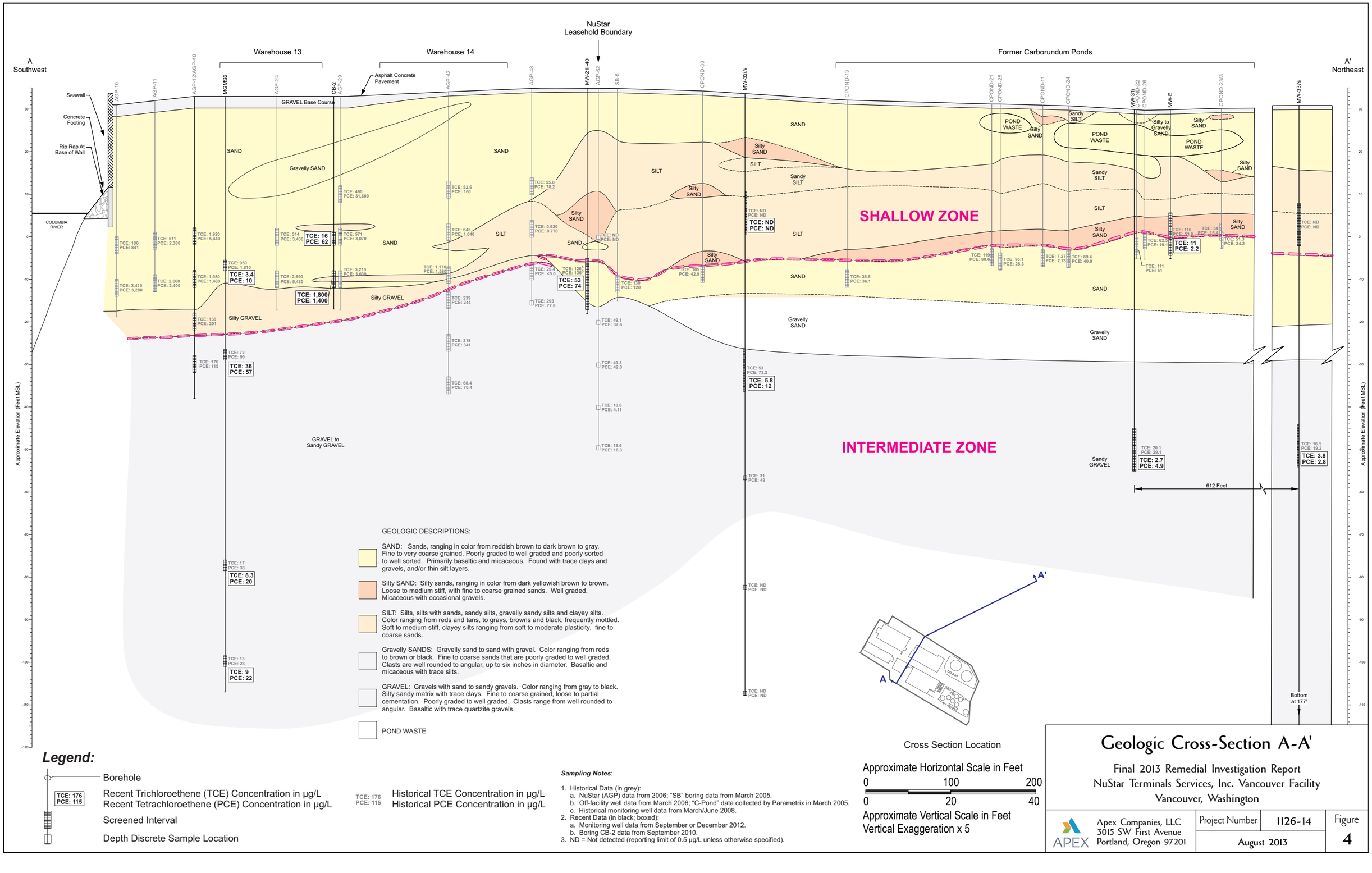
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
EX-3	GROUNDWATER EXTRACTION WELL
C	BORING LOCATION (2011 GROUNDWATER INV.)
MW-11	ABANDONED GROUNDWATER WELL
AGP-48	BORING LOCATION
SB-1	STS GEOPROBE LOCATION (MARCH 2005)
	APPROXIMATE PROPERTY LINE
BLUE	SHALLOW WELL LOCATION
GREEN	INTERMEDIATE WELL LOCATION
ORANGE	DEEP WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

Historical Chlorinated Solvent Handling Areas, Potential Source Areas, and Boring Locations

Final 2013 Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	1126-14	Figure
August 2013		3



GEOLOGIC DESCRIPTIONS:

SAND: Sands, ranging in color from reddish brown to dark brown to gray. Fine to very coarse grained. Poorly graded to well graded and poorly sorted to well sorted. Primarily basaltic and micaceous. Found with trace clays and gravels, and/or thin silt layers.

Silty SAND: Silty sands, ranging in color from dark yellowish brown to brown. Loose to medium stiff, with fine to coarse grained sands. Well graded. Micaceous with occasional gravels.

SILT: Silts, silts with sands, sandy silts, gravelly sandy silts and clayey silts. Color ranging from reds and tans, to grays, browns and black, frequently mottled. Soft to medium stiff, clayey silts ranging from soft to moderate plasticity. fine to coarse sands.

Gravelly SANDS: Gravelly sand to sand with gravel. Color ranging from reds to brown or black. Fine to coarse sands that are poorly graded to well graded. Clasts are well rounded to angular, up to six inches in diameter. Basaltic and micaceous with trace silts.

GRAVEL: Gravels with sand to sandy gravels. Color ranging from gray to black. Silty sandy matrix with trace clays. Fine to coarse grained, loose to partial cementation. Poorly graded to well graded. Clasts range from well rounded to angular. Basaltic with trace quartzite gravels.

POND WASTE

Legend:

Borehole

TCE: 176 PCE: 115 — Recent Trichloroethene (TCE) Concentration in µg/L; Recent Tetrachloroethene (PCE) Concentration in µg/L

Screened Interval

Depth Discrete Sample Location

TCE: 176 PCE: 115 — Historical TCE Concentration in µg/L; Historical PCE Concentration in µg/L

Sampling Notes:

1. Historical Data (in grey):
   a. NuStar (AGP) data from 2006; "SB" boring data from March 2005.
   b. Off-facility well data from March 2006; "C-Pond" data collected by Parametrix in March 2005.
   c. Historical monitoring well data from March/June 2008.
2. Recent Data (in black; boxed):
   a. Monitoring well data from September or December 2012.
   b. Boring CB-2 data from September 2010.
3. ND = Not detected (reporting limit of 0.5 µg/L unless otherwise specified).

Cross Section Location

Approximate Horizontal Scale in Feet
0 100 200
0 20 40
Approximate Vertical Scale in Feet
Vertical Exaggeration x 5

Geologic Cross-Section A-A'

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NuStar Terminals Services, Inc. Vancouver Facility
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Apex Companies, LLC
3015 SW First Avenue
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Figure 4

B
Northwest

B'
Southeast

AGP-59 | SB-8 | SB-7 | AGP-62 | SB-5 | SB-4 | AGP-63 | SB-3 | SB-1 | SB-2 | SB-6 | SB-9 | AGP-60 | MW-15 | AGP-61 | AGP-64 | MW-6

Approximate Elevation (Feet MSL)

SHALLOW ZONE

INTERMEDIATE ZONE

GEOLOGIC DESCRIPTIONS:

SAND: Sands, ranging in color from reddish brown to dark brown to gray. Fine to very coarse grained. Poorly graded to well graded and poorly sorted to well sorted. Primarily basaltic and micaceous. Found with trace clays and gravels, and/or thin silt layers.

Silty SAND: Silty sands, ranging in color from dark yellowish brown to brown. Loose to medium stiff, with fine to coarse grained sands. Well graded. Micaceous with occasional gravels.

SILT: Silts, silts with sands, sandy silts, gravelly sandy silts and clayey silts. Color ranging from reds and tans, to grays, browns and black, frequently mottled. Soft to medium stiff, clayey silts ranging from soft to moderate plasticity. fine to coarse sands.

GRAVEL: Gravels with sand to sandy gravels. Color ranging from gray to black. Silty sandy matrix with trace clays. Fine to coarse grained, loose to partial cementation. Poorly graded to well graded. Clasts range from well rounded to angular. Basaltic with trace quartzite gravels.

CLAY: Clays to silty clays. Color ranging form green/gray to black. Medium plasticity, sticky, stiff, ranging from dry to moist.

Legend:

Borehole

TCE: 176 PCE: 115 — Recent Trichloroethene (TCE) Concentration in µg/L / Recent Tetrachloroethene (PCE) Concentration in µg/L

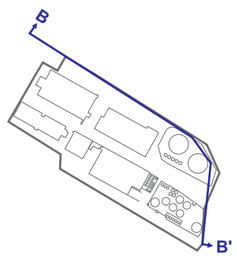
Screened Interval

Depth Discrete Sample Location

TCE: 176 PCE: 115 — Historical TCE Concentration in µg/L / Historical PCE Concentration in µg/L

Sampling Notes:

1. Historical Data (in grey):
   a. NuStar (AGP) data from 2006; "SB" boring data from March 2005.
   b. Historical monitoring well data from March/June 2008.
2. Recent Data (in black; boxed):
   a. Monitoring well data from September or December 2012.
3. ND = Not detected (reporting limit of 0.5 µg/L unless otherwise specified).



Cross Section Location

Approximate Horizontal Scale in Feet
0 100 200
0 20 40
Approximate Vertical Scale in Feet
Vertical Exaggeration x 5

Geologic Cross-Section B-B

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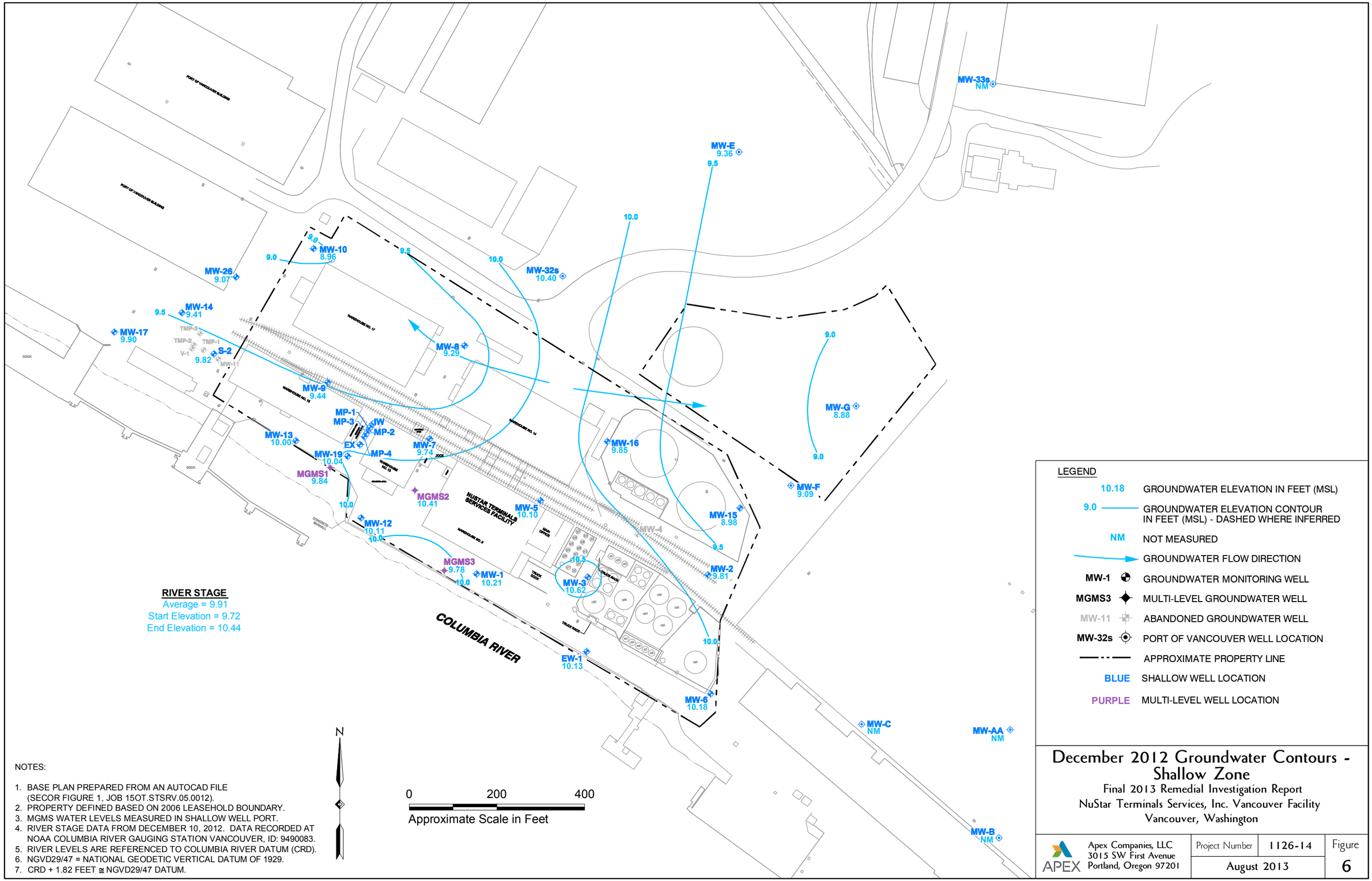
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number 1126-14

August 2013

Figure 5



RIVER STAGE
Average = 9.91
Start Elevation = 9.72
End Elevation = 10.44

LEGEND

10.18	GROUNDWATER ELEVATION IN FEET (MSL)
9.0	GROUNDWATER ELEVATION CONTOUR IN FEET (MSL) - DASHED WHERE INFERRED
NM	NOT MEASURED
	GROUNDWATER FLOW DIRECTION
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-11	ABANDONED GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
	APPROXIMATE PROPERTY LINE
BLUE	SHALLOW WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

NOTES:

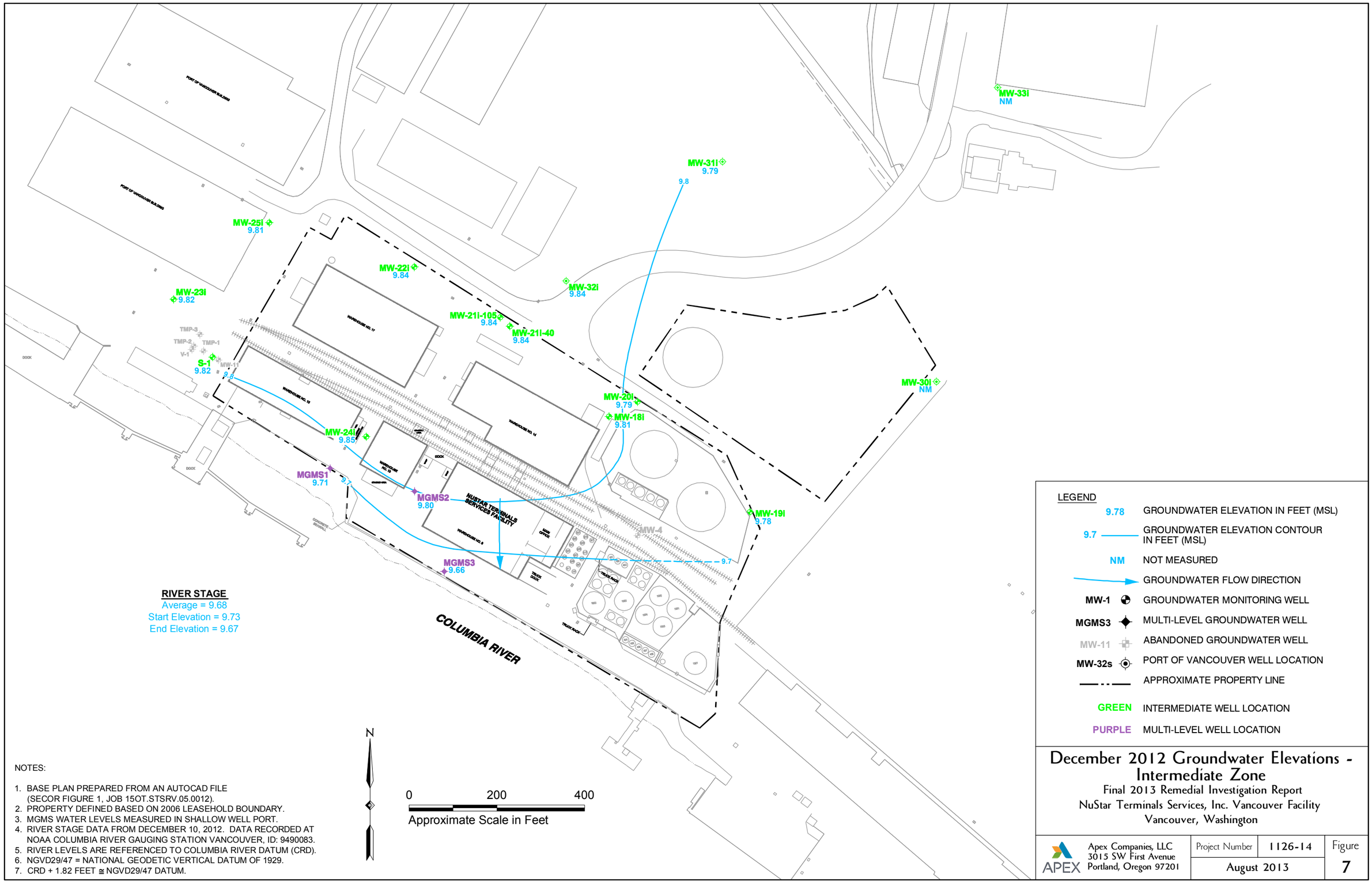
1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.
4. RIVER STAGE DATA FROM DECEMBER 10, 2012. DATA RECORDED AT NOAA COLUMBIA RIVER GAUGING STATION VANCOUVER, ID: 9490083.
5. RIVER LEVELS ARE REFERENCED TO COLUMBIA RIVER DATUM (CRD).
6. NGVD29/47 = NATIONAL GEODETIC VERTICAL DATUM OF 1929.
7. CRD + 1.82 FEET ≅ NGVD29/47 DATUM.

December 2012 Groundwater Contours - Shallow Zone

Final 2013 Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

APEX
Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	1126-14	Figure
August 2013		6



NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.
4. RIVER STAGE DATA FROM DECEMBER 10, 2012. DATA RECORDED AT NOAA COLUMBIA RIVER GAUGING STATION VANCOUVER, ID: 9490083.
5. RIVER LEVELS ARE REFERENCED TO COLUMBIA RIVER DATUM (CRD).
6. NGVD29/47 = NATIONAL GEODETIC VERTICAL DATUM OF 1929.
7. CRD + 1.82 FEET ≅ NGVD29/47 DATUM.

LEGEND

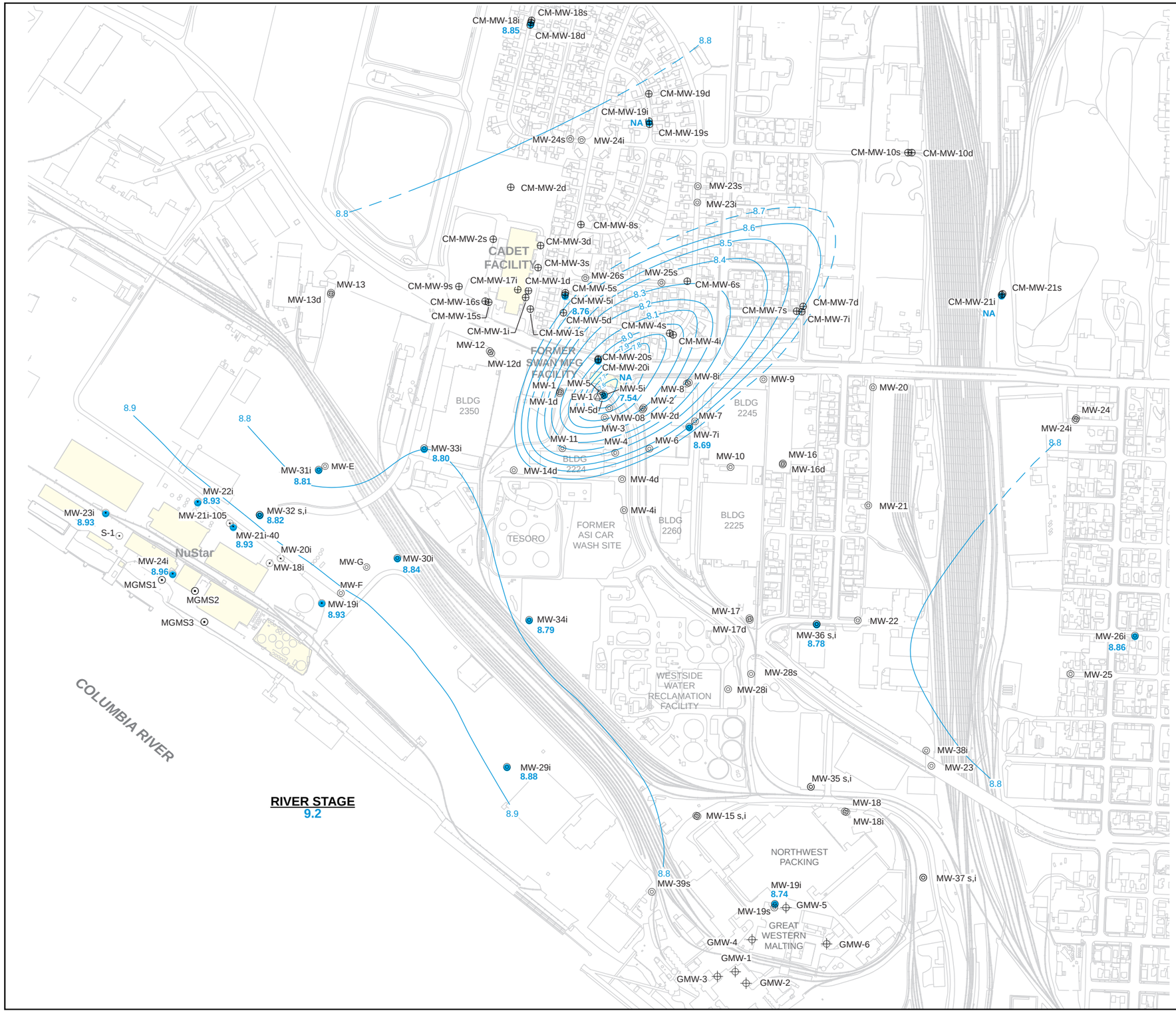
9.78	GROUNDWATER ELEVATION IN FEET (MSL)
9.7	GROUNDWATER ELEVATION CONTOUR IN FEET (MSL)
NM	NOT MEASURED
	GROUNDWATER FLOW DIRECTION
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-11	ABANDONED GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
	APPROXIMATE PROPERTY LINE
GREEN	INTERMEDIATE WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

December 2012 Groundwater Elevations - Intermediate Zone

Final 2013 Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	1126-14	Figure
August 2013		7



LEGEND:

- Port of Vancouver (POV) Groundwater Extraction Well
- Swan Manufacturing (POV) Monitoring Well
- ST Services (NuStar) Monitoring Well
- Cadet Manufacturing (POV) Monitoring Well
- Great Western Malting Extraction Well
- Shaded Well Indicates Transducer Data Available
- 8.85 — Groundwater Elevation in Feet Relative to Mean Sea Level
- 8.8 — Groundwater Elevation Contour in Feet Relative to Mean Sea Level (Dashed Where Inferred)

GRADIENT:

MW-24i→MW-21i-40

$\frac{0.3}{450}$ = 0.000067 Ft./Ft.

MW-32i→MW-33i

$\frac{0.02}{1,100}$ = 0.000018 Ft./Ft.

1) Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005
2) Swan facility data provided by Parametrix.
3) River stage data from NOAA Columbia River gauging stations:
   Vancouver ID: 9440083
   St. Helen's ID: 9439201
4) NuStar site is 3% of the distance from the Vancouver station to the St. Helen's station.
5) CRD = Columbia River Datum
6) NGVD29/47 = National Geodetic Vertical Datum of 1929.

N

0 600 1,200

Approximate Scale in Feet

Annualized Groundwater Elevation Contour Map January 9, 2011 to January 9, 2012

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NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

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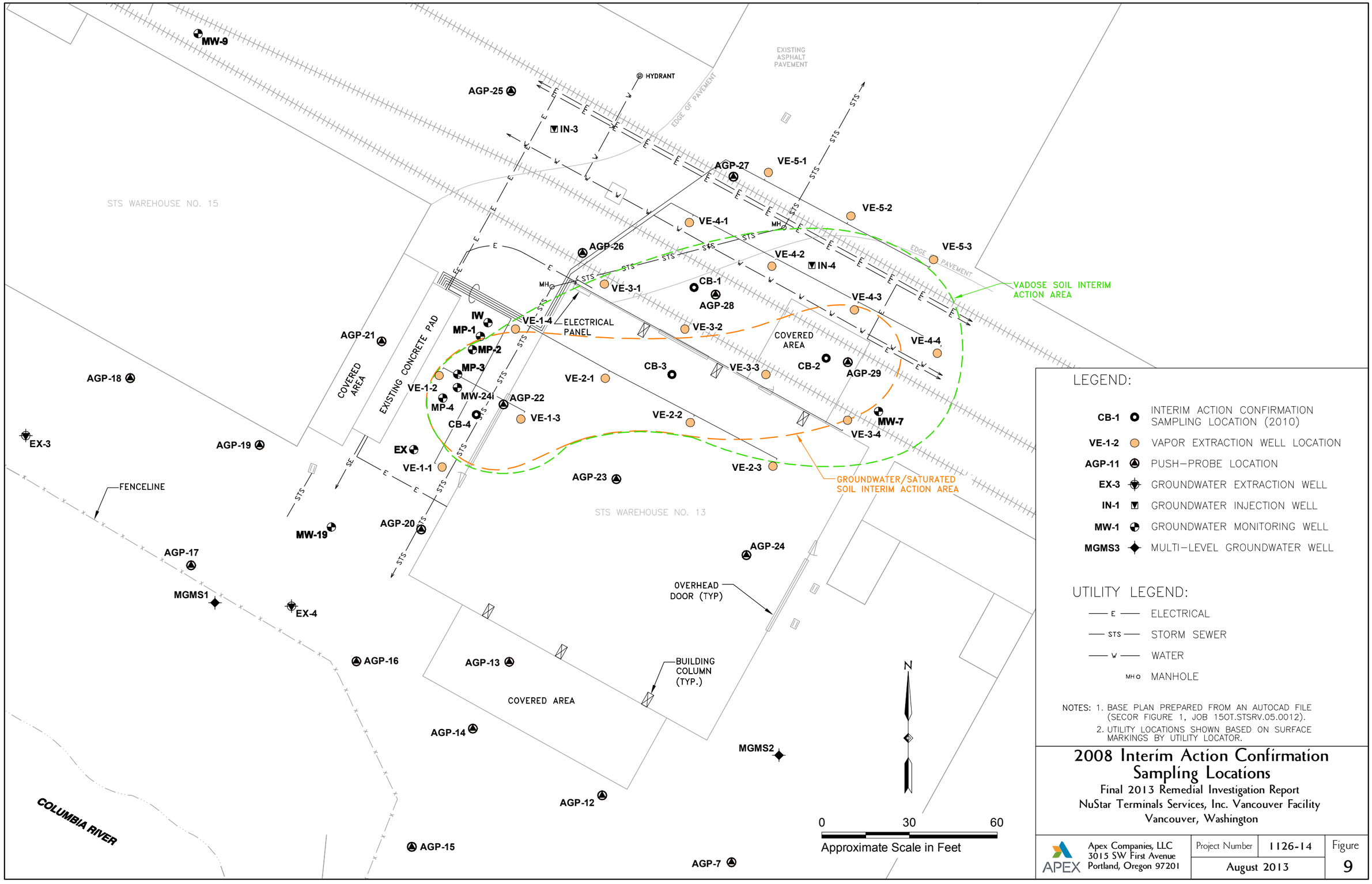
Portland, Oregon 97201

Project Number	1126-14	Figure
August 2013		8



LEGEND:

- CB-1 — INTERIM ACTION CONFIRMATION SAMPLING LOCATION (2010)
- VE-1-2 — VAPOR EXTRACTION WELL LOCATION
- AGP-11 — PUSH-PROBE LOCATION
- EX-3 — GROUNDWATER EXTRACTION WELL
- IN-1 — GROUNDWATER INJECTION WELL
- MW-1 — GROUNDWATER MONITORING WELL
- MGMS3 — MULTI-LEVEL GROUNDWATER WELL

UTILITY LEGEND:

- E — ELECTRICAL
- STS — STORM SEWER
- W — WATER
- MH — MANHOLE

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

2008 Interim Action Confirmation Sampling Locations

Final 2013 Remedial Investigation Report
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Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number 1126-14
August 2013
Figure 9

LEGEND:

- SOURCE AREA INJECTION POINT
- STANDARD OIL SUBSTRATE INJECTION POINT
- ANGLED INJECTION POINT
- 2008 INTERIM ACTION INJECTION POINT
- EX-3 — EARLY 2000s INTERIM ACTION GROUNDWATER EXTRACTION WELL
- IN-1 — EARLY 2000s INTERIM ACTION GROUNDWATER INJECTION WELL AND VAPOR EXTRACTION WELL
- MW-1 — GROUNDWATER MONITORING WELL
- MGMS3 — MULTI-LEVEL GROUNDWATER WELL
- CATCH BASIN
- BUILDING
- FENCE
- ELECTRICAL
- SYSTEM ELECTRICAL
- STORM SEWER
- WATER
- MH — MANHOLE
- RAILROAD TRACKS

NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. UTILITY LOCATIONS SHOWN BASED ON SURFACE MARKINGS BY UTILITY LOCATOR.
3. INJECTION LOCATIONS BASED ON FIELD MEASUREMENTS TO EXISTING SITE STRUCTURES.

2011 Groundwater Interim Action Area

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NuStar Terminals Services, Inc. Vancouver Facility
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Portland, Oregon 97201

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NORTH SOIL VAPOR EXTRACTION UNIT (NO CARBON TREATMENT)

SOUTH SOIL VAPOR EXTRACTION UNIT (WITH CARBON TREATMENT VESSELS)

WAREHOUSE NO. 15

COVERED AREA

EXISTING CONCRETE PAD

ELECTRICAL PANEL

COVERED AREA

WAREHOUSE NO. 13

OVERHEAD DOOR (TYP)

BUILDING COLUMN (TYP.)

COVERED AREA

DOCK

RAMP

RAMP

NUSTAR TERMINALS SERVICES FACILITY

WAREHOUSE

EXISTING ASPHALT PAVEMENT

EDGE OF PAVEMENT

HYDRANT

IN-2 IN-3 IN-4 IN-5 IN-6

MW-9 MW-19 MW-12 MW-7

MGMS1 MGMS2

EX-1 EX-4 EX-5

IW MP-1 MP-2 MP-3 MP-4

VE-1-1 VE-1-2 VE-1-3 VE-1-4

VE-2-1 VE-2-2 VE-2-3

VE-3-1 VE-3-2 VE-3-3 VE-3-4

VE-4-1 VE-4-2 VE-4-3 VE-4-4

VE-5-1 VE-5-2 VE-5-3

VE-6-1 (S/D) VE-6-2 (S/D) VE-6-3 (S/D)

VE-7-1 (S/D) VE-7-2 (S/D) VE-7-3 (S/D)

VE-8-1 (S/D) VE-8-2 (S/D) VE-8-3 (S/D) VE-8-4 (S/D)

VE-9-1 (S/D) VE-9-2 (S/D) VE-9-3 (S/D) VE-9-4 (S/D)

VE-10-1 (S/D) VE-10-2 (S/D) VE-10-3 (S/D)

N

0 40 80

Scale in Feet

NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. UTILITY LOCATIONS SHOWN BASED ON SURFACE MARKINGS BY UTILITY LOCATOR.

LEGEND:

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

2011 Vadose Zone Interim Action Area

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NuStar Terminals Services, Inc. Vancouver Facility
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Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	1126-14	Figure
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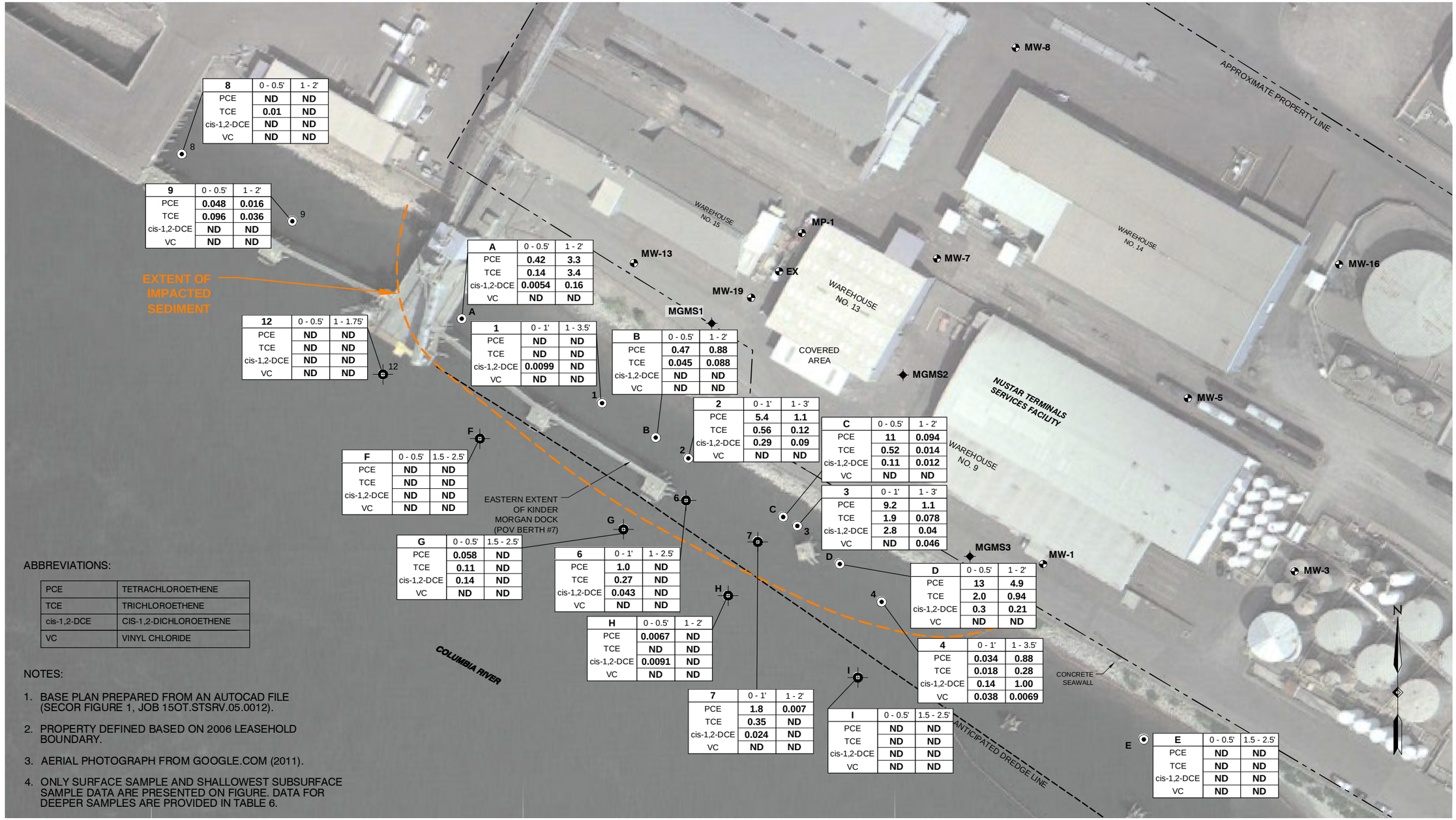

8	0 - 0.5'	1 - 2'
PCE	ND	ND
TCE	0.01	ND
cis-1,2-DCE	ND	ND
VC	ND	ND

9	0 - 0.5'	1 - 2'
PCE	0.048	0.016
TCE	0.096	0.036
cis-1,2-DCE	ND	ND
VC	ND	ND

A	0 - 0.5'	1 - 2'
PCE	0.42	3.3
TCE	0.14	3.4
cis-1,2-DCE	0.0054	0.16
VC	ND	ND

12	0 - 0.5'	1 - 1.75'
PCE	ND	ND
TCE	ND	ND
cis-1,2-DCE	ND	ND
VC	ND	ND

1	0 - 1'	1 - 3.5'
PCE	ND	ND
TCE	ND	ND
cis-1,2-DCE	0.0099	ND
VC	ND	ND

B	0 - 0.5'	1 - 2'
PCE	0.47	0.88
TCE	0.045	0.088
cis-1,2-DCE	ND	ND
VC	ND	ND

2	0 - 1'	1 - 3'
PCE	5.4	1.1
TCE	0.56	0.12
cis-1,2-DCE	0.29	0.09
VC	ND	ND

C	0 - 0.5'	1 - 2'
PCE	11	0.094
TCE	0.52	0.014
cis-1,2-DCE	0.11	0.012
VC	ND	ND

3	0 - 1'	1 - 3'
PCE	9.2	1.1
TCE	1.9	0.078
cis-1,2-DCE	2.8	0.04
VC	ND	0.046

F	0 - 0.5'	1.5 - 2.5'
PCE	ND	ND
TCE	ND	ND
cis-1,2-DCE	ND	ND
VC	ND	ND

G	0 - 0.5'	1.5 - 2.5'
PCE	0.058	ND
TCE	0.11	ND
cis-1,2-DCE	0.14	ND
VC	ND	ND

6	0 - 1'	1 - 2.5'
PCE	1.0	ND
TCE	0.27	ND
cis-1,2-DCE	0.043	ND
VC	ND	ND

H	0 - 0.5'	1 - 2'
PCE	0.0067	ND
TCE	ND	ND
cis-1,2-DCE	0.0091	ND
VC	ND	ND

7	0 - 1'	1 - 2'
PCE	1.8	0.007
TCE	0.35	ND
cis-1,2-DCE	0.024	ND
VC	ND	ND

D	0 - 0.5'	1 - 2'
PCE	13	4.9
TCE	2.0	0.94
cis-1,2-DCE	0.3	0.21
VC	ND	ND

4	0 - 1'	1 - 3.5'
PCE	0.034	0.88
TCE	0.018	0.28
cis-1,2-DCE	0.14	1.00
VC	0.038	0.0069

I	0 - 0.5'	1.5 - 2.5'
PCE	ND	ND
TCE	ND	ND
cis-1,2-DCE	ND	ND
VC	ND	ND

E	0 - 0.5'	1.5 - 2.5'
PCE	ND	ND
TCE	ND	ND
cis-1,2-DCE	ND	ND
VC	ND	ND

ABBREVIATIONS:

PCE	TETRACHLOROETHENE
TCE	TRICHLOROETHENE
cis-1,2-DCE	CIS-1,2-DICHLOROETHENE
VC	VINYL CHLORIDE

NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. AERIAL PHOTOGRAPH FROM GOOGLE.COM (2011).
4. ONLY SURFACE SAMPLE AND SHALLOWEST SUBSURFACE SAMPLE DATA ARE PRESENTED ON FIGURE. DATA FOR DEEPER SAMPLES ARE PROVIDED IN TABLE 6.

LEGEND

- A — SEDIMENT SAMPLING LOCATION - 2011 AND 2012 (INTERSECTS SHALLOW ZONE GROUNDWATER)
- F — SEDIMENT SAMPLING LOCATION - 2011 AND 2012 (INTERSECTS INTERMEDIATE ZONE GROUNDWATER)
- MW-12 — GROUNDWATER MONITORING WELL
- MGMS3 — MULTI-LEVEL GROUNDWATER WELL (40 FOOT SAMPLE INTERVAL)

A	0 - 0.5'	1 - 2'
PCE	0.42	3.3
TCE	0.14	3.4
cis-1,2-DCE	0.0054	0.16
VC	ND	ND

- A — LOCATION ID
- 0 - 0.5' — DEPTH OF SAMPLE
- 0.42 — VOLATILE ORGANIC COMPOUNDS (VOCs) CONCENTRATION IN MG/KG
- PCE — ANALYTE SAMPLED

0 100 200

Approximate Scale in Feet

Extent of VOC Impacts to Sediments

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Apex Companies, LLC
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Portland, Oregon 97201

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NUSTAR TERMINALS SERVICES PROPERTY

2008 Vadose Zone Soil Interim Action Area

2011 Additional Vadose Zone Soil Interim Action Area

AGP-38 12.1 (24)
AGP-42 ND (17)
AGP-27 18.0 (8.8)
AGP-26 36.7 (18)
AGP-21 9.92 (13)
AGP-43 ND (16.5)
AGP-28 446 (17.5)
AGP-29 8,434 (9.5)
AGP-22 286 (18)
AGP-45 ND (7)
AGP-20 13.9 (17.5)
AGP-23 13.1 (12.5)
AGP-24 21.9 (12)
AGP-39 ND (17.5)
AGP-12 29.8 (13)
AGP-32 ND (14)
AGP-33 ND (14)
AGP-10 54.6 (6.5)
AGP-36 ND (18)
AGP-35 ND (18.5)
AGP-3 ND (13)

MW-14, MW-32s, MW-G, MW-18i, MW-16, MW-F, MW-8, MW-9, MW-13, MW-7, MW-5, MW-12, MW-1, MW-3, S-1, S-2, IN-1, IN-2, IN-3, IN-5, IN-6, IN-7, IN-8, IN-9, EX-3, EX-4, EX-5, MGMS2, MGMS3, AGP-48, AGP-50, AGP-25, AGP-47, AGP-49, AGP-18, AGP-19, AGP-41, AGP-17, AGP-16, AGP-13, AGP-14, AGP-15, AGP-11, AGP-7, AGP-8, AGP-44, AGP-37, AGP-34, AGP-31, AGP-30, AGP-40, AGP-9, AGP-6, AGP-5, AGP-4, AGP-2, AGP-1, EW-1

STS WAREHOUSE NO. 17; STS WAREHOUSE NO. 15; STS WAREHOUSE NO. 14; STS WAREHOUSE NO. 13; STS WAREHOUSE NO. 9; MAIN OFFICE; DOCK; CONCRETE SEAWALL; COLUMBIA RIVER

10; 100; 1,000

N

0 100 200
Approximate Scale in Feet

NOTES:

1. PRESENTED TOTAL MOLAR CONCENTRATIONS ARE MAXIMUM CONCENTRATION IN EACH EXPLORATION.
2. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
3. PUSH-PROBE EXPLORATION LOCATIONS ARE APPROXIMATE.
4. SAMPLES COLLECTED APRIL-JUNE 2006.
5. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.

LEGEND

- AGP-38 / 12.1 (24) — BORING LOCATION; TOTAL MOLAR CHLOROETHENE CONCENTRATION IN µMOL/KG (DEPTH IN FEET); ND = NOT DETECTED
- 10 — TOTAL MOLAR CHLOROETHENE ISOPLETH IN µMOL/KG
- MW-1 — GROUNDWATER MONITORING WELL
- MGMS3 — MULTI-LEVEL GROUNDWATER WELL
- MW-32I — PORT OF VANCOUVER WELL LOCATION
- MW-F — CARBORUNDUM / PORT GROUNDWATER MONITORING WELL LOCATION

Total Molar Chloroethenes in Soil - Vadose Zone (Less Than 25 Feet)

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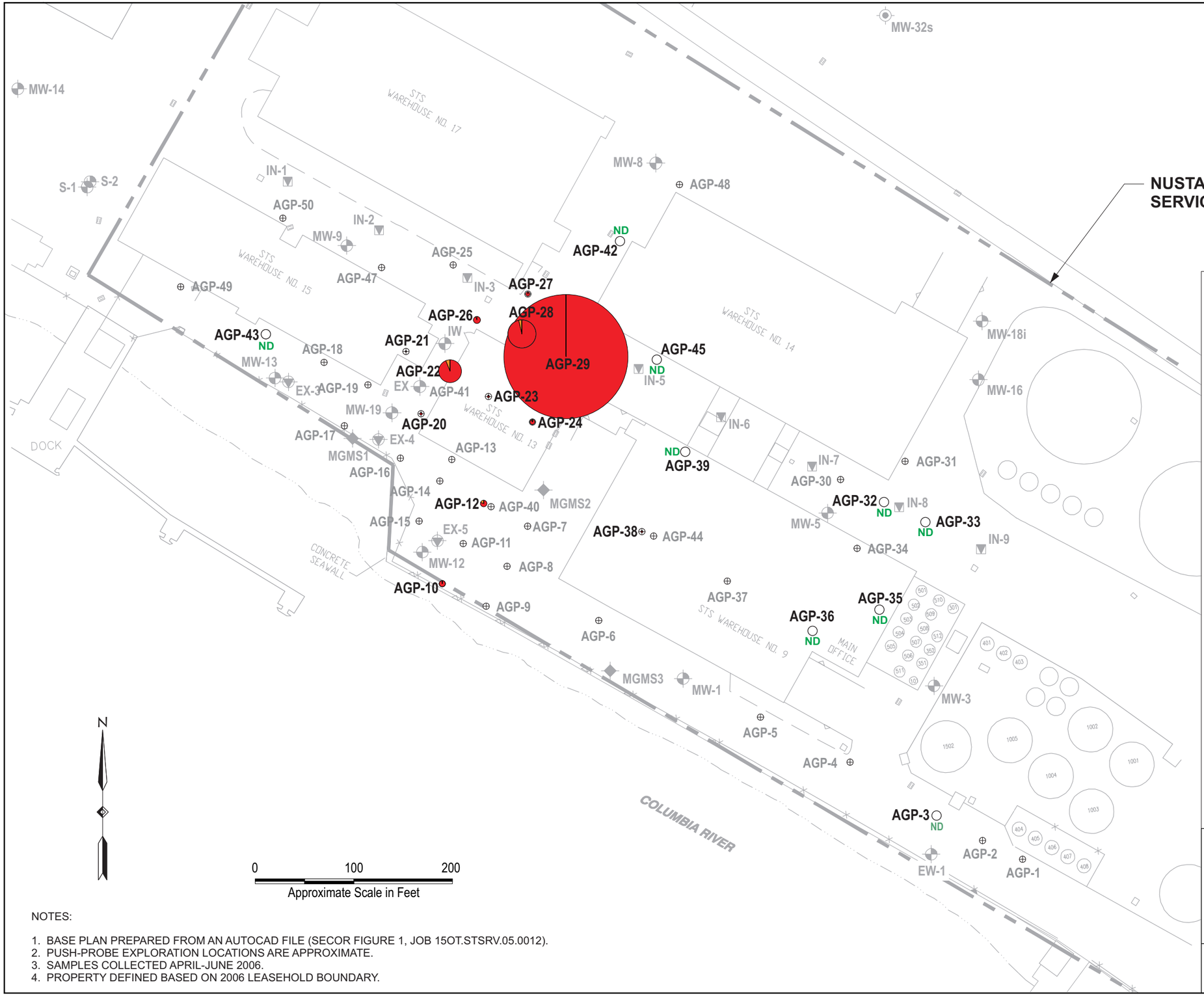
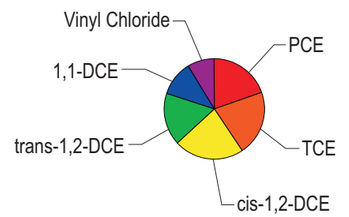
Figure 13



LEGEND

- AGP-3 — BORING LOCATION WITH DETECTED CHLOROETHENES (SEE BELOW)
- AGP-1 — BORING LOCATION WITH NO SAMPLE AT THIS DEPTH
- AGP-33 ND — NO CHLOROETHENES DETECTED
- MW-1 — GROUNDWATER MONITORING WELL
- MGMS3 — MULTI-LEVEL GROUNDWATER WELL
- MW-32I — PORT OF VANCOUVER WELL LOCATION
- MW-F — CARBORUNDUM / PORT GROUNDWATER MONITORING WELL LOCATION

Detected Chloroethenes



Size of Wheel and Wedges Proportional to Molar Chloroethene Concentration

NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PUSH-PROBE EXPLORATION LOCATIONS ARE APPROXIMATE.
3. SAMPLES COLLECTED APRIL-JUNE 2006.
4. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.

Chloroethenes in Soil - Vadose Zone (Less Than 25 Feet)

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NuStar Terminals Services, Inc. Vancouver Facility
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Apex Companies, LLC
3015 SW First Avenue
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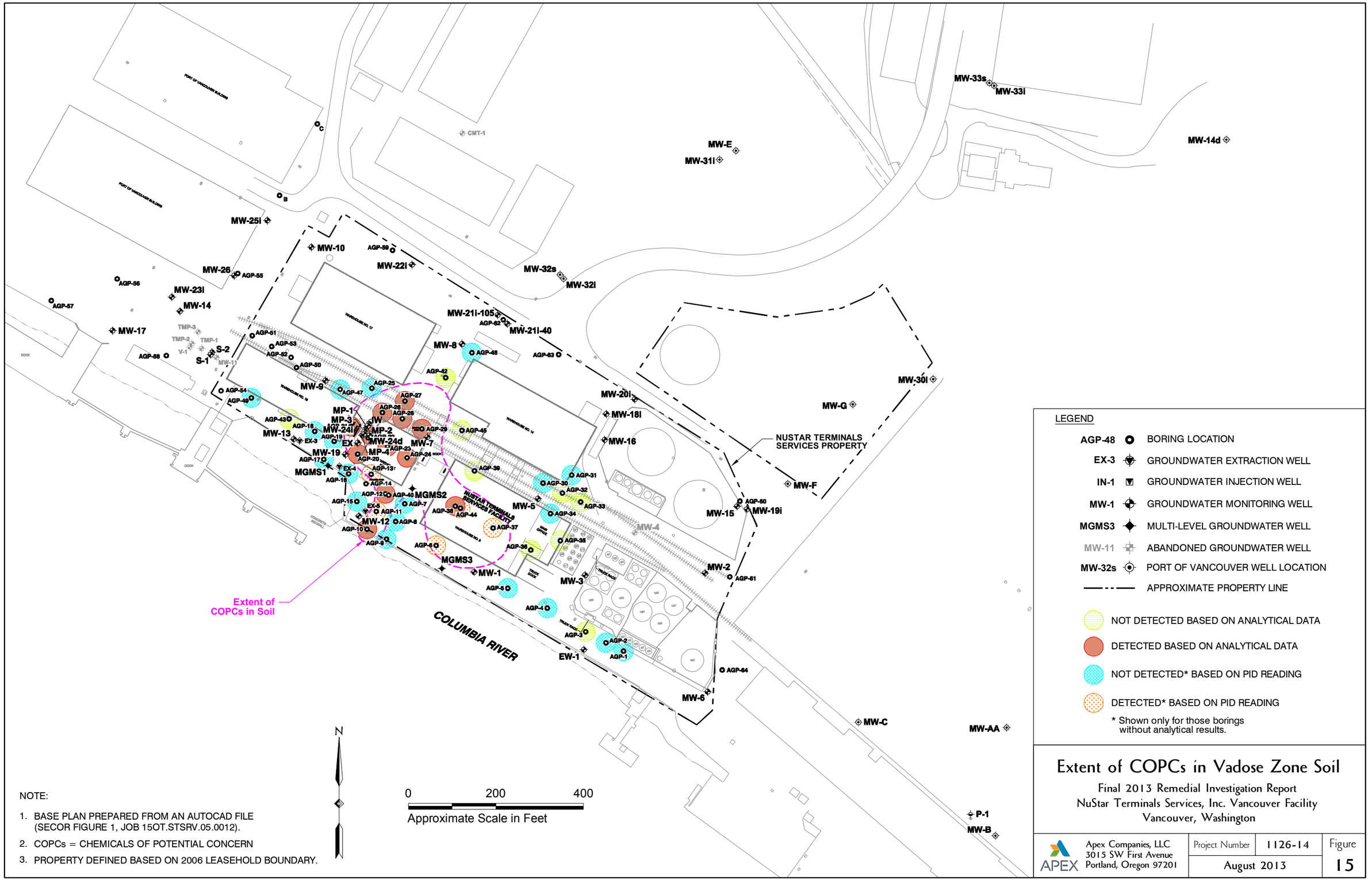

NOTE:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. COPCs = CHEMICALS OF POTENTIAL CONCERN
3. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.

LEGEND

- AGP-48 — BORING LOCATION
- EX-3 — GROUNDWATER EXTRACTION WELL
- IN-1 — GROUNDWATER INJECTION WELL
- MW-1 — GROUNDWATER MONITORING WELL
- MGMS3 — MULTI-LEVEL GROUNDWATER WELL
- MW-11 — ABANDONED GROUNDWATER WELL
- MW-32s — PORT OF VANCOUVER WELL LOCATION
- APPROXIMATE PROPERTY LINE
- NOT DETECTED BASED ON ANALYTICAL DATA
- DETECTED BASED ON ANALYTICAL DATA
- NOT DETECTED* BASED ON PID READING
- DETECTED* BASED ON PID READING

* Shown only for those borings without analytical results.

Extent of COPCs in Vadose Zone Soil

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PCE in Shallow Zone 1Q 2008

PCE in Shallow Zone 4Q 2012*

NOTE:
*Figures utilize most current data. For wells sampled quarterly, data are from december 2012. For wells sampled semi-annually, data are from september 2012

N

LEGEND:

- ◎ Swan Manufacturing (POV) Monitoring Well
- ⊙ ST Services (NuStar) Monitoring Well
- ⊕ Cadet Manufacturing (POV) Monitoring Well
- ⌖ Great Western Malting Extraction Well

- 1.16 Concentration in Groundwater (µg/L)
- 1µg/L Isoconcentration Contour
- 20µg/L Isoconcentration Contour
- 200µg/L Isoconcentration Contour
- 1,000µg/L Isoconcentration Contour
- 10,000µg/L Isoconcentration Contour

0 600 1,200
Approximate Scale in Feet

NOTE:
Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005

2008 and 2012 Isocontours of Tetrachloroethene (PCE) Concentrations in Shallow Zone Groundwater

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Project Number	1126-14	Figure
August 2013		16

TCE in Shallow Zone 1Q 2008

TCE in Shallow Zone 4Q 2012*

NOTE:
*Figures utilize most current data. For wells sampled quarterly, data are from december 2012. For wells sampled semi-annually, data are from september 2012

N

LEGEND:

- ◎ Swan Manufacturing (POV) Monitoring Well
- ⊙ ST Services (NuStar) Monitoring Well
- ⊕ Cadet Manufacturing (POV) Monitoring Well
- ⌖ Great Western Malting Extraction Well

19.9 Concentration in Groundwater (µg/L)

- 1µg/L Isoconcentration Contour
- 20µg/L Isoconcentration Contour
- 200µg/L Isoconcentration Contour
- 1,000µg/L Isoconcentration Contour

NOTE:

Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005

2008 and 2012 Isocontours of Trichloroethene (TCE) Concentrations in Shallow Zone Groundwater

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NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

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Project Number	1126-14	Figure 17
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cDCE in Shallow Zone 1Q 2008

cDCE in Shallow Zone 4Q 2012*

NOTE:
*Figures utilize most current data. For wells sampled quarterly, data are from december 2012. For wells sampled semi-annually, data are from september 2012

N

LEGEND:

- ◎ Swan Manufacturing (POV) Monitoring Well
- ⊙ ST Services (NuStar) Monitoring Well
- ⊕ Cadet Manufacturing (POV) Monitoring Well
- ⌖ Great Western Malting Extraction Well

- 19.9 Concentration in Groundwater (µg/L)
- 1µg/L Isoconcentration Contour
- 20µg/L Isoconcentration Contour
- 200µg/L Isoconcentration Contour
- 1,000µg/L Isoconcentration Contour

0 600 1,200
Approximate Scale in Feet

NOTE:

Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005

2008 and 2012 Isocontours of cis-1,2-Dichloroethene (cDCE) Concentrations in Shallow Zone Groundwater

Final 2013 Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
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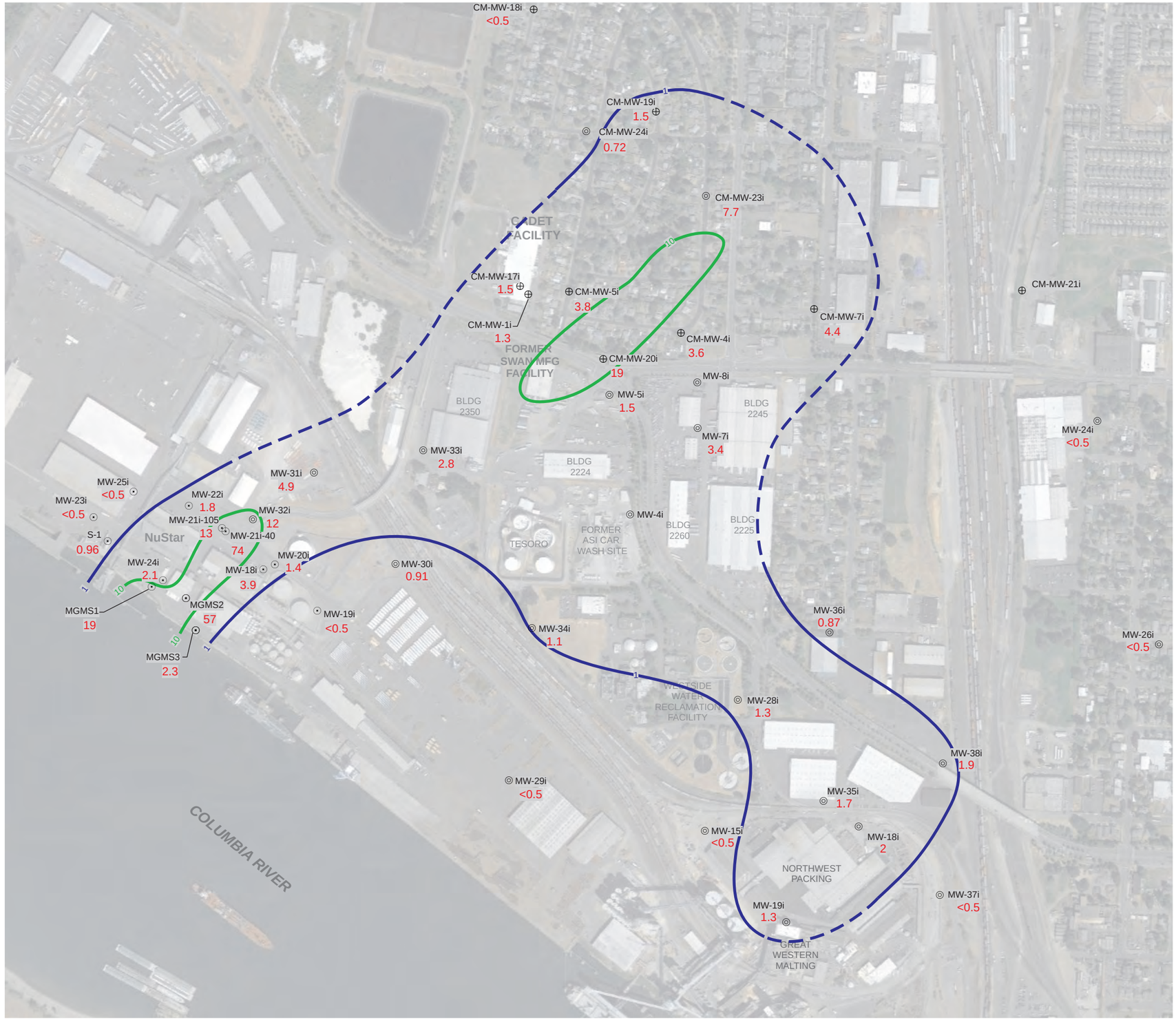
Project Number	1126-14	Figure
August 2013		18



LEGEND:

- Swan Manufacturing (POV) Monitoring Well
- ST Services (NuStar) Monitoring Well
- Cadet Manufacturing (POV) Monitoring Well
- Great Western Malting Extraction Well
- 4.4 PCE Concentration in Groundwater (µg/L)
- Isoconcentration Contours (µg/L)

NOTES:

1) Data from most recent monitoring event.
For NuStar wells, data are from 4Q 2012.
For POV wells, data are from 3Q 2012.

2) MW-29i is sampled annually; therefore, data are present for 1Q 2012.

Base Map, Legend and Scale
from S.S. Papadopulos & Associates, Inc.
Expert Report of Dimitrios Vlassopoulos
Port of Vancouver v. Cadet Manufacturing
Company, May 2005

N

0 600 1,200
Approximate Scale in Feet

Tetrachloroethene (PCE) in Intermediate Zone - Final Monitoring Event 2012

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Apex Companies, LLC
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LEGEND:

- Swan Manufacturing (POV) Monitoring Well
- ST Services (NuStar) Monitoring Well
- Cadet Manufacturing (POV) Monitoring Well
- Great Western Malting Extraction Well
- 0.71 — TCE Concentration in Groundwater (µg/L)
- Isoconcentration Contours (µg/L)

NOTES:

1) Data from most recent monitoring event.
For NuStar wells, data are from 4Q 2012.
For POV wells, data are from 3Q 2012.

2) MW-29i is sampled annually; therefore, data are present for 1Q 2012.

Base Map, Legend and Scale
from S.S. Papadopulos & Associates, Inc.
Expert Report of Dimitrios Vlassopoulos
Port of Vancouver v. Cadet Manufacturing
Company, May 2005

N

0 600 1,200
Approximate Scale in Feet

Trichloroethene (TCE) in Intermediate Zone - Final Monitoring Event 2012

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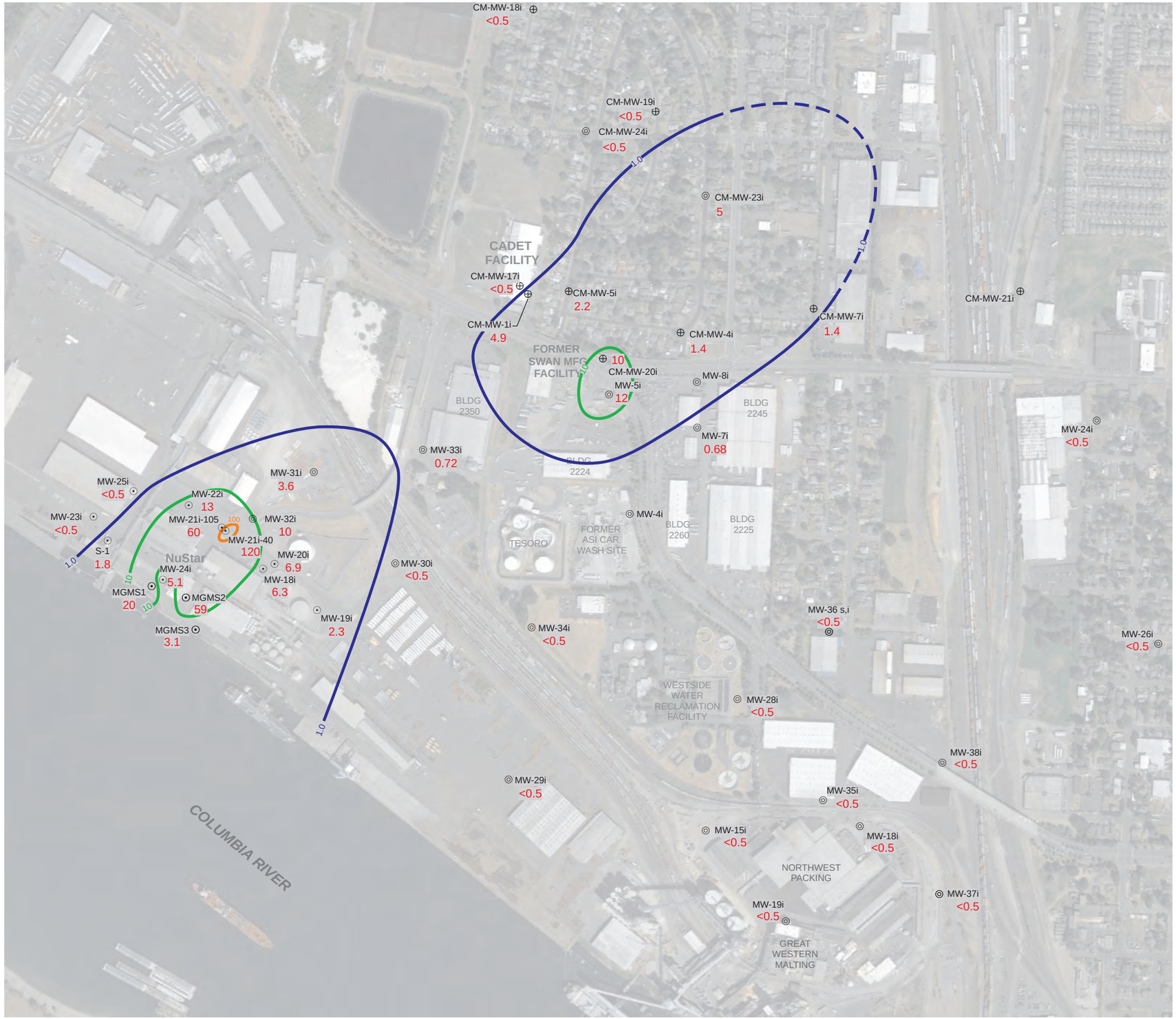
Project Number	1126-14	Figure
August 2013		20



LEGEND:

- Swan Manufacturing (POV) Monitoring Well
- ST Services (NuStar) Monitoring Well
- Cadet Manufacturing (POV) Monitoring Well
- Great Western Malting Extraction Well
- 1.4 cDCE Concentration in Groundwater (µg/L)
- Isoconcentration Contours (µg/L)

NOTES:

1) Data from most recent monitoring event.
For NuStar wells, data are from 4Q 2012.
For POV wells, data are from 3Q 2012.

2) MW-29i is sampled annually; therefore, data are present for 1Q 2012.

Base Map, Legend and Scale
from S.S. Papadopulos & Associates, Inc.
Expert Report of Dimitrios Vlassopoulos
Port of Vancouver v. Cadet Manufacturing
Company, May 2005

N

0 600 1,200
Approximate Scale in Feet

cis-1,2-Dichloroethene (cDCE) in Intermediate Zone – Final Monitoring Event 2012

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NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

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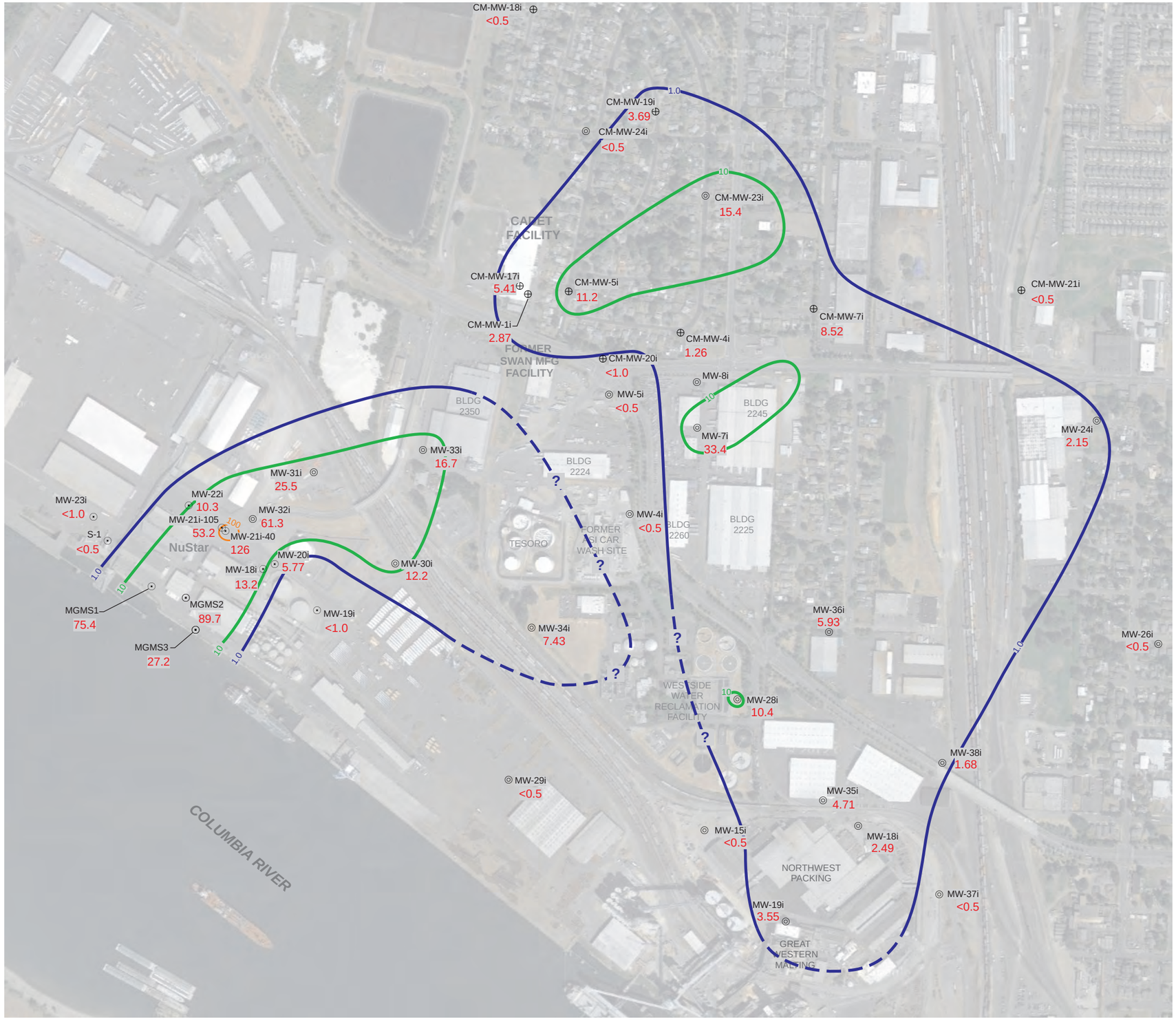
Project Number	1126-14	Figure
August 2013		21



LEGEND:

- Swan Manufacturing (POV) Monitoring Well
- ST Services (NuStar) Monitoring Well
- Cadet Manufacturing (POV) Monitoring Well
- Great Western Malting Extraction Well
- 2.15 — PCE Concentration in Groundwater (µg/L)
- Isoconcentration Contours (µg/L)

NOTES:

1) Data for wells MW-19i, MW-20i, MW-21i-40, MW-20i-105 and MW-22i are from 2Q 2008 as wells were not yet installed during the 1Q 2008 monitoring event.

Base Map, Legend and Scale
from S.S. Papadopulos & Associates, Inc.
Expert Report of Dimitrios Vlassopoulos
Port of Vancouver v. Cadet Manufacturing
Company, May 2005

N

0 600 1,200
Approximate Scale in Feet

Tetrachloroethene (PCE) in Intermediate Zone - First Quarter 2008

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NuStar Terminals Services, Inc. Vancouver Facility
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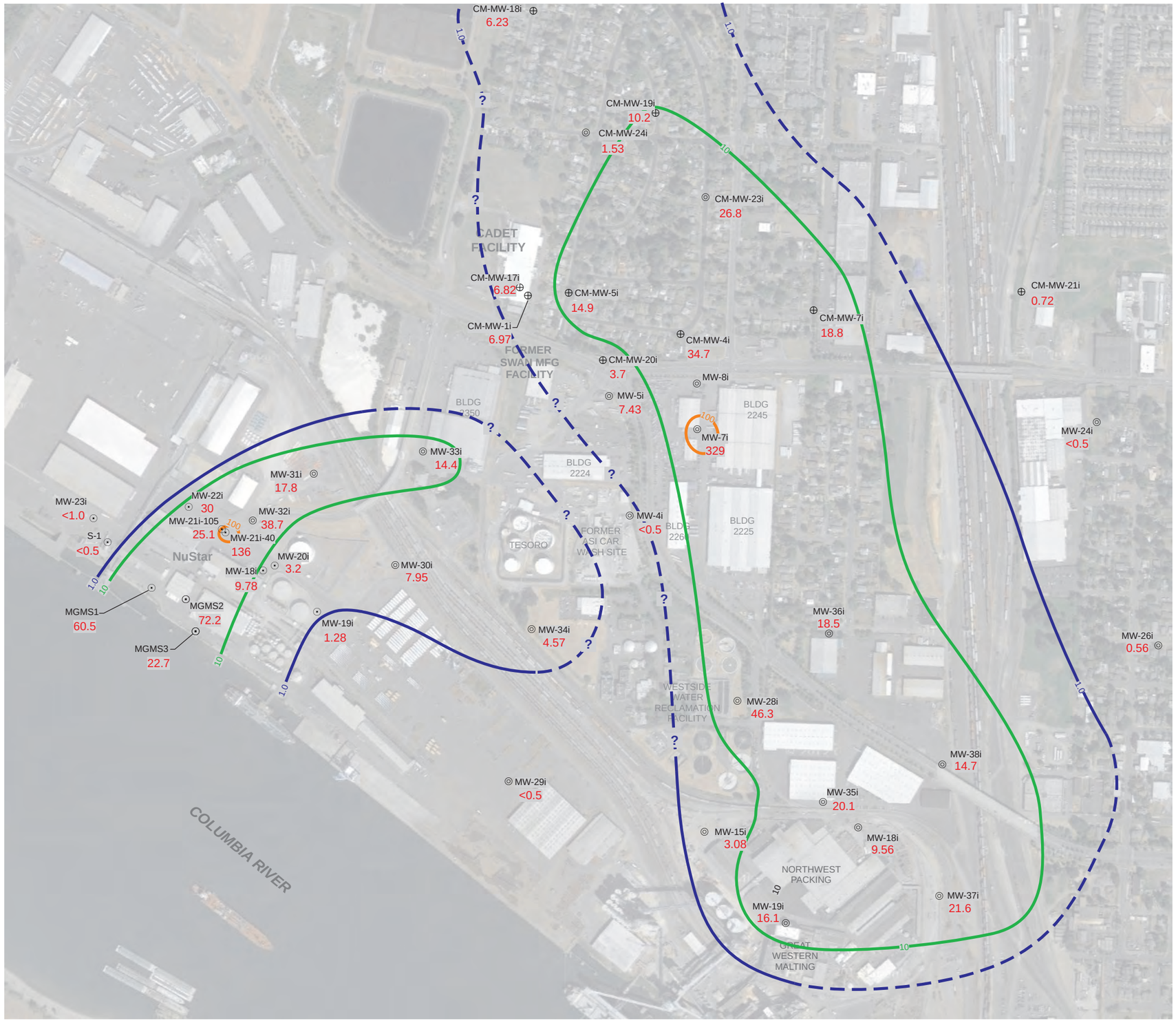
Project Number	1126-14	Figure
August 2013		22



LEGEND:

- Swan Manufacturing (POV) Monitoring Well
- ST Services (NuStar) Monitoring Well
- Cadet Manufacturing (POV) Monitoring Well
- Great Western Malting Extraction Well
- 0.72 — TCE Concentration in Groundwater (µg/L)
- Isoconcentration Contours (µg/L)

NOTES:

1) Data for wells MW-19i, MW-20i, MW-21i-40, MW-20i-105 and MW-22i are from 2Q 2008 as wells were not yet installed during the 1Q 2008 monitoring event.

Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005

N

0 600 1,200

Approximate Scale in Feet

Trichloroethene (TCE) in Intermediate Zone - First Quarter 2008

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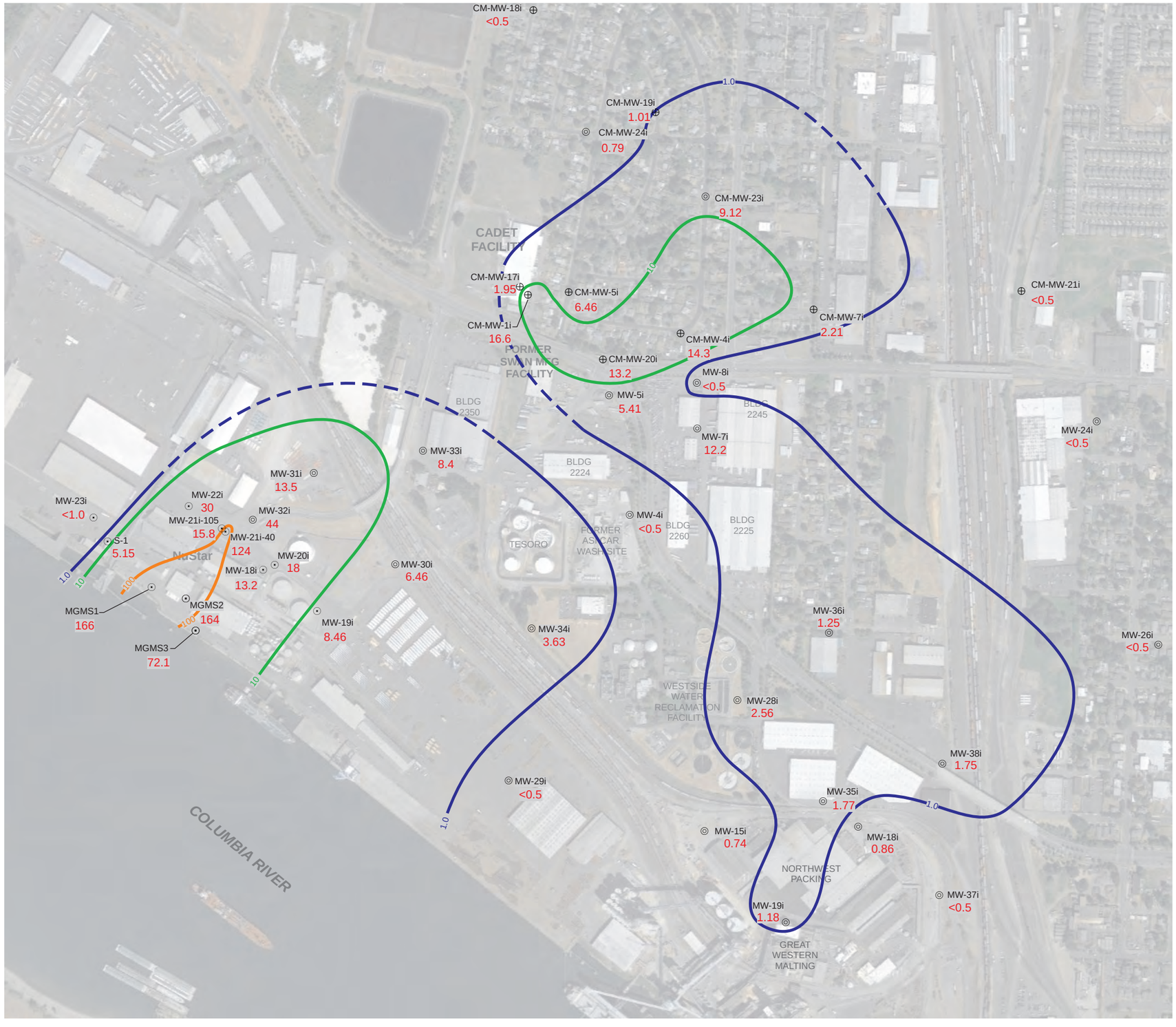
Project Number	1126-14	Figure
August 2013		23



LEGEND:

- Swan Manufacturing (POV) Monitoring Well
- ST Services (NuStar) Monitoring Well
- Cadet Manufacturing (POV) Monitoring Well
- Great Western Malting Extraction Well
- 2.21 — cDCE Concentration in Groundwater (µg/L)
- Isoconcentration Contours (µg/L)

NOTES:

1) Data for wells MW-19i, MW-20i, MW-21i-40, MW-20i-105 and MW-22i are from 2Q 2008 as wells were not yet installed during the 1Q 2008 monitoring event.

Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005

N

0 600 1,200

Approximate Scale in Feet

cis-1,2-Dichloroethene (cDCE) in Intermediate Zone – First Quarter 2008

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NuStar Terminals Services, Inc. Vancouver Facility
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Project Number	1126-14	Figure
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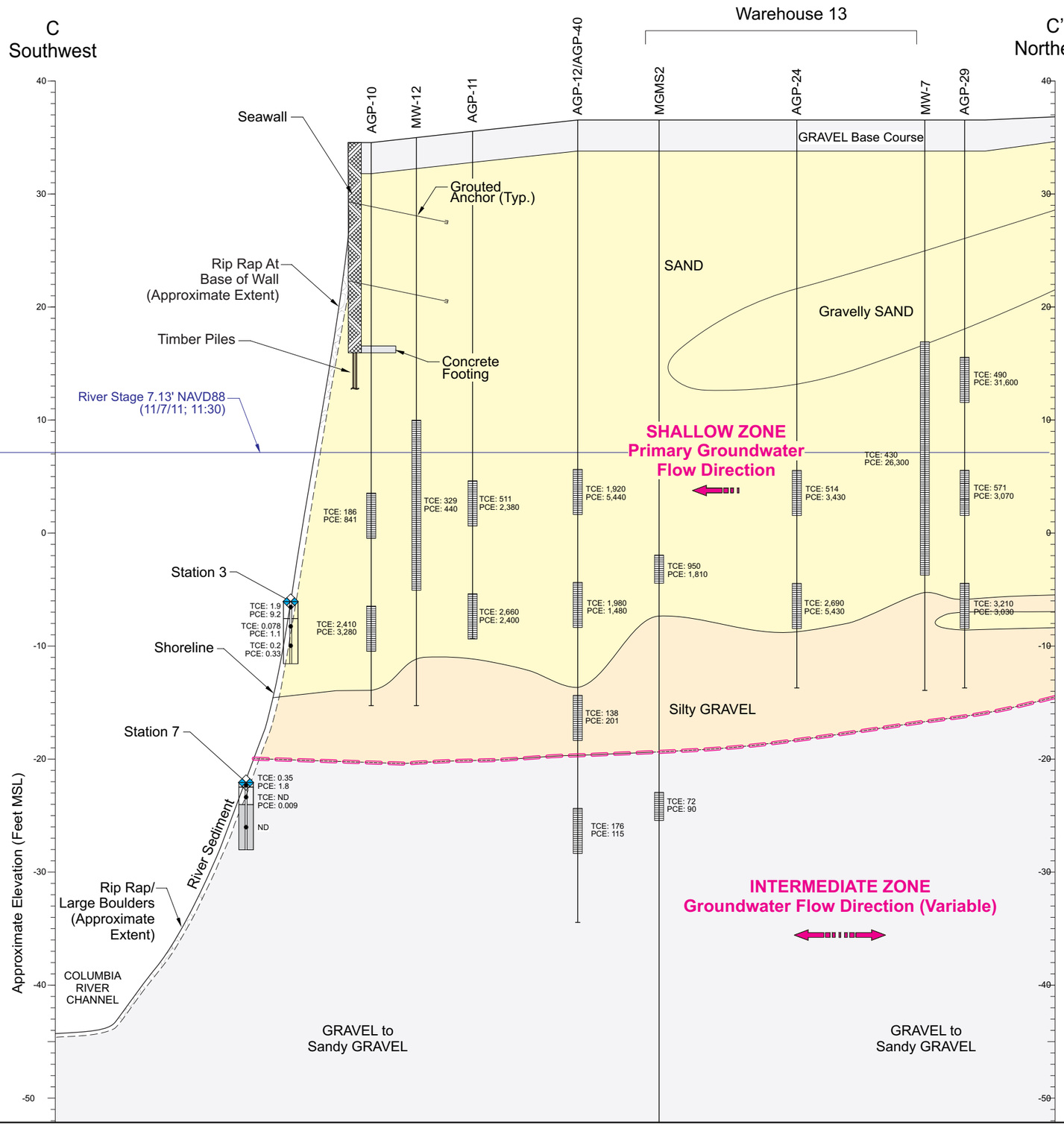


Legend:

- Borehole
- TCE: 176 PCE: 115 — Trichloroethene (TCE) Concentration in µg/L; Tetrachloroethene (PCE) Concentration in µg/L
- Screened Interval
- Depth Discrete Sample Location
- Approximate Boundary Between Shallow and Intermediate Zone

NOTE: Mean Sea Level (MSL) referenced to NAVD88 Datum.

GEOLOGIC DESCRIPTIONS:

SAND: Sands, ranging in color from reddish brown to dark brown to gray. Fine to very coarse grained. Poorly graded to well graded and poorly sorted to well sorted. Primarily basaltic and micaceous. Found with trace clays and gravels, and/or thin silt layers.

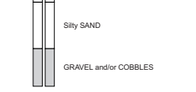
SILT: Silts, silts with sands, sandy silts, gravelly sandy silts and clayey silts. Color ranging from reds and tans, to grays, browns and black, frequently mottled. Soft to medium stiff, clayey silts ranging from soft to moderate plasticity. fine to coarse sands.

Gravelly SANDS: Gravelly sand to sand with gravel. Color ranging from reds to brown or black. Fine to coarse sands that are poorly graded to well graded. Clasts are well rounded to angular, up to six inches in diameter. Basaltic and micaceous with trace silts.

GRAVEL: Gravels with sand to sandy gravels. Color ranging from gray to black. Silty sandy matrix with trace clays. Fine to coarse grained, loose to partial cementation. Poorly graded to well graded. Clasts range from well rounded to angular. Basaltic with trace quartzite gravels.

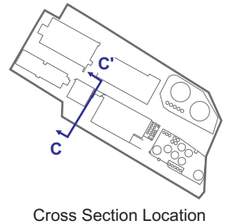
River Sediment

Sediment Log Lithology

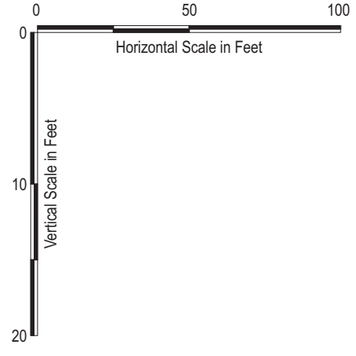


Note: PCE/TCE Concentration for Sediment in mg/kg

NOTES: Monitoring well data from 3/08. Probe data from 4/06 and 5/06.



Cross Section Location



Geologic Cross-Section C-C'

Final 2013 Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

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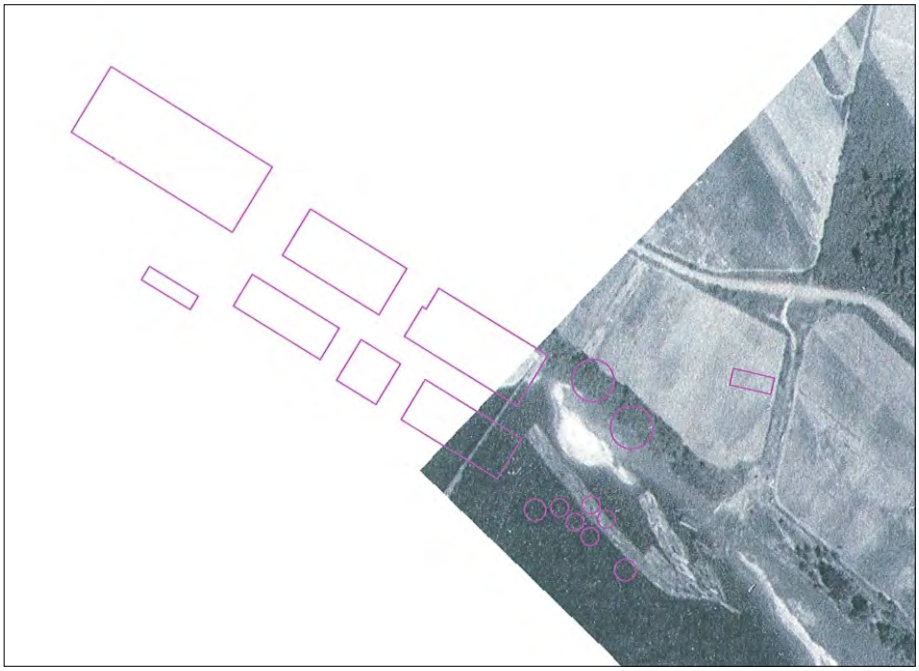
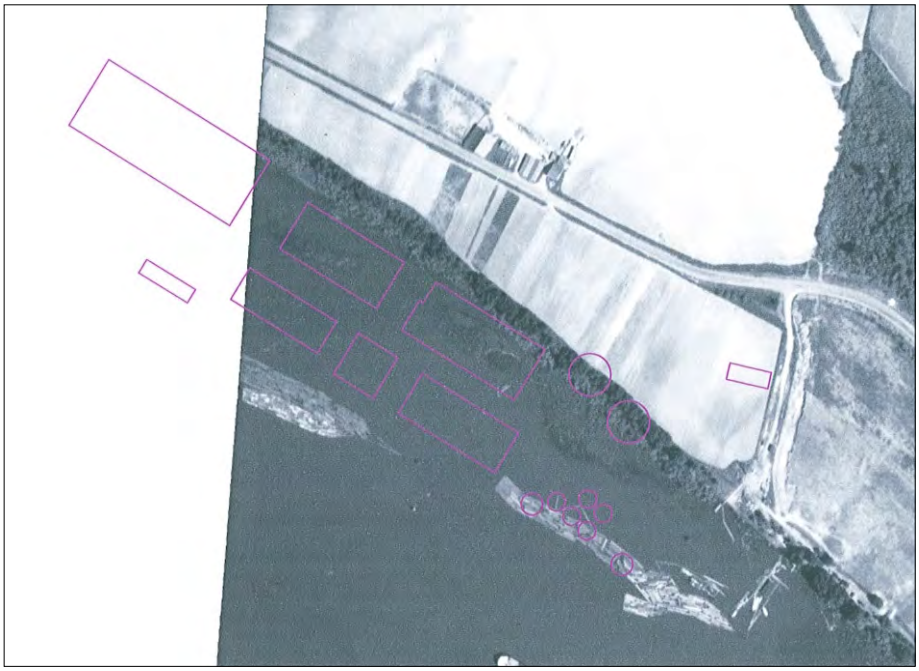
Figure 25

Appendix A

Historical Aerial Photographs



1935



1939

N

1935 and 1939 Aerial Photographs

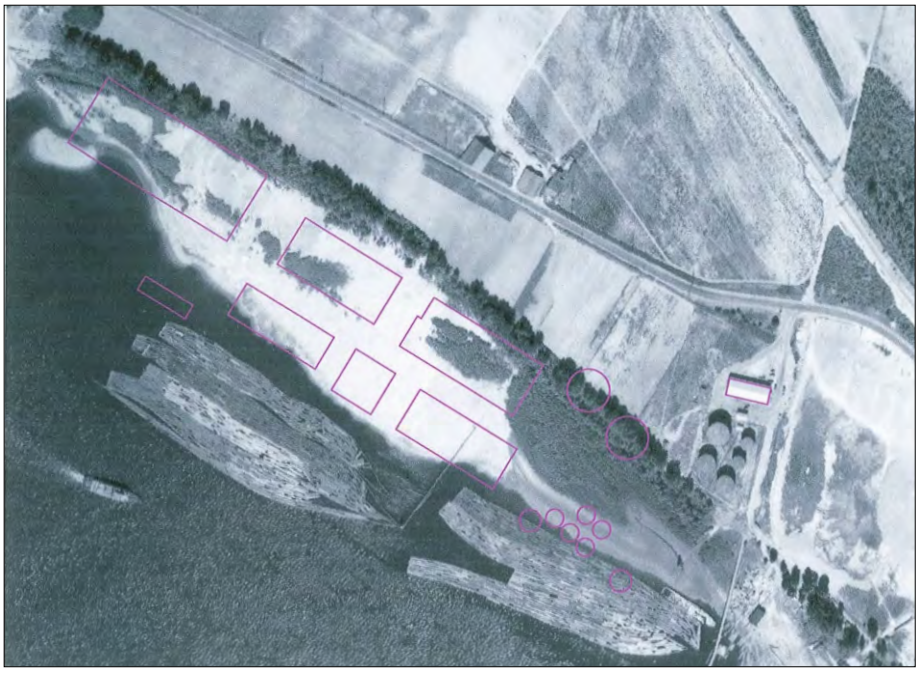
Revised Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1126-09

October 2009

Figure A-1



1940

1948

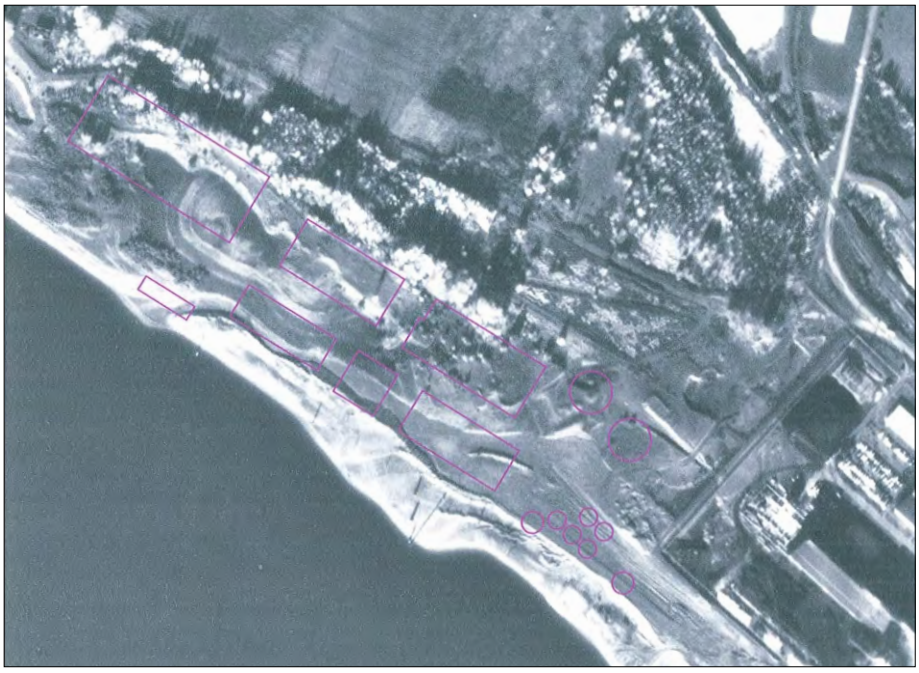
N

1940 and 1948 Aerial Photographs

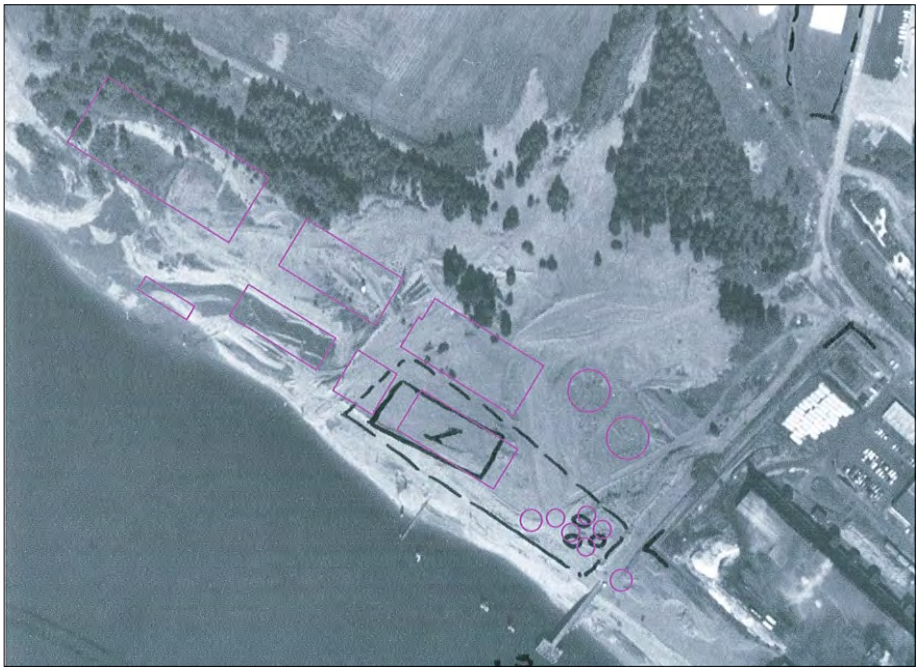
Revised Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1126-09	Figure
October 2009		A-2



1956



1959

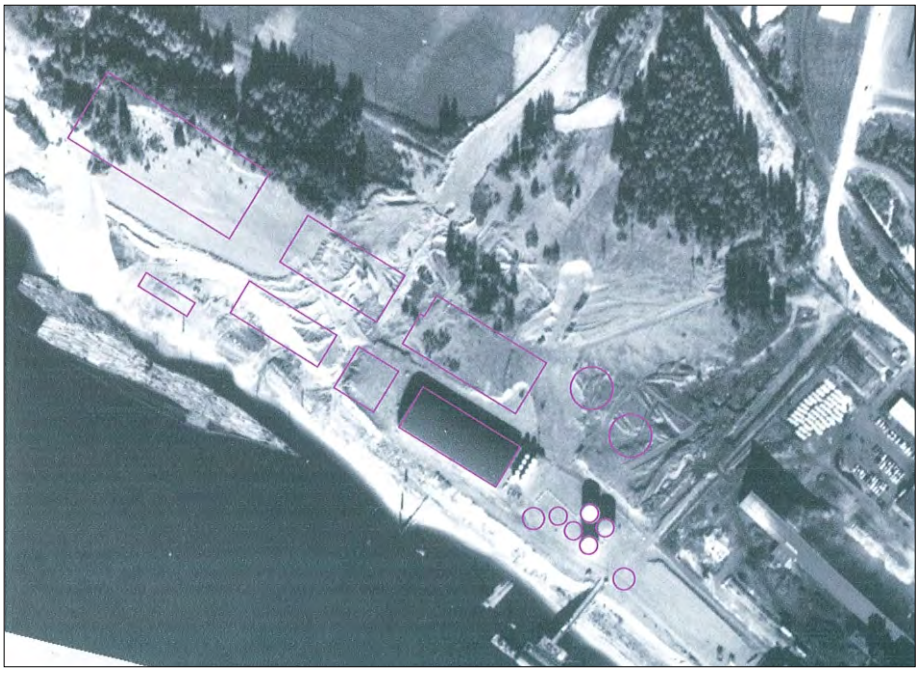
N

1956 and 1959 Aerial Photographs

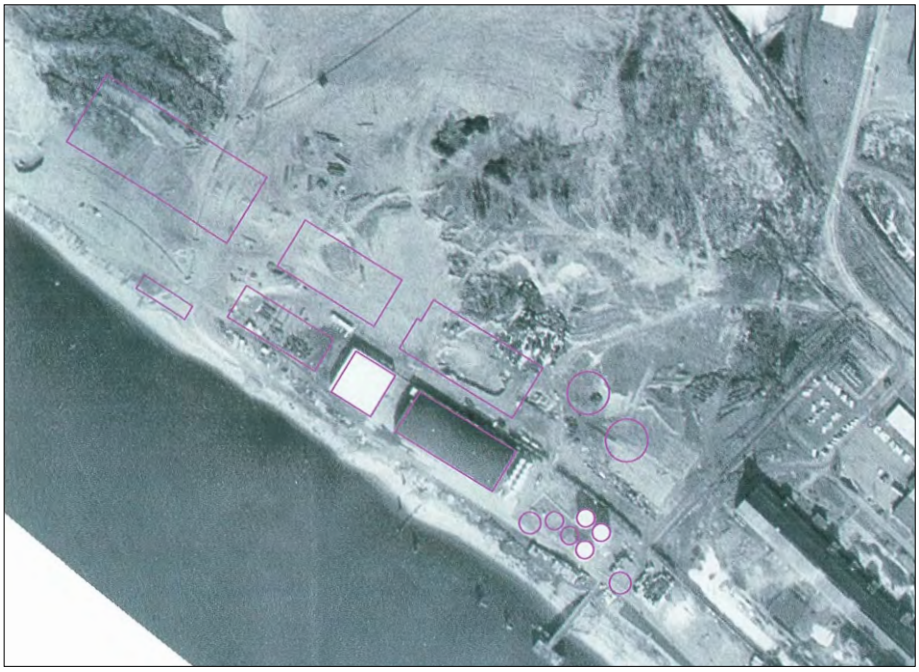
Revised Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1126-09	Figure
October 2009		A-3



1961



1966

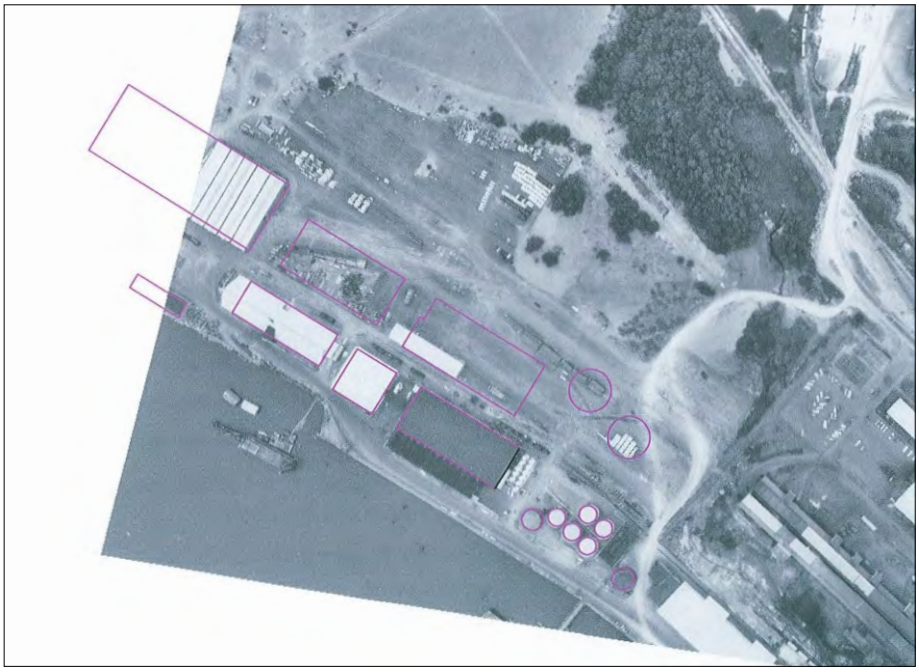
N

1961 and 1966 Aerial Photographs

Revised Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc. Environmental and Geotechnical Consultants	Project Number 1126-09 October 2009	Figure A-4

1967



1971

N

1967 and 1971 Aerial Photographs

Revised Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

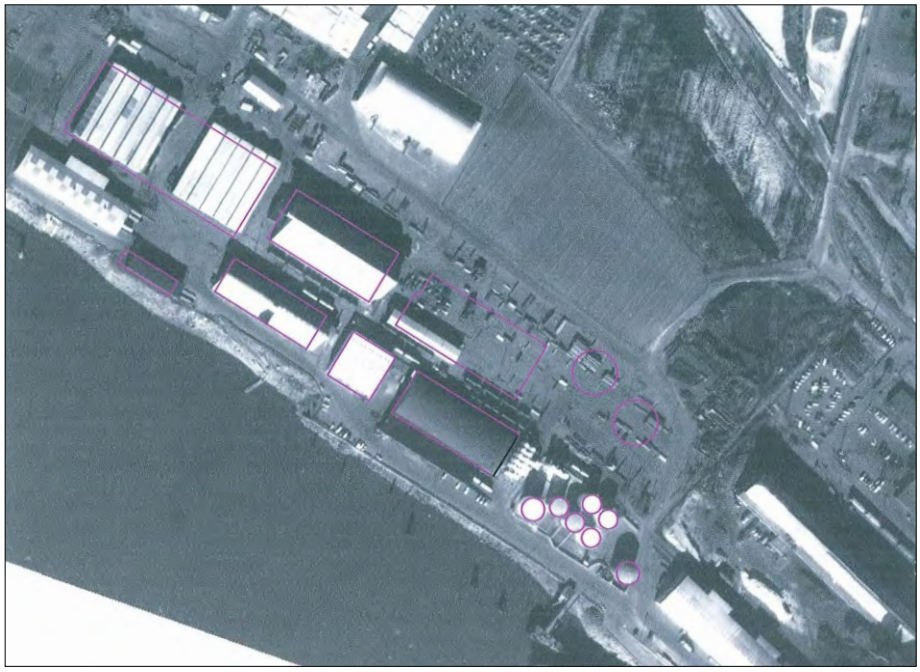
Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1126-09

October 2009

Figure A-5

1974



1980

N

1974 and 1980 Aerial Photographs

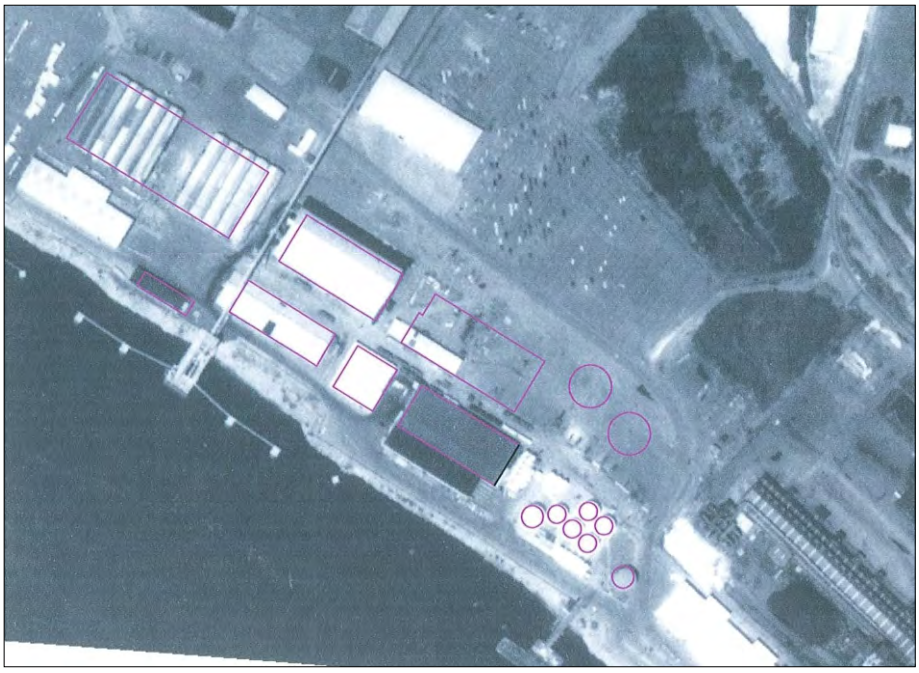
Revised Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

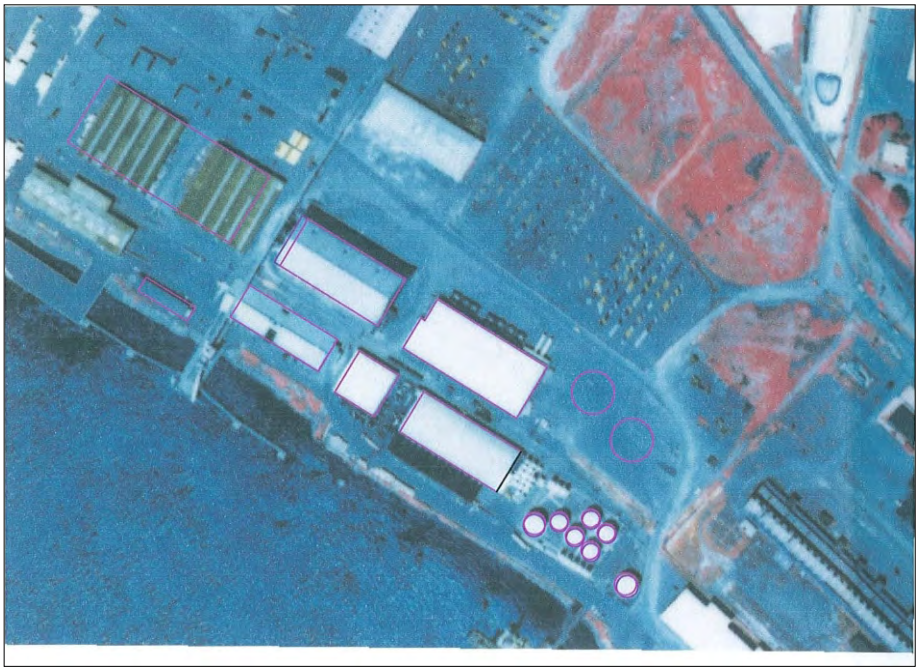
Project Number 1126-09

October 2009

Figure A-6



1983



1990

N

1983 and 1990 Aerial Photographs

Revised Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1126-09

October 2009

Figure A-7

1998

2002

N

1998 and 2002 Aerial Photographs

Revised Remedial Investigation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

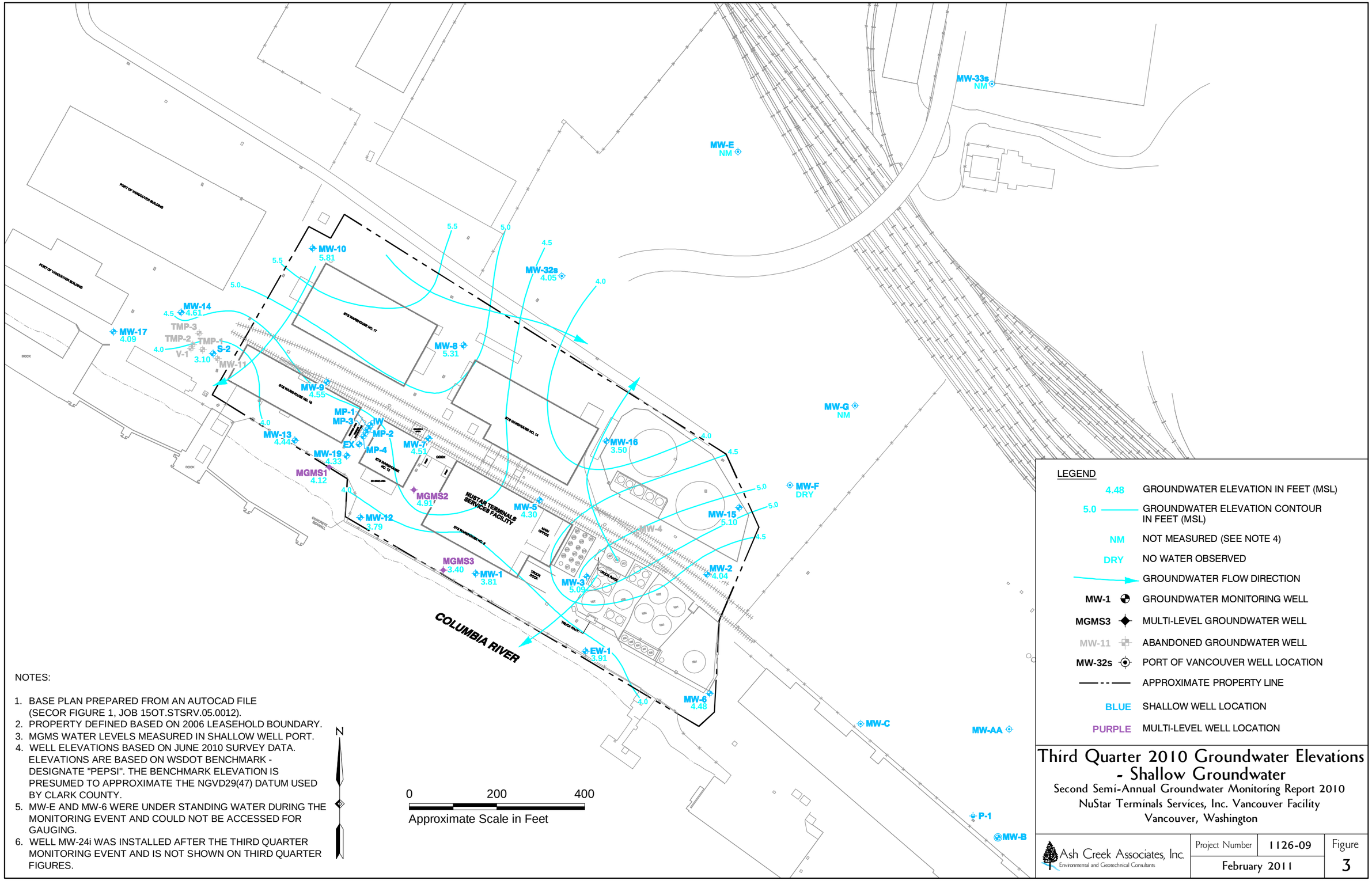
Project Number 1126-09

October 2009

Figure A-8

Appendix B

Historical Potentiometric Maps



NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.
4. WELL ELEVATIONS BASED ON JUNE 2010 SURVEY DATA. ELEVATIONS ARE BASED ON WSDOT BENCHMARK - DESIGNATE "PEPSI". THE BENCHMARK ELEVATION IS PRESUMED TO APPROXIMATE THE NGVD29(47) DATUM USED BY CLARK COUNTY.
5. MW-E AND MW-6 WERE UNDER STANDING WATER DURING THE MONITORING EVENT AND COULD NOT BE ACCESSED FOR GAUGING.
6. WELL MW-24i WAS INSTALLED AFTER THE THIRD QUARTER MONITORING EVENT AND IS NOT SHOWN ON THIRD QUARTER FIGURES.

LEGEND

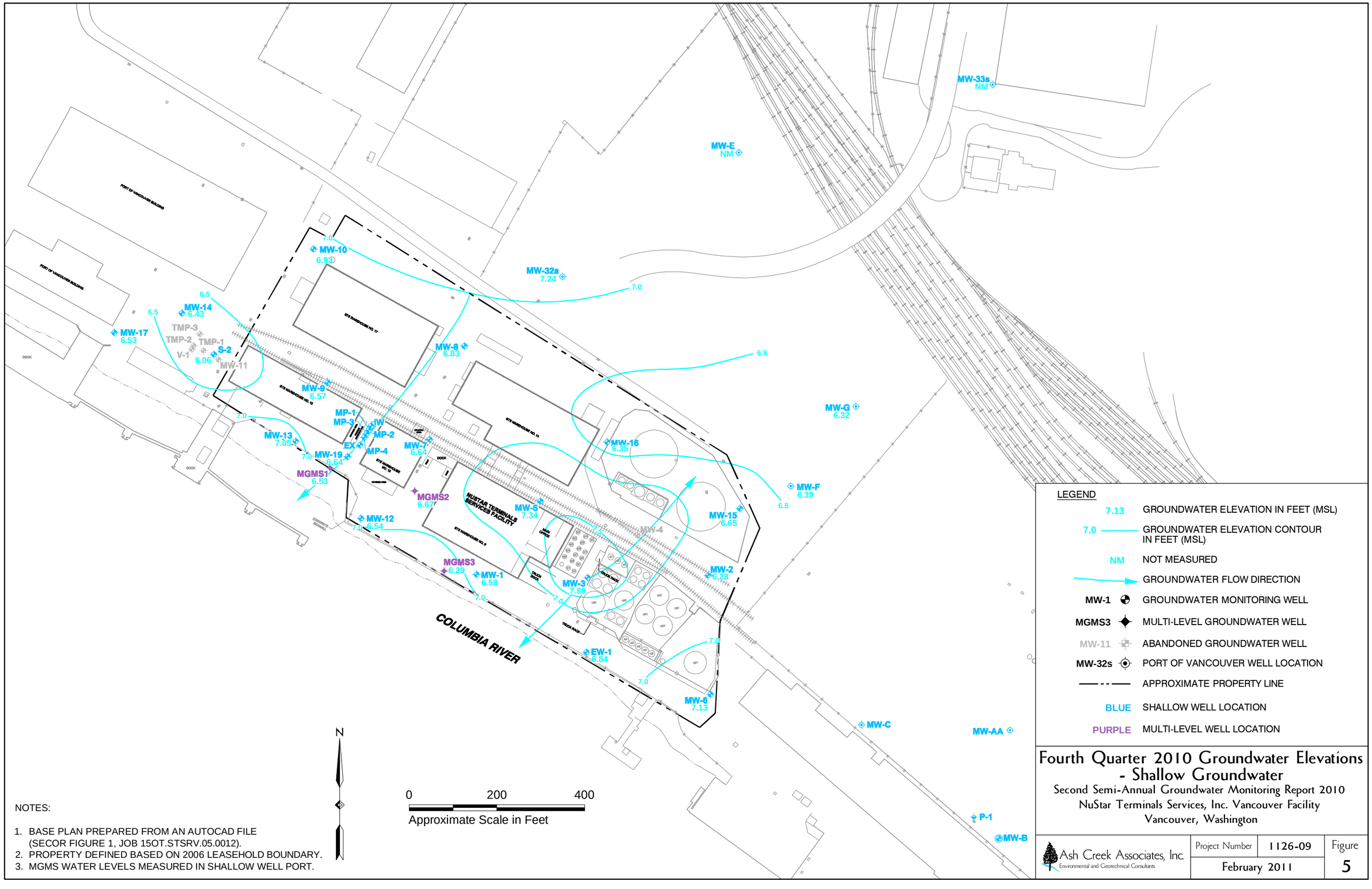
4.48	GROUNDWATER ELEVATION IN FEET (MSL)
5.0	GROUNDWATER ELEVATION CONTOUR IN FEET (MSL)
NM	NOT MEASURED (SEE NOTE 4)
DRY	NO WATER OBSERVED
	GROUNDWATER FLOW DIRECTION
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-11	ABANDONED GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
	APPROXIMATE PROPERTY LINE
BLUE	SHALLOW WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

Third Quarter 2010 Groundwater Elevations - Shallow Groundwater

Second Semi-Annual Groundwater Monitoring Report 2010
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1126-09	Figure
February 2011		3



NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.

LEGEND

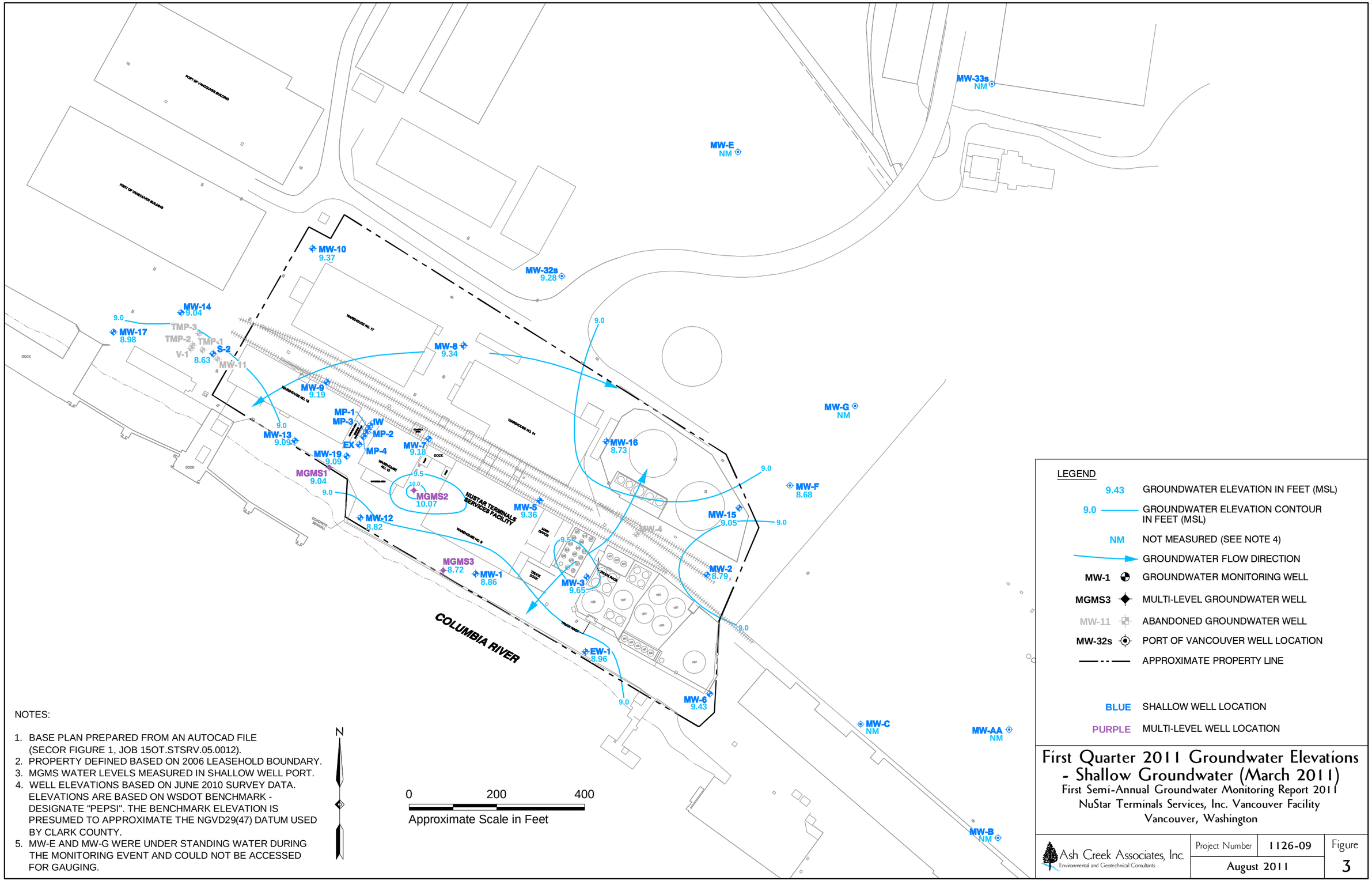
7.13	GROUNDWATER ELEVATION IN FEET (MSL)
7.0	GROUNDWATER ELEVATION CONTOUR IN FEET (MSL)
NM	NOT MEASURED
	GROUNDWATER FLOW DIRECTION
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-11	ABANDONED GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
	APPROXIMATE PROPERTY LINE
BLUE	SHALLOW WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

Fourth Quarter 2010 Groundwater Elevations - Shallow Groundwater

Second Semi-Annual Groundwater Monitoring Report 2010
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1126-09	Figure
February 2011		5



NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.
4. WELL ELEVATIONS BASED ON JUNE 2010 SURVEY DATA. ELEVATIONS ARE BASED ON WSDOT BENCHMARK - DESIGNATE "PEPSI". THE BENCHMARK ELEVATION IS PRESUMED TO APPROXIMATE THE NGVD29(47) DATUM USED BY CLARK COUNTY.
5. MW-E AND MW-G WERE UNDER STANDING WATER DURING THE MONITORING EVENT AND COULD NOT BE ACCESSED FOR GAUGING.

LEGEND

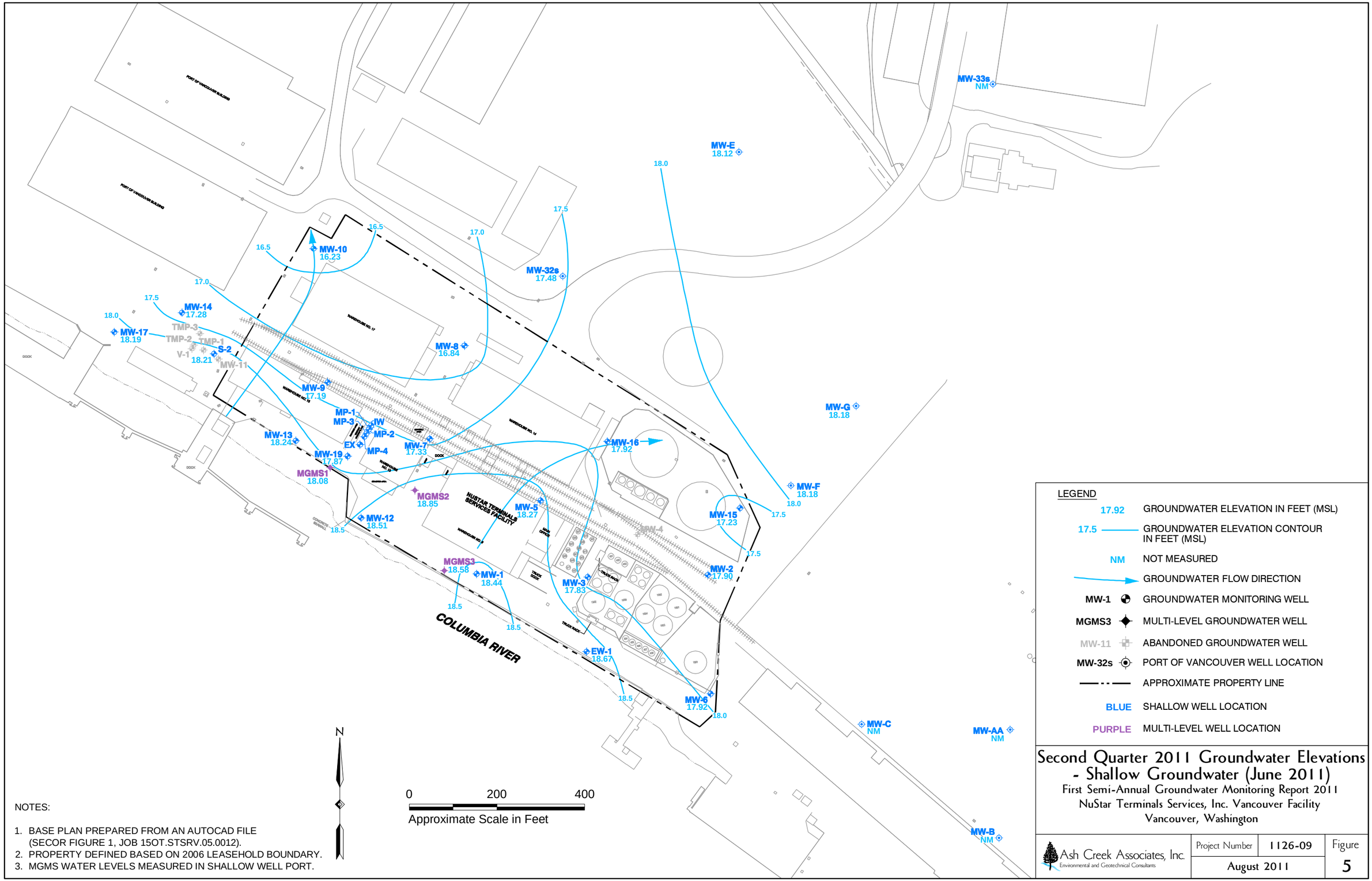
9.43	GROUNDWATER ELEVATION IN FEET (MSL)
9.0	GROUNDWATER ELEVATION CONTOUR IN FEET (MSL)
NM	NOT MEASURED (SEE NOTE 4)
	GROUNDWATER FLOW DIRECTION
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-11	ABANDONED GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
	APPROXIMATE PROPERTY LINE
BLUE	SHALLOW WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

First Quarter 2011 Groundwater Elevations - Shallow Groundwater (March 2011)

First Semi-Annual Groundwater Monitoring Report 2011
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1126-09	Figure
August 2011		3



NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.

LEGEND

17.92	GROUNDWATER ELEVATION IN FEET (MSL)
17.5	GROUNDWATER ELEVATION CONTOUR IN FEET (MSL)
NM	NOT MEASURED
	GROUNDWATER FLOW DIRECTION
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-11	ABANDONED GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
	APPROXIMATE PROPERTY LINE
BLUE	SHALLOW WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

Second Quarter 2011 Groundwater Elevations - Shallow Groundwater (June 2011)

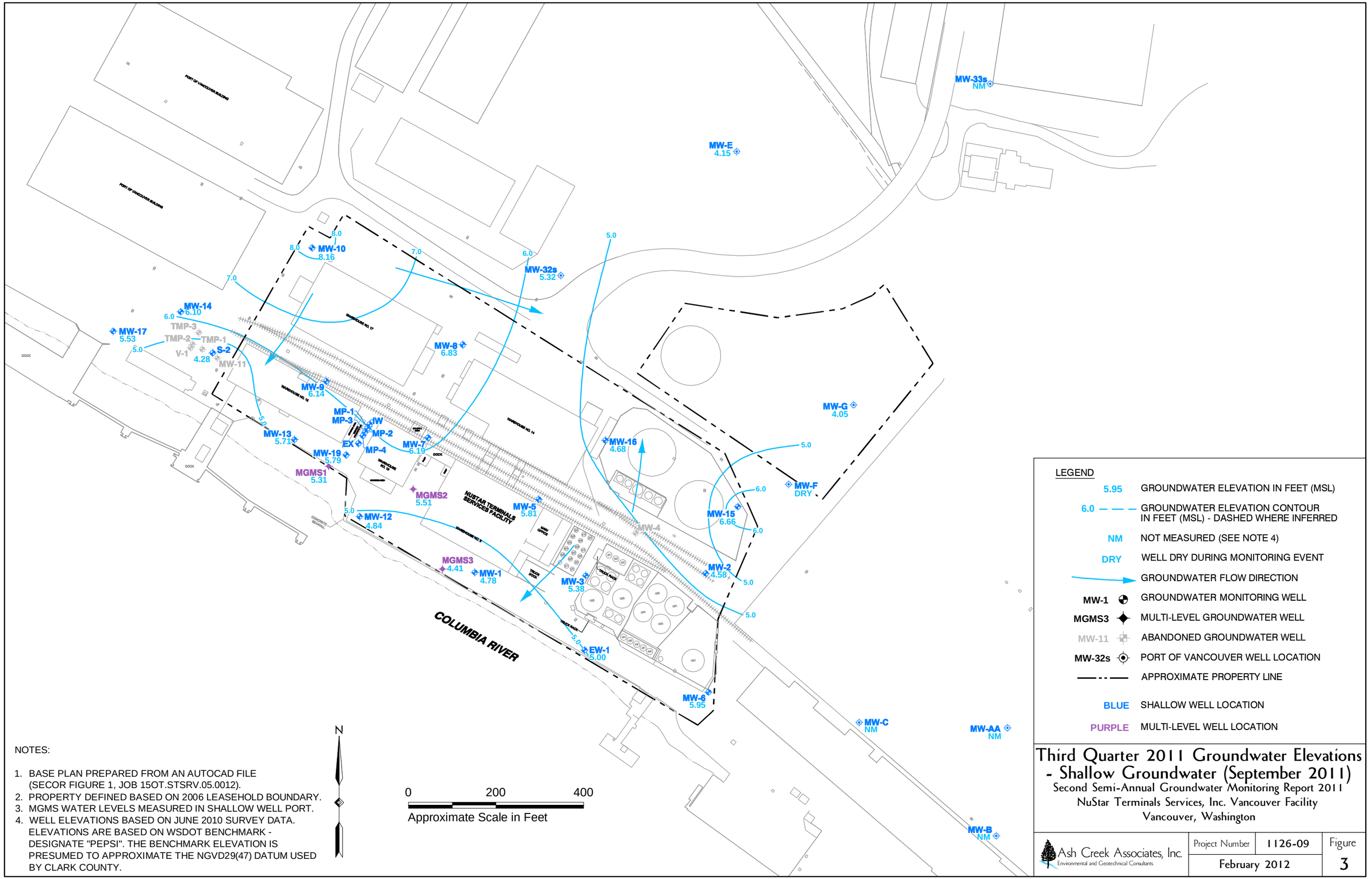
First Semi-Annual Groundwater Monitoring Report 2011
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1126-09

August 2011

Figure 5



NOTES:

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2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.
4. WELL ELEVATIONS BASED ON JUNE 2010 SURVEY DATA. ELEVATIONS ARE BASED ON WSDOT BENCHMARK - DESIGNATE "PEPSI". THE BENCHMARK ELEVATION IS PRESUMED TO APPROXIMATE THE NGVD29(47) DATUM USED BY CLARK COUNTY.

N

0 200 400

Approximate Scale in Feet

LEGEND

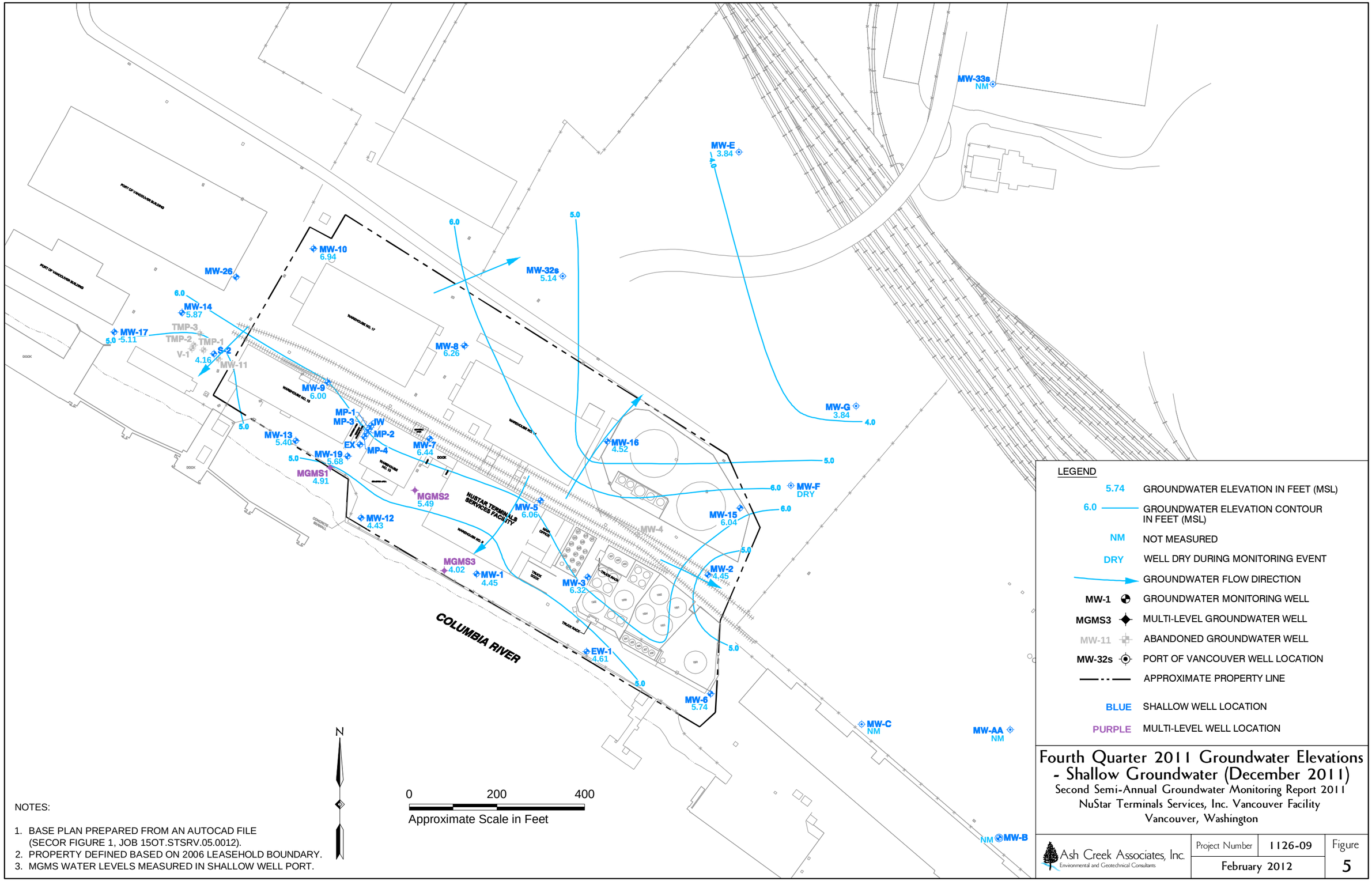
5.95	GROUNDWATER ELEVATION IN FEET (MSL)
6.0	GROUNDWATER ELEVATION CONTOUR IN FEET (MSL) - DASHED WHERE INFERRED
NM	NOT MEASURED (SEE NOTE 4)
DRY	WELL DRY DURING MONITORING EVENT
	GROUNDWATER FLOW DIRECTION
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-11	ABANDONED GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
	APPROXIMATE PROPERTY LINE
BLUE	SHALLOW WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

Third Quarter 2011 Groundwater Elevations - Shallow Groundwater (September 2011)

Second Semi-Annual Groundwater Monitoring Report 2011
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1126-09	Figure
February 2012		3



NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.

LEGEND

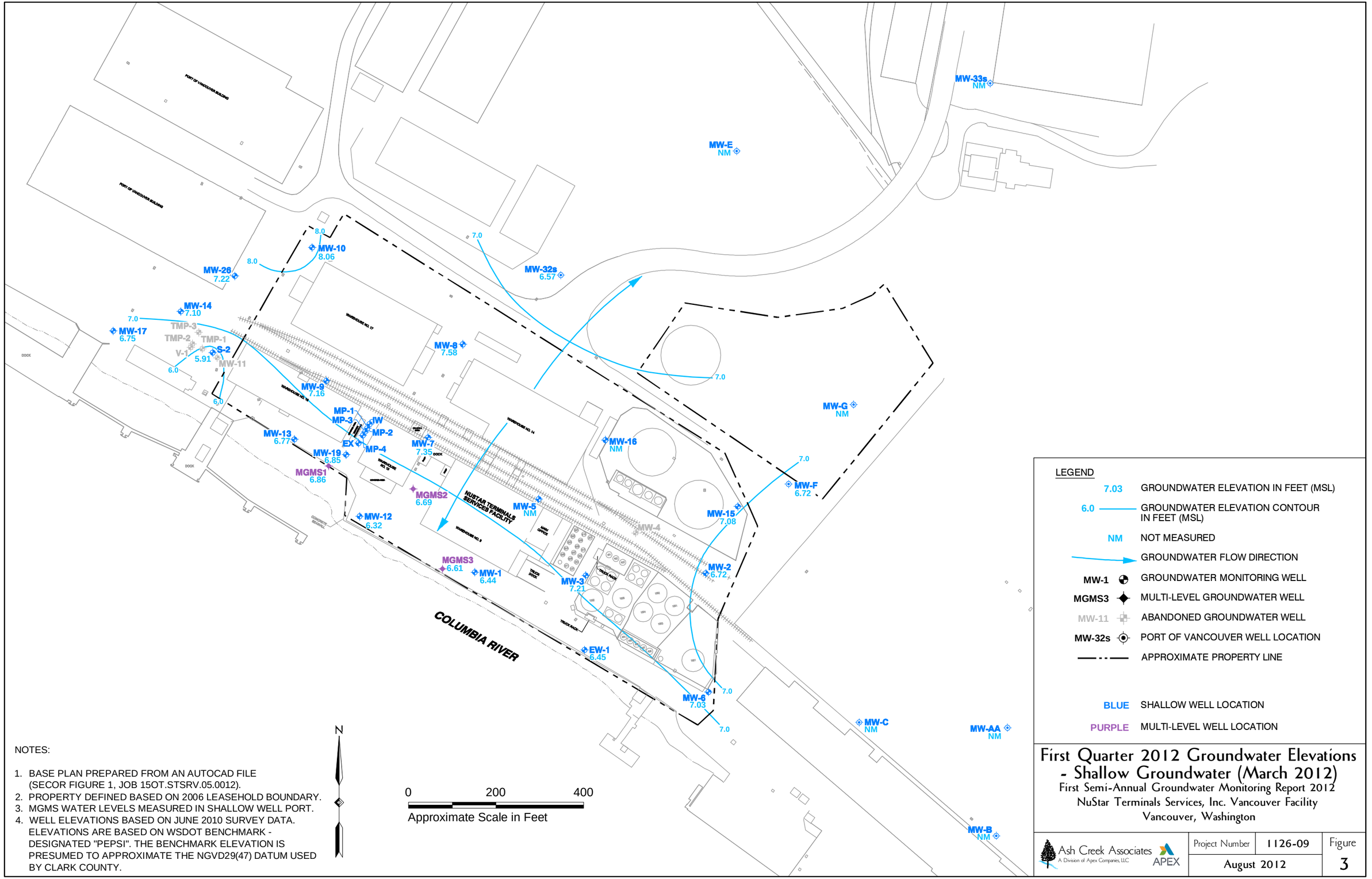
5.74	GROUNDWATER ELEVATION IN FEET (MSL)
6.0	GROUNDWATER ELEVATION CONTOUR IN FEET (MSL)
NM	NOT MEASURED
DRY	WELL DRY DURING MONITORING EVENT
	GROUNDWATER FLOW DIRECTION
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-11	ABANDONED GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
	APPROXIMATE PROPERTY LINE
BLUE	SHALLOW WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

Fourth Quarter 2011 Groundwater Elevations - Shallow Groundwater (December 2011)

Second Semi-Annual Groundwater Monitoring Report 2011
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1126-09	Figure
February 2012		5



NOTES:

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2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.
4. WELL ELEVATIONS BASED ON JUNE 2010 SURVEY DATA. ELEVATIONS ARE BASED ON WSDOT BENCHMARK - DESIGNATED "PEPSI". THE BENCHMARK ELEVATION IS PRESUMED TO APPROXIMATE THE NGVD29(47) DATUM USED BY CLARK COUNTY.

LEGEND

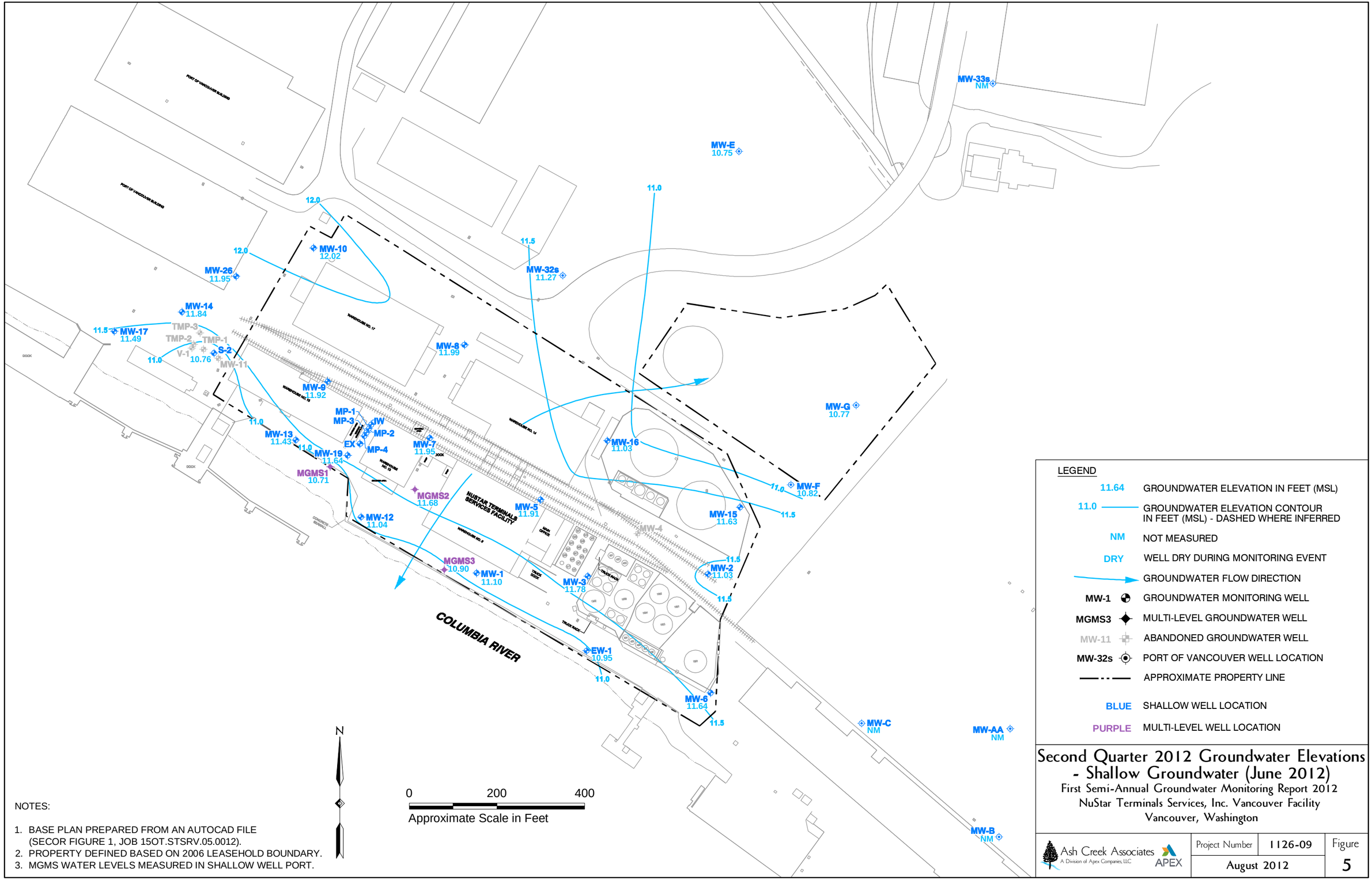
7.03	GROUNDWATER ELEVATION IN FEET (MSL)
6.0	GROUNDWATER ELEVATION CONTOUR IN FEET (MSL)
NM	NOT MEASURED
	GROUNDWATER FLOW DIRECTION
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-11	ABANDONED GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
	APPROXIMATE PROPERTY LINE
BLUE	SHALLOW WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

First Quarter 2012 Groundwater Elevations - Shallow Groundwater (March 2012)

First Semi-Annual Groundwater Monitoring Report 2012
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates
A Division of Apex Companies, LLC
APEX

Project Number	1126-09	Figure
August 2012		3



NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. MGMS WATER LEVELS MEASURED IN SHALLOW WELL PORT.

LEGEND

11.64	GROUNDWATER ELEVATION IN FEET (MSL)
11.0	GROUNDWATER ELEVATION CONTOUR IN FEET (MSL) - DASHED WHERE INFERRED
NM	NOT MEASURED
DRY	WELL DRY DURING MONITORING EVENT
	GROUNDWATER FLOW DIRECTION
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-11	ABANDONED GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
	APPROXIMATE PROPERTY LINE
BLUE	SHALLOW WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

Second Quarter 2012 Groundwater Elevations - Shallow Groundwater (June 2012)

First Semi-Annual Groundwater Monitoring Report 2012
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates
A Division of Apex Companies, LLC
APEX

Project Number	1126-09	Figure
August 2012		5

Appendix C

2011 Groundwater Flow Evaluation Report
(Contained on CD-ROM)

Groundwater Flow Evaluation Report
NuStar Vancouver Facility
Vancouver, Washington

Prepared for:
NuStar Terminals Services, Inc.

March 30, 2012
1126-09

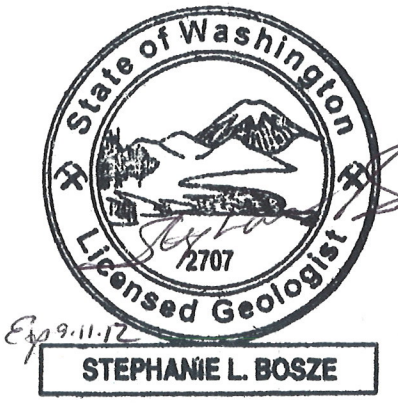
Ash Creek Associates
A Division of Apex Companies, LLC
APEX

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Groundwater Flow Evaluation Report
NuStar Vancouver Facility
Vancouver, Washington

Prepared for:
NuStar Terminals Services, Inc.

March 30, 2012
1126-09



Stephanie Bosze, L.G.
Senior Project Geologist

FOR

Amanda Spencer
Principal Geologist

3015 SW First Avenue
Portland, Oregon 97201-4707
(503) 924-4704 Portland
(360) 567-3977 Vancouver
(503) 943-6357 Fax
www.ashcreekassociates.com

Table of Contents

Tables

Figures

Figures (continued)

Appendices

1.0 Introduction

This *Groundwater Flow Evaluation Report* (GFER) was prepared by Ash Creek Associates, a Division of Apex Companies, LLC (Ash Creek) on behalf of NuStar Terminals Services, Inc. (NuStar) for the NuStar Vancouver Facility (Facility) in Vancouver, Washington (Figure 1). A Facility plan is provided on Figure 2. NuStar is currently implementing interim remedial actions and groundwater monitoring at the Facility pursuant to Amended Agreed Order No 07-TC-S-DE3938 (the Order). The NuStar Facility is leased by NuStar from the Port of Vancouver (Port). The Port is currently implementing interim remedial actions and conducting groundwater monitoring for two facilities north of the Facility: the Cadet Manufacturing Company (Cadet) facility and the former Swan Manufacturing Company (SMC) facility (Figure 3). In an August 24, 2010 letter, the Washington State Department of Ecology (Ecology) requested that NuStar evaluate groundwater levels at the Facility using transducers and requested an associated work plan for the proposed transducer monitoring program. On September 17, 2010, a *Transducer Installation Work Plan* (Ash Creek, 2010) was submitted to Ecology that proposed the installation of transducers in five monitoring wells at the Facility. The transducers were installed and recording of water level data was initiated on January 6, 2011. These transducer data have been combined with transducer data provided by the Port in order to evaluate groundwater gradient and groundwater flow on a regional basis. This report summarizes the methodology used to collect and evaluate the transducer data; evaluates the magnitude and direction of regional groundwater gradients; and, given these gradients, provides an evaluation of groundwater flow pathways from the NuStar Facility.

2.0 Background

2.1 Facility Environmental Framework

The NuStar Vancouver Terminal has operated as a bulk storage terminal since 1960. A Facility plan is provided as Figure 2. The terminal formerly handled chlorinated solvents, including tetrachloroethene (PCE), methylene chloride (MC), and 1,1,1-trichloroethane (1,1,1-TCA); however, handling and storage of chlorinated solvents was terminated in 1994. During the period in which chlorinated solvents were handled at the Facility, chlorinated solvents and associated degradation chemicals were released into soil and groundwater. Several environmental Facility assessments have been conducted at the Facility to evaluate soil and groundwater conditions. Over the course of these investigations, more than 35 groundwater monitoring wells have been installed at and in the vicinity of the Facility to understand the extent and magnitude of dissolved-phase chlorinated solvents in groundwater and to evaluate groundwater flow conditions. The results of the investigations are presented in the Revised Remedial Investigation (RI) Report submitted to Ecology in October 2009 (Ash Creek, 2009) and evaluated in the Baseline Risk Assessment (BRiA) report submitted to Ecology in September 2008 (Ash Creek, 2008a). Groundwater

monitoring is conducted on a quarterly basis; the most recent monitoring results are presented in the Second Semi-Annual 2011 Groundwater Monitoring Report (Ash Creek, 2012).

2.2 Geology and Hydrogeology

The geology and hydrogeology in the vicinity of the Facility is summarized in this section and is based primarily on the environmental investigations performed for the RI (Ash Creek, 2009a).

2.2.1 Geology

The vicinity of the Facility is dominated by two primary units: the Unconsolidated Sedimentary Aquifer (USA), and the Troutdale Formation.

The USA is the upper unit. The thickness of this unit varies, observed to range from 125 to 200 feet thick within the areas investigated at and near the Port. The USA consists of alluvial deposits of the Columbia River and the catastrophic Missoula Floods. The upper portion of the USA contains unconsolidated silt and sand. The lower portion generally consists of sand or sand and gravel.

The Troutdale Formation underlies the USA and can be in excess of 1,000 feet thick. The base of the USA is typically identified by the transition to an underlying conglomerate or consolidated/unconsolidated silty, sandy gravel of the Pleistocene Troutdale Formation.

The upper part of the USA that underlies the Facility consists of fine to coarse sand with variable layers of silt or silty sand. The upper sandy zone extends from the ground surface to a depth of up to 50 feet beneath the western and central portions of the Facility and extending south to the Columbia River. Within the upper USA, a silt layer is present on the north and east parts of the Facility. At the northern Facility boundary, the silt is encountered at depths as shallow as 9 to 10 feet below the ground surface (bgs) and extends to depths of approximately 40 feet bgs. This layer is continuous along the north and east of the Facility, forming a low-permeability ridge at the Facility boundary. The upper contact of the silt appears to coincide with the historical riverbank. The sand lying above the silt corresponds to the fill observed being placed in aerial photographs from 1948 through 1961.

A silty gravel layer underlies the sandy/silty layers of the upper USA beneath the Facility. The silty gravel grades into the coarse sand and/or gravel of the lower portion of the USA. The depth to the top of the silty gravel varies from 39 (north) to 50 (south) feet bgs beneath the Facility. North of the northern Facility boundary (i.e., north of the silt ridge), the shallow geology is predominantly silt. The silty gravel is not observed and a sand layer is found between the silt and underlying sand and gravel. During a Facility investigation in August 2011, the Troutdale Formation was encountered at a depth of approximately 210 feet below the ground surface (bgs) in the source area (between warehouses 13 and 15) at the Facility.

2.2.2 Hydrogeology

The regional aquifers follow the regional geology discussed above. The USA is unconfined and receives recharge directly from the land surface and/or surface water features. It is a productive aquifer with high well yields (several thousand gallons per minute [gpm] without significant drawdown).

Based on numerous studies conducted in the Port area, the following aquifer terminology has been adopted:

- Shallow Zone – The Shallow Zone corresponds to first encountered groundwater, generally the upper 20 to 30 feet of the saturated zone. At the Facility, depth to first encountered groundwater is generally 21 to 33 feet below grade (elevation of 5 to 12 feet). The bottom of the Shallow Zone is about elevation -10 to -20 feet, or a depth of about 40 to 50 feet.
- Intermediate Zone – The Intermediate Zone generally corresponds to the middle of the USA. This zone is most directly influenced by pumping wells in the USA. The Intermediate Zone lies between approximate elevations -15 and -100 feet. At the Facility, the Intermediate Zone is between the depths of about 55 and 130 feet.
- Deep Zone – The Deep Zone includes the Troutdale Formation and, in some areas, the lower part of the USA. It generally corresponds to portions of the aquifers that are less influenced by groundwater pumping and more by regional influences.

Beneath most of the Facility, the Shallow Zone lies within the sand layer overlying the silty gravel. Along the northern Facility boundary and continuing to the north, the Shallow Zone lies entirely within the silt layer. As a result, the silt layer forms a low-permeability zone that greatly impedes hydrogeologic communication between the Shallow and Intermediate Zones on the Facility, and effectively isolates the Shallow Zone on-Facility from the Shallow Zone off-Facility. Off-Facility to the north, the sand layer beneath the silt layer is hydrogeologically connected to the underlying sand and gravel, so is therefore effectively part of the Intermediate Zone.

The lower reaches of the Columbia River – where the Facility is located – are subject to tidal variations as well as seasonal and stage variations due to precipitation and regulation of river flow by dams.

A groundwater divide is present in the central portion of the Facility within the Shallow Zone, generally corresponding to the southern edge of the "silt ridge" at the Facility. Groundwater south of the groundwater divide is more sensitive to tidal variations. Shallow groundwater to the north of the divide appears to be less tidally influenced and generally flows away from the river. The presence of the silt ridge, coupled with the groundwater divide, effectively isolates the Shallow Zone groundwater at the Facility from the influences of pumping from the Shallow or Intermediate Zones north and east of the Facility. Furthermore, given that the geologic source of the silt ridge is the former natural river bank, this feature is continuous well beyond the Facility boundaries to the east and west.

Groundwater flow in the Intermediate Zone at the Facility has been variable and, until recently, was not evaluated within a regional context. The Intermediate Zone groundwater flow at the NuStar Facility and in the larger area that encompasses the SMC and Cadet properties is evaluated in Sections 4 through 6 of this report. As a part of a recent groundwater modeling effort, Aspect, NuStar's groundwater modeling consultant, used the Theim equation (1906) to estimate the hydraulic conductivity of the Intermediate Zone using data from the Port's groundwater extraction system and observed water level changes in nearby observation wells. The hydraulic conductivity calculations are summarized in Appendix A. Groundwater pumping rates were obtained from the Port's Interim Action Summary Report (Port, 2011) and groundwater elevation data for observation wells MW-05i and CM-M-20i were obtained from the Port's transducer dataset. The hydraulic conductivity was estimated by dividing the transmissivity by the screen length for extraction well EW-1. Groundwater level data from two time periods (March 2010 and October 2011) were used to assess the transmissivity. Both data sets yielded a hydraulic conductivity of 1,900 feet per day (ft/day). This estimate of hydraulic conductivity is consistent with references summarized in the Port's Interim Action Report (2011) including the following:

- Swanson and Leschuk (1991) – 1,000 ft/day
- McFarland and Morgan (1996) – Median hydraulic conductivity in the USA of 200 ft/day
- Port of Vancouver step-rate pump test on extraction well EW-1 (POV, 2011) – range between 950 and 1,200 ft/day
- Port of Vancouver distance-drawdown test (POV, 2011) – 950 and 1,900 feet/day

2.3 Recent Interim Actions

Historical interim actions on vadose zone soil and shallow groundwater have been conducted at both the NuStar and Port Facilities to address the VOC source areas. This section summarizes the most recent interim actions at both the NuStar Facility (2008 through present) and Port properties (2009 through present).

2.3.1 NuStar Interim Action

The interim action implemented at the NuStar Facility consists of Soil Vapor Extraction (SVE) in the vadose zone and enhanced anaerobic bioremediation of Shallow Zone groundwater. The interim action was initiated in April 2008 and consisted of injection of a bioremediation substrate into 38 temporary injection points and installing 18 SVE wells and a vapor extraction system. NuStar prepared a *2011 Interim Action Work Plan* (IA Work Plan; Ash Creek, 2011) proposing the expansion of the 2008 interim action to include 155 additional bioremediation injection points and an expansion of the 2008 SVE to include an additional 34 SVE wells. Ecology approved the IA Work Plan in an email on March 30, 2011 and the interim action was implemented between July and October 2011. Through December 2011, the system performance monitoring has demonstrated removal of 3,300 pounds of volatile organic compounds (VOCs) by the SVE

system, and a 99 percent and 91 percent decrease in concentrations of PCE and trichloroethene (TCE), respectively, in Shallow Zone groundwater monitoring well MW-7, located in the source area.

2.3.2 Port Interim Action

The Port implemented a groundwater pump and treat interim action at the former SMC Facility in June 2009. The purpose of the interim action is to hydraulically contain dissolved phase VOCs from the SMC and Cadet Facilities and reduce VOC concentrations in Shallow Zone groundwater at the former SMC Facility (Parametrix, 2010). The extraction well pump has been operating at a flow rate of approximately 2,500 gpm since full-time operation began on June 15, 2009 (Parametrix, 2010). The extraction well is screened in Intermediate Zone groundwater from 40 to 86.5 feet bgs. As of December 2010, the system has reportedly removed 485 pounds of total VOCs from the aquifer (Parametrix, 2011).

2.4 2010 Transducer Study

In June 2010, Ash Creek conducted an evaluation of regional Intermediate Zone groundwater flow using a combination of manually collected water levels and automated (via transducer) water levels. The original objective of that study was to determine whether manually collected groundwater elevation data could be combined with transducer data to develop accurate representations of regional groundwater flow. During the 2010 study, transducers were installed in eight Intermediate Zone wells at the NuStar Facility and data were collected over approximately a 5-day period. The Port maintains a network of transducers in eighteen monitoring wells (17 in the Intermediate Zone; one in the Deep Zone) in order to monitor groundwater conditions in the general vicinity of the former SMC and Cadet Facilities. The NuStar and Port transducer data were combined to prepare regional groundwater potentiometric maps. The results were presented to Ecology at a meeting on July 20, 2010 and indicated that there was very little difference between regional groundwater flow maps that utilized solely transducer data with those that utilized a combination of manual and transducer data. The results also indicated an area of flat gradient between the northern boundary of the NuStar Facility and the Port's interim action area, with the predominant groundwater flow in the Intermediate Zone toward the Columbia River beneath the NuStar Facility. The results contradicted the conceptual model of groundwater flow presented by the Port (Parametrix, 2010), which identified that groundwater in the Intermediate Zone at the NuStar facility was within the immediate capture zone of the POV's interim action extraction well (EW-1). A regional map including the relative locations of the NuStar, SMC, and Cadet Facilities, as well as the location of monitoring wells with transducers, is shown on Figure 3.

3.0 Methodology of Data Collection

Pressure transducers were installed in five Intermediate Zone groundwater monitoring wells at the NuStar Facility, including MW-19i, MW-21i-40, MW-22i, MW-23i and MW-24i. The Port currently maintains

transducers in seventeen Intermediate Zone wells, including MW-05i, MW-7i, MW-19i, MW-26i, MW-29i through MW-34i, MW-36i, CM-MW-5i, CM-MW-7i, and CM-MW-18i through CM-MW-21i. Figure 3 shows the NuStar and Port wells that contain transducers.

The transducer monitoring period evaluated in this report was initiated on January 6, 2011 and includes data through January 9, 2012. To date, transducers are still maintained in wells at the NuStar and the Port facilities. In general, monitoring of water levels has been continuous over the referenced one-year monitoring period with a few exceptions. Ash Creek noted a few short time periods (typically less than one hour) in which transducers were removed from a monitoring well for the purpose of sampling groundwater in the well during quarterly groundwater monitoring events. Data are missing for a few of the Port wells (CM-MW-19i through CM-MW-21i) for periods of up 6 months due to technical difficulties associated with the transducers.

3.1 Equipment and Procedures

A non-vented logging pressure transducer (*In Situ* Level Troll 500) was placed in each of the referenced wells, with an additional transducer (*In Situ* Barotroll) deployed in the study area to log atmospheric pressure. The Barotroll is used to correct the absolute-pressure transducer data for atmospheric pressure. In the Work Plan, the proposed transducer model was a vented variety that could automatically compensate for barometric pressure change (Ash Creek, 2010). Given the potential for standing water to collect in the monitoring wells during periods of heavy rain and potentially damage the vented transducer, a non-vented transducer type was ultimately selected for this evaluation. To ensure that the atmosphere within the well casing was the same as the atmosphere being recorded by the Barotroll, tubing was inserted into the well cap and was extended to the top of the monument (and above any standing water).

Prior to installation in the monitoring well, the transducers were positioned in place and connected to a data communication cable. The data communication cable was secured at the top of casing in order to be easily accessed for downloading data without disturbing the transducer. Each transducer was installed approximately 10 feet below the groundwater level at the time of installation. This allowed for groundwater levels to rise and fall in response to tidal fluctuations, while maintaining a measurable pressure head above the transducer. Each transducer was calibrated to Standard Time (not taking into account Daylight Saving time) and assigned a reference elevation prior to deployment. The initial transducer elevation (reference elevation) is determined by measuring depth to water using a water level meter and subtracting that value from the well top of casing (TOC) elevation. Any changes in water pressure (head) above the transducer are recorded as either an increase or decrease in groundwater elevation from the reference elevation. TOC elevations were based on a June 2010 survey of Facility wells. Benchmark data were provided by Parametrix and the recent survey utilized one of those benchmarks to ensure elevation comparability between NuStar and Port data. A list of TOC elevations used in the study is provided in the Transducer Installation Work Plan (Ash Creek, 2010). The transducers were programmed to collect data in 15-minute

intervals starting at a quarter-hour time (i.e. 12:15, 12:30, etc.) so that data sets are easily comparable to data collected from Port transducers

3.2 Monitoring and Data Download Schedule

On approximately a monthly basis, data were downloaded *in situ* to confirm that the transducers were working properly. Manual groundwater levels were collected in conjunction with the download data to confirm that the transducer readings were accurate and that the instrument was not experiencing significant drift. Adjustments to the transducer and/or reference settings were made at that time if necessary.

3.3 River Stage Data Collection

Columbia River stage in the vicinity of the Facility was evaluated to assist in the interpretation of the transducer groundwater elevation data. Because there is not a gauging station for the river at the Facility, river stage at the Facility was estimated by extrapolating between upstream and downstream gauging stations. The Facility is located along the northern shore of the Columbia River, between two National Oceanographic and Atmospheric Administration (NOAA) river gauging stations. The Vancouver gauging station (Station ID: 9440083) is located upstream and approximately 0.5 mile from the midpoint of the Facility. The St. Helens gauging station (Station ID: 9439201) is located downstream approximately 16.8 miles from the midpoint of the Facility. The Facility is approximately 3 percent of the distance from the Vancouver station to the St. Helens station. Thus, when determining river stage adjacent to the Facility, the water level is determined by taking 3 percent of the difference in river stage between the two stations, and subtracting (or adding) that value to the river stage at the Vancouver gauging station. In most cases the river stage at the upstream Vancouver gauging station is higher than the downstream St. Helens gauging station; therefore, 3 percent of the difference in river stage is subtracted from the river stage data for the Vancouver station to obtain the water level at the Facility. River stage elevations near for the Facility area are presented on each of the contour maps presented in this report (Figures 4 and 6 through 10) and river stage determinations are summarized in Appendix B. NOAA reports river stage data for both the Vancouver and St. Helens gauging stations as the "station datum", which is referenced to the Columbia River Datum (CRD). To convert between the CRD and the NGVD29/47 datum to which NuStar and Port monitoring well elevations are referenced, 1.85 feet is added to the CRD elevation:

(NGVD29/47 (feet) = CRD (feet) + 1.85 (feet))

4.0 Transducer Groundwater Elevation Data Analysis

Groundwater level data collected from January 9, 2011 to January 9, 2012 via transducers in Intermediate Zone wells were evaluated several ways to assess the groundwater flow patterns over the course of a year. First, an annualized average dataset was developed and an annualized groundwater elevation contour map was constructed to assess the net flow over the year. Second, groundwater elevation maps were prepared

during distinct river stage events to better assess the significant influences of river stage on Intermediate Zone groundwater flow in the region. Finally, historical river stage data were evaluated and compared to the 2011 river stage to assess whether 2011 could be considered a typical flow year. The following subsections discuss the results of each of these evaluations.

4.1 Annualized Groundwater Gradient

Many factors can influence Columbia River stage including seasonal changes in precipitation, melt from upland snowpack, openings or closures of upgradient dams, etc. Given the proximity to the Columbia River, these factors also influence groundwater levels in the region. In order to evaluate regional groundwater flow without utilizing a seasonally (or otherwise) biased dataset, annualized groundwater levels were used to prepare a groundwater potentiometric map for the region. Figure 4 depicts year-averaged data for each monitoring well in the transducer network from January 9, 2011 through January 9, 2012. Data sets for several Port wells (i.e., CM-MW-19i, CM-MW-20i and CM-MW-21i) were incomplete during the portions of third and/or fourth quarter 2011, reportedly due to technical issues associated with the transducers; therefore, annualized data is not available for these wells. Because data for monitoring wells in the vicinity of the extraction well were not available for inclusion into the regional potentiometric map, it is difficult to depict the groundwater gradient and capture zone in the vicinity of extraction well EW-1.

As shown on Figure 4, the annualized groundwater gradient between NuStar well MW-24i and Port well MW-33i is 0.000095 ft/ft. However, closer inspection indicates that gradient between these wells is not constant and there are two different gradient zones: one beneath the NuStar Facility and a second essentially flat gradient zone northeast of the NuStar Facility. The gradient measured across the NuStar Facility (MW-24i to MW-21i-40) was 6.7 $X10^{-5}$ to the northeast; the gradient northeast of the Facility (MW-32i to MW-33i), in the area previously referred to as the stagnation zone (Ash Creek, 2010), was1.8 X 10^{-5}. The data indicate that there was a slight net gradient to the north/northeast at the NuStar Facility during 2011; however, to the northeast (between Port wells MW-32i and MW-33i) the gradient was essentially flat, limiting the direct flow of groundwater between the Port and NuStar Facilities.

4.2 Groundwater Flow Evaluation During Specific River Events

Annualized data provides the net flow, but does not allow a detailed understanding of the significant influences on groundwater flow (e.g., tidal, river stage, etc.) nor an ability to assess whether 2011 was a typical or atypical flow year. To better understand the significant influences on groundwater flow, groundwater gradients were evaluated over distinct river stage events.

Water levels in the Columbia River are presented on Figure 5, based on hourly water levels recorded at the Vancouver gauging station. During 2011 there was a general increase in river stage from the beginning of the year through the end of June with one large increase (in both magnitude and duration) in river stage from mid-May through early June 2011. Water levels decreased from approximately mid-June through late

August and then remained relatively constant through the remainder of the year. For the purpose of evaluating regional groundwater levels in response to river stage changes, the 2011 river stage data were divided into 5 distinct events. These events include:

1. No change in river stage.
2. Gradual increase in river stage.
3. Gradual decrease in river stage.
4. Rapid increase in river stage.
5. Rapid decrease in river stage.

The 2011 river stage data have been pattern-coded to represent one of the five events listed above (see legend on Figure 5). Regional potentiometric maps were prepared using average water level data from a time period representative of each of the five river stage events. For example, a regional potentiometric map was prepared using average transducer data from May 13 through May 18, which correlates with a sharp increase in Columbia River stage. Potentiometric maps for time periods representative of the five events listed above are presented in Figures 6 through 10, respectively. The groundwater gradient between NuStar wells MW-24i and MW-21i-40 (located at the northern boundary of the NuStar Facility) and MW-32i and Port well MW-33i are calculated for each potentiometric map and provided in Table 1. At the NuStar Facility the gradient was generally flat (between 0 and 10^{-5}) during periods when there was no change in river stage, when river stage was gradually increasing, and when there was a sharp decrease in river stage. During a gradually decreasing river stage, the groundwater flow at the NuStar Facility was towards the Columbia River. During a time period correlating with a sharp increase in river stage, the gradient was to the northeast at 0.00062 ft/ft.

Northeast of the NuStar Facility as measured between Port wells MW-32i and MW-33i, the groundwater gradients were much smaller than at the NuStar Facility, and were either flat or towards the Columbia River during three of the five types of river events. Groundwater gradients in this area were only to the northeast when river stage was gradually increasing or rapidly increasing and the magnitude of these gradients was typically approximately one-half of the magnitude of the gradients at the NuStar facility over the same time period, supporting the analysis of the annualized average that indicates there is little to no flow across this stagnation area.

As would be expected, groundwater levels further inland are influenced far less by changes in river stage than wells located in close proximity to the river.

4.3 Comparison to Previous Years

Field observations of the Columbia River stage as well as anecdotal observations from terminal staff support that river stage conditions in the Columbia River during at least a portion of 2011 were extreme and well

above normal conditions. An evaluation of river stage data collected by NOAA, including the highest recorded river stages for the past 10 years, the average river stage as compared to the past 7 years, and the magnitude of fluctuations in river stage as compared to the past 7 years, support that 2011 was not a typical flow year.

Evaluation of Highest and Lowest River Stage Events. NOAA ranks the 10 highest recorded river stage data as well as the lowest recorded river stage data for the Vancouver gauging station over a specified query period (http://tidesandcurrents.noaa.gov). A query period was selected from January 1, 2003 through January 1, 2012. The results indicate that the 10 highest recorded water levels occurred in 2011, specifically in June 2011, while the 10 lowest recorded water levels at the gauging station occurred in 2003, 2005, 2006, 2007, 2008 and 2009 (Table 2). The evaluation of gradients during significant 2011 river stage events (presented in Section 4.2) indicated that the only time there was a significant landward gradient was during rapidly increasing river stage events. The fact that the 10 highest river stage events of the past 10 years all occurred in 2011 supports that 2011 gradients would present a stronger net landward gradient than typical flow years, although the net gradient in 2011 was only $6.7X10^{-5}$ ft/ft NE beneath the Facility and $1.8X10^{-5}$ ft/ft NE to the north of the Facility.

Evaluation of Average River Stage over Past Seven Years. Average river stage levels at the Vancouver gauging station from 2004 through 2011 (excluding 2005) are summarized in Table 3. Data from 2005 were not included in the evaluation as the NOAA dataset for that year was incomplete. The 7-year historical data evaluation was selected based on NOAA data availability and was considered an appropriate duration for understanding variability in annual data.

From 2004 through 2010, the average river elevation was 5.03 feet CRD. In 2011 the average water elevation was 7.3 feet CRD, more than 2 feet higher than the average of the previous 7 years. NOAA publishes predicted river stage data based on astronomical tides. These predictions do not include the effect that wind, rain, freshwater runoff, and other short-term meteorological events will have on the tides. As a result, the relative portion of the river stage associated with non-tidal events can be determined by subtracting the average hourly predicted water levels from the average hourly verified water levels (Table 3). From 2004 through 2010 the average difference was 2.23 feet, while in 2011 the difference was nearly 4.49 feet.

The 2011 river stage water levels ranged from 115% to 165% of the water levels measured during the six years prior. The fact that the average river stage in 2011 was significantly higher than the average river stage for the previous six years suggests that the annualized gradient measured in 2011 is also higher than what is typical. The higher the river stage, the higher the likelihood of a net landward gradient. As discussed above, given abnormally high river stage in 2011, the annualized groundwater gradient at NuStar and the surrounding vicinity is still very flat.

Evaluation of Magnitude and Duration of River Stage Fluctuations Over Past Seven Years. Since groundwater levels are closely correlated with changes in river stage, and river stage can be highly variable, a comparison was made between river stage fluctuations in 2011 and historical river stage fluctuations from 2004 through 2010. A 2011 river stage plot is provided on Figure 5, and historical river stage plots are provided for 2004 and 2006 through 2010 in Appendix C (note river stage is presented in feet Columbia River Datum). A qualitative review of these plots reveals the following:

- The magnitude of large spikes in river stage is larger in 2011 than during previous years;
- The frequency of large spikes in river stage is larger in 2011 than during previous years; and
- The duration in which large spikes in river stage are sustained is longer in 2011 than during previous years.

The evaluation of river stage events presented in Section 4.2 indicates that the rapidly increasing river stage events influence the landward gradients. More frequent increases in river stage or increases that occur over longer timer periods would also likely contribute to a more significant inward gradient. The comparison of the magnitudes and duration of river of river stage increases further supports that 2011 was not a typical year and the hydraulic gradients identified in 2011, while small, are likely greater than typically observed on both an annualized basis and during natural river stage variability.

4.4 Summary of Groundwater Gradient Evaluation

The conclusions from the groundwater gradient evaluations are summarized as follows:

- The annualized gradient from the NuStar Facility to Port well MW-33i is 0.000095 ft/ft. However, to the northeast of the NuStar Facility there is a stagnation zone present between Port wells MW-32i and MW-33i with an annualized gradient of 0.000018 ft/ft in 2011.
- The river influence on groundwater gradient is significant near the river and rapidly decreases with distance from the river.
- A comparison of river stage events and average river elevations in 2011 to previous years supports that 2011 was not a typical year and that both the average river elevation and magnitude of river stage fluctuations were significantly larger than during typical years. Both the magnitude of river fluctuations and the overall height of the river elevation strongly influence hydraulic gradients in the Intermediate Zone, with the higher magnitude fluctuations and higher average river stage increasing the net landward gradient. In spite of this, the annualized net gradient of 2011 was extremely small and the area north of the Facility is essentially a stagnation zone. Therefore, during more typical river stage years, the net gradient would be expected to be even flatter with little to no flow across the stagnation area.

5.0 Groundwater Flow Evaluation

Collectively, the gradient between MW-24i and MW-33i is 0.000095 ft/ft (as discussed in Section 4.1); however, when evaluated more closely, a stagnation zone is almost always present to the northeast of the NuStar Facility and limits the northeastern movement of groundwater. Therefore, a more accurate assessment of groundwater flow needs to account for the separate gradients in these two areas. The 2011 annualized gradient beneath the NuStar Facility (MW-24i to MW-21i-40) is 0.000065 ft/ft to the northeast, and the 2011 annualized gradient northeast of the Facility (between Port wells MW-32i and MW-33i) is approximately 0.000018 ft/ft to the northeast.

Groundwater velocity calculations are summarized in Appendix D. The groundwater velocity across the NuStar Facility is 0.41 foot per day or approximately 151 feet per year. At this velocity it would take a molecule of groundwater approximately 3 years to travel between wells MW-24i and MW-21i-40 at the NuStar Facility. The groundwater velocity to the northeast of the Facility is 0.11 feet per day or approximately 42 feet per year. At this velocity it would take a molecule of groundwater approximately 25 years to travel between wells MW-32i and MW-33i. Therefore, it would take over 28 years for a molecule of groundwater to travel from MW-24i to MW-33i, assuming a consistent annualized gradient from what was measured in 2011. As discussed in Section 4.2, historical river stage data indicate that normal river conditions consist of lower overall water levels and smaller spikes in river stage. Historical data suggest that historical, and likely future, gradients would be less than what was measured in 2011, thus resulting in groundwater travel times between MW-24i and MW-33i in excess of 28 years.

6.0 References

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Table 1
Groundwater Gradients during River Stage Events
NuStar Vancouver Facility
Vancouver, Washington

2011						
River Event	Number of Days	% of Year	Example Interval	Gradient MW21i-40 to MW24i (NuStar Facility Wells)	Gradient MW-32i to MW-33i (Port Wells)	Distance Weighted Average Gradient
Sharp Increase	25	7	5/13/11 - 5/18/11	-0.00062	-0.00025	-0.00036
Sharp Decrease	72	20	6/21/11 - 7/20/11	-0.00004	0.000036	0.000013
Flat	106	29	9/1/11 - 11/19/11	-0.000022	0.000000	-0.000006
Gradual Increase	84	23	2/8/11 - 4/2/11	-0.00004	-0.000027	-0.000032
Gradual Decrease	78	21	7/20/11 - 8/23/11	0.00016	0.000064	0.000090
Annualized	365	-	1/9/2011 - 1/9/2012	-0.000067	-0.000018	-0.000032

Notes:

1. Annualized gradient is the average gradient between MW-21i-40 and MW-24i and between Port wells MW-33i and MW-32i.
2. Postive gradients values indicate gradient towards the river; negative gradient values indicate gradient towards the northeast.

Table 2
NOAA River Extreme Data (2003-2011)
NuStar Vancouver Facility
Vancouver, Washington

Rank	Highest (feet CRD)	Date	Time (GMT)	Lowest (feet CRD)	Date	Time (GMT)
1	17.41	6/1/2011	15:18	-0.7	9/21/2003	18:24
2	17.4	6/2/2011	14:48	-0.65	9/28/2009	17:18
3	17.34	6/6/2011	17:36	-0.61	9/27/2009	16:36
4	17.32	6/4/2011	16:24	-0.54	9/20/2003	17:18
5	17.31	5/31/2011	12:36	-0.5	9/26/2005	16:42
6	17.3	6/5/2011	16:06	-0.42	11/4/2007	17:24
7	17.28	6/5/2011	5:36	-0.41	9/6/2010	19:54
8	17.16	6/3/2011	14:18	-0.38	10/30/2006	15:48
9	17.03	6/8/2011	7:06	-0.34	10/8/2008	16:18
10	16.75	6/10/2011	10:12	-0.33	11/3/2007	16:36

Notes:

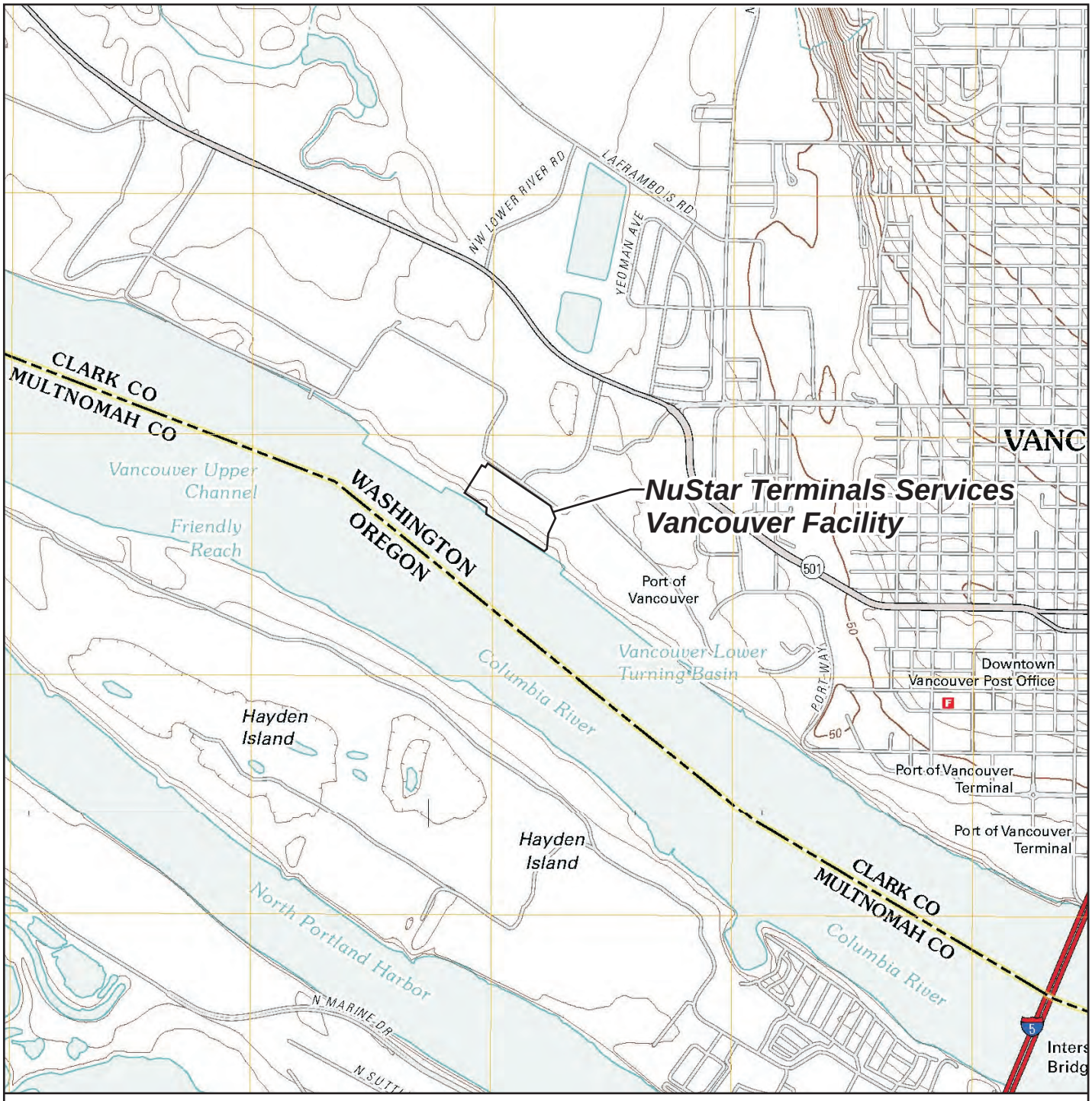
1. CRD = Columbia River Datum.
2. GMT = Greenwich Mean Time .
3. Data query from NOAA website (http://tidesandcurrents.noaa.gov) for Vancouver gauging station (ID: 9440083).

Table 3
Comparison of 2011 River Stage to Historical River Stage
NuStar Vancouver Facility
Vancouver, Washington

Year	Average Hourly Verified Data (CRD)	Verified Minus Predicted (CRD)	2011 Water Levels relative to previous years (as %)
2011	7.31	4.49	-
2010	4.74	1.92	154
2009	4.68	1.85	156
2008	5.1	2.27	143
2007	4.84	2.02	151
2006	6.38	3.55	115
**2004	4.43	1.75	165
Average (2004 - 2010)	5.03	2.23	145

Notes:

1. River stage data from NOAA website (http://tidesandcurrents.noaa.gov) for Vancouver gauging station (ID: 9440083).
2. * = 2005 Date not plotted - NOAA data station missing data from 1/1/2005 through 5/31/2005.
3. **= 2004 Date not available from 12/2/2004 through 12/31/2004. Annual averaged data do not include these dates.
4. CRD = Columbia River Datum.



Note: Base map prepared from USGS 7.5-minute quadrangles of Portland, OR-WA and Vancouver, WA-OR, dated 2011 as provided by USGS.gov.

0 2,000 4,000

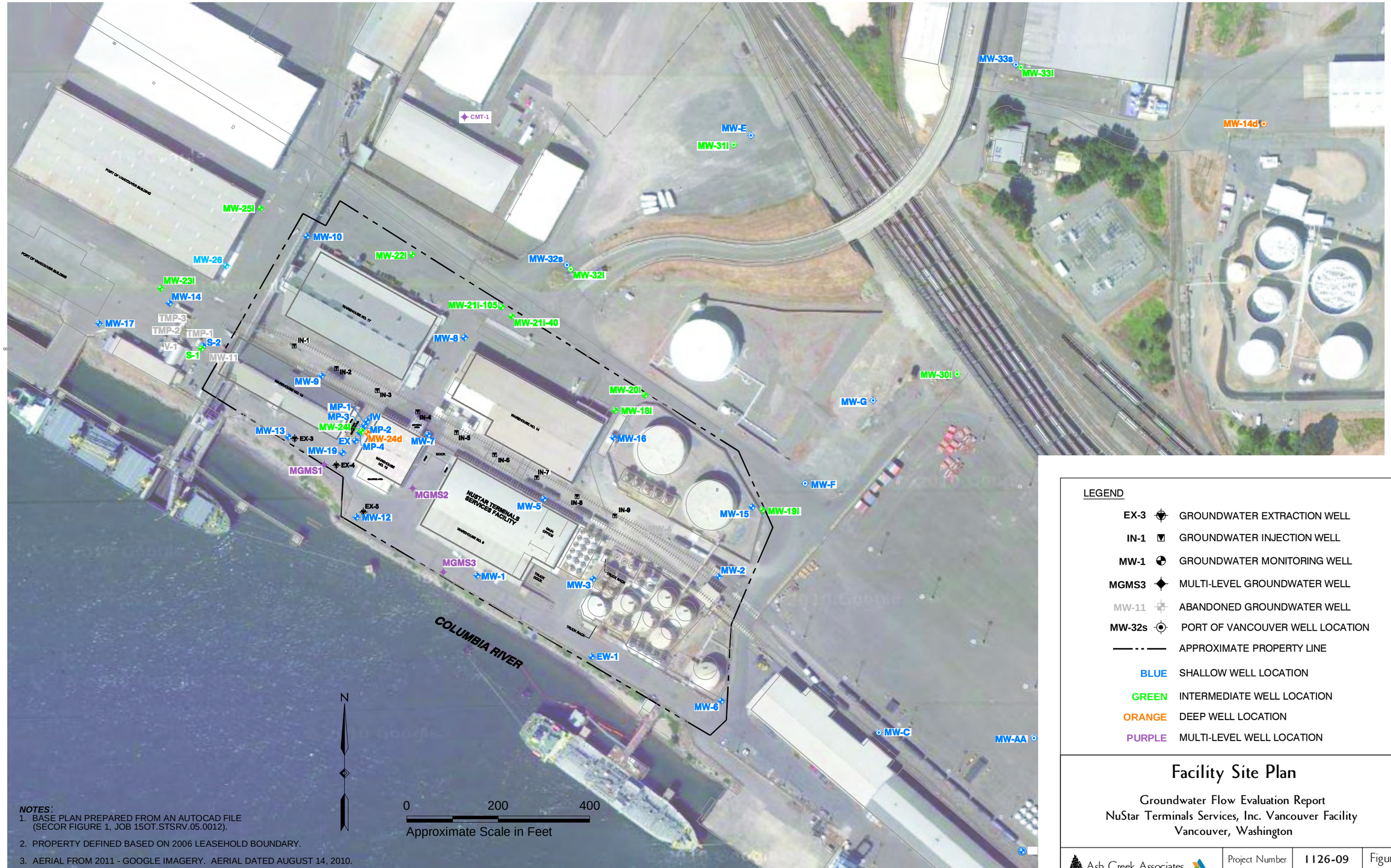
Approximate Scale in Feet

N

Facility Location Map

Groundwater Flow Evaluation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates, A Division of Apex Companies, LLC / APEX	Project Number 1126-09	Figure 1
	March 2012	



NOTES:

1. BASE PLAN PREPARED FROM AN AUTOCAD FILE (SECOR FIGURE 1, JOB 15OT.STSRV.05.0012).
2. PROPERTY DEFINED BASED ON 2006 LEASEHOLD BOUNDARY.
3. AERIAL FROM 2011 - GOOGLE IMAGERY. AERIAL DATED AUGUST 14, 2010.

LEGEND

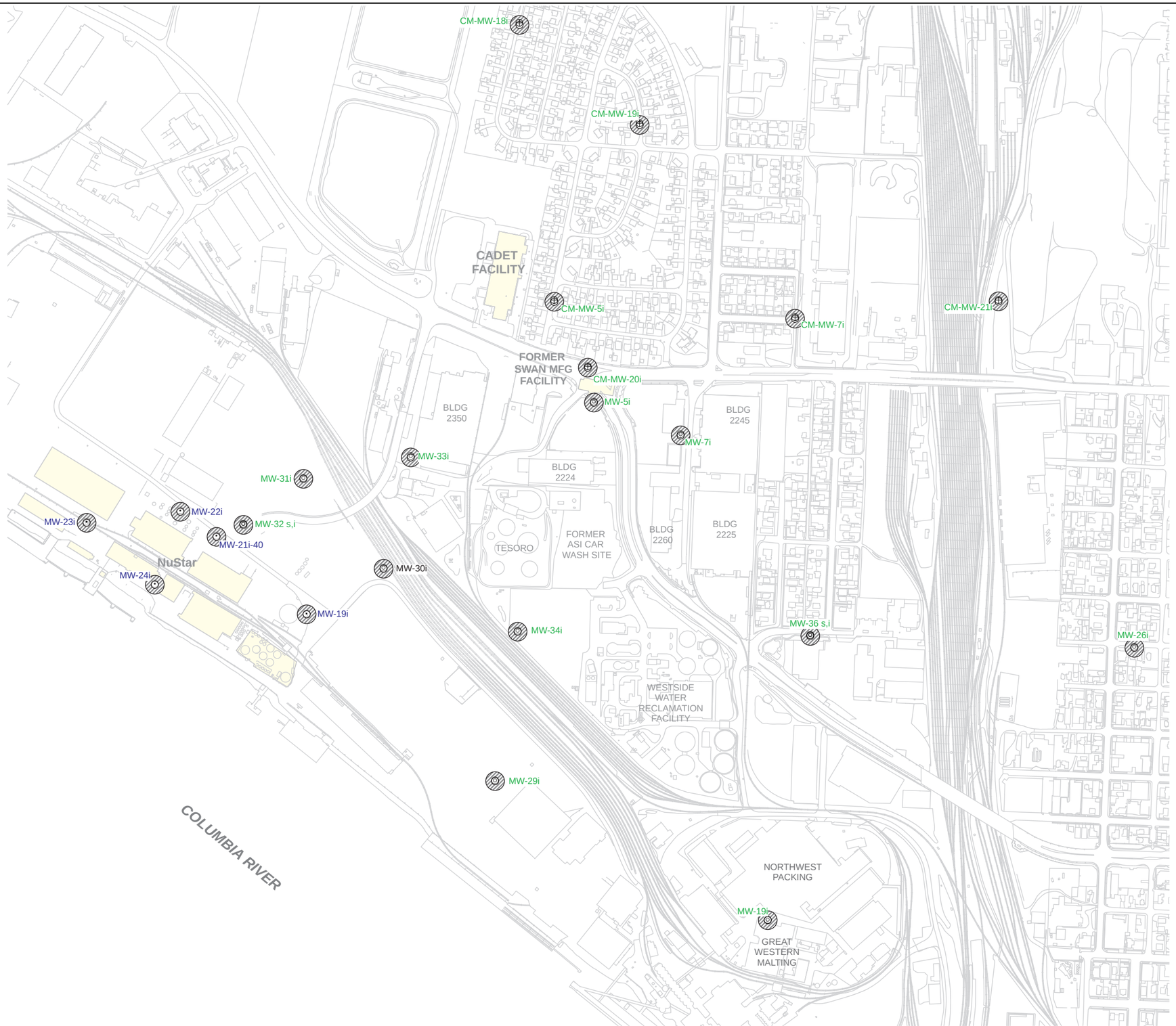
EX-3	GROUNDWATER EXTRACTION WELL
IN-1	GROUNDWATER INJECTION WELL
MW-1	GROUNDWATER MONITORING WELL
MGMS3	MULTI-LEVEL GROUNDWATER WELL
MW-11	ABANDONED GROUNDWATER WELL
MW-32s	PORT OF VANCOUVER WELL LOCATION
	APPROXIMATE PROPERTY LINE
BLUE	SHALLOW WELL LOCATION
GREEN	INTERMEDIATE WELL LOCATION
ORANGE	DEEP WELL LOCATION
PURPLE	MULTI-LEVEL WELL LOCATION

Facility Site Plan

Groundwater Flow Evaluation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates
A Division of Apex Companies, LLC
APEX

Project Number	1126-09	Figure
March 2012		2



LEGEND:

- MW-5i — Swan Manufacturing (POV) Monitoring Well
- MW-19i — ST Services (NuStar) Monitoring Well
- CM-MW-5i — Cadet Manufacturing (POV) Monitoring Well
- Well Containing Transducer

1) Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005

2) Swan facility data provided by Parametrix.

N

0 600 1,200

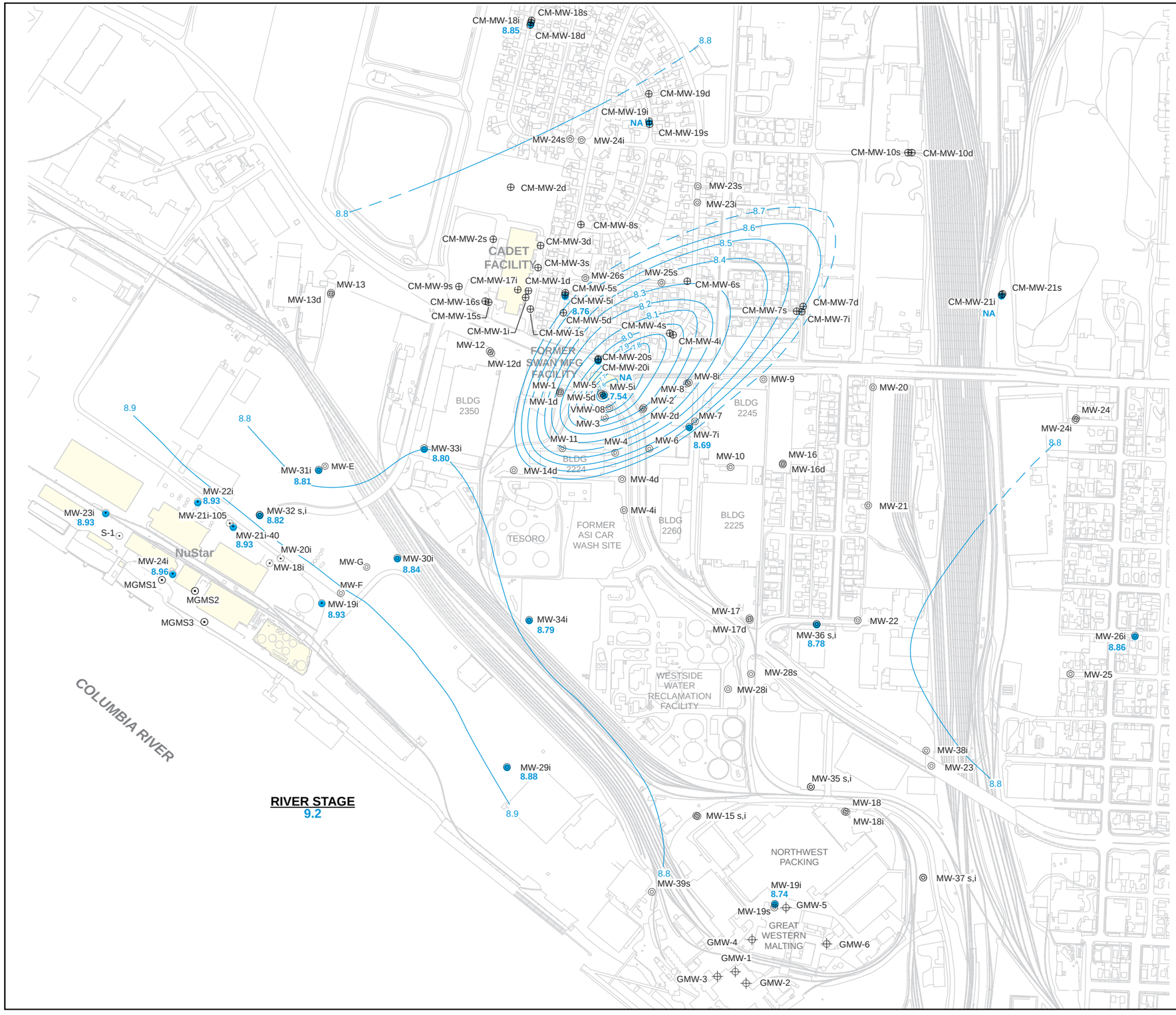
Approximate Scale in Feet

Regional Transducer Network

Groundwater Flow Evaluation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

Ash Creek Associates
A Division of Apex Companies, LLC
APEX

Project Number	1126-09	Figure
March 2012		3



LEGEND:

- ◎ Swan Manufacturing (POV) Monitoring Well
- ⊙ ST Services (NuStar) Monitoring Well
- ⊕ Cadet Manufacturing (POV) Monitoring Well
- ⊕ Great Western Malting Extraction Well
- Shaded Well Indicates Transducer Data Available
- 8.85 Groundwater Elevation in Feet Relative to Mean Sea Level
- 8.8 Groundwater Elevation Contour in Feet Relative to Mean Sea Level (Dashed Where Inferred)

GRADIENT:

MW-24i→MW-21i-40

$\frac{0.3}{450}$ = 0.000067 Ft./Ft.

MW-32i→MW-33i

$\frac{0.02}{1,100}$ = 0.000018 Ft./Ft.

1) Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005

2) Swan facility data provided by Parametrix.

3) River stage data from NOAA Columbia River gauging stations:
   Vancouver ID: 9440083
   St. Helen's ID: 9439201

4) NuStar site is 3% of the distance from the Vancouver station to the St. Helen's station.

5) CRD = Columbia River Datum

6) NGVD29/47 = National Geodetic Vertical Datum of 1929.

N

0 600 1,200

Approximate Scale in Feet

Annualized Groundwater Elevation Contour Map January 9, 2011 to January 9, 2012

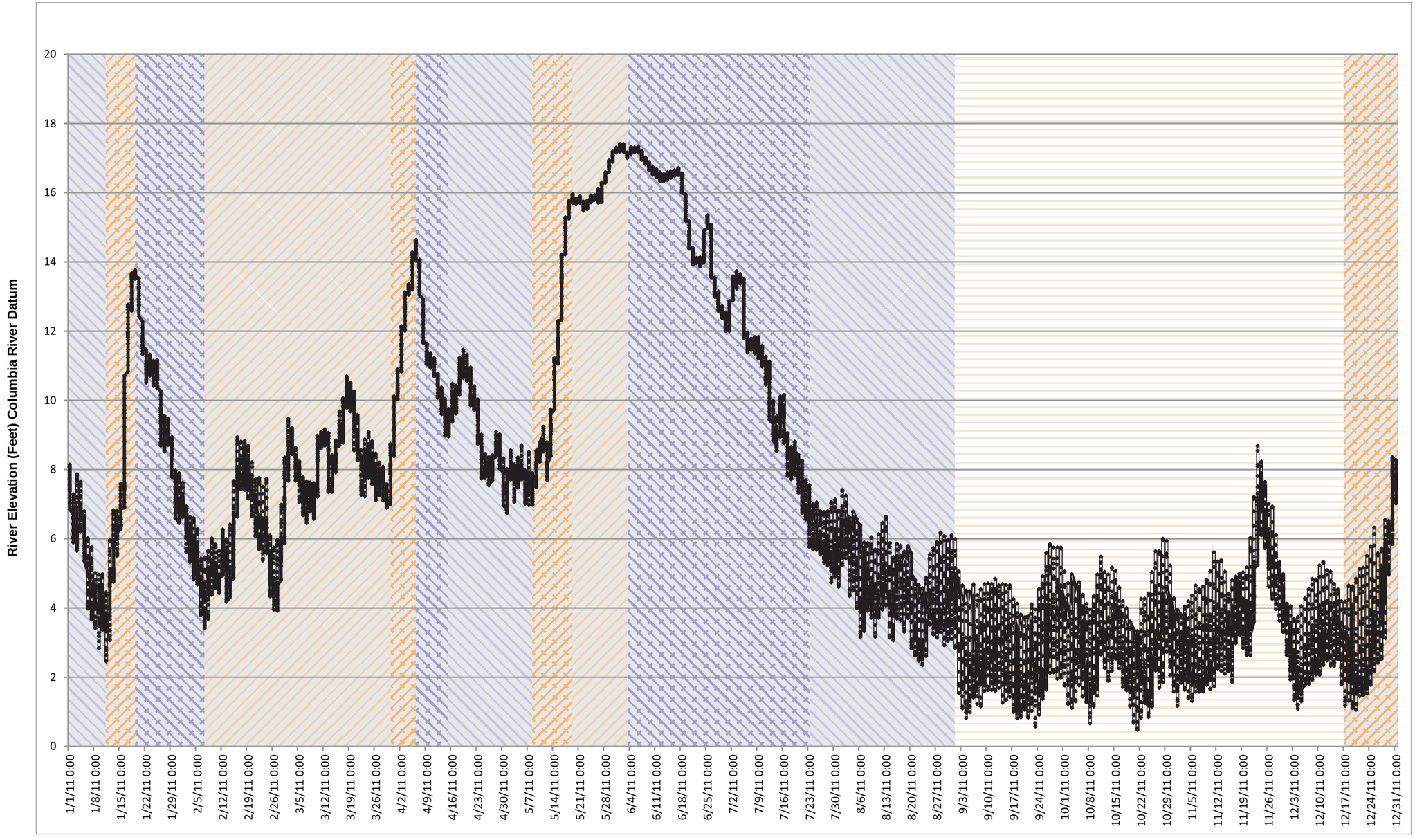
Groundwater Flow Evaluation Report

NuStar Terminals Services, Inc. Vancouver Facility

Vancouver, Washington

Ash Creek Associates
A Division of Apex Companies, LLC
APEX

Project Number	1126-09	Figure
March 2012		4



Legend:

- Sharp Increase
- Gradual Increase
- Sharp Decrease
- Gradual Decrease
- Relatively Flat

NOTE: River elevation data from NOAA Gauging Station in Vancouver, WA (Station ID: 9440083)

2011 Vancouver Station Data - Representative River Stage Events

Groundwater Flow Evaluation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

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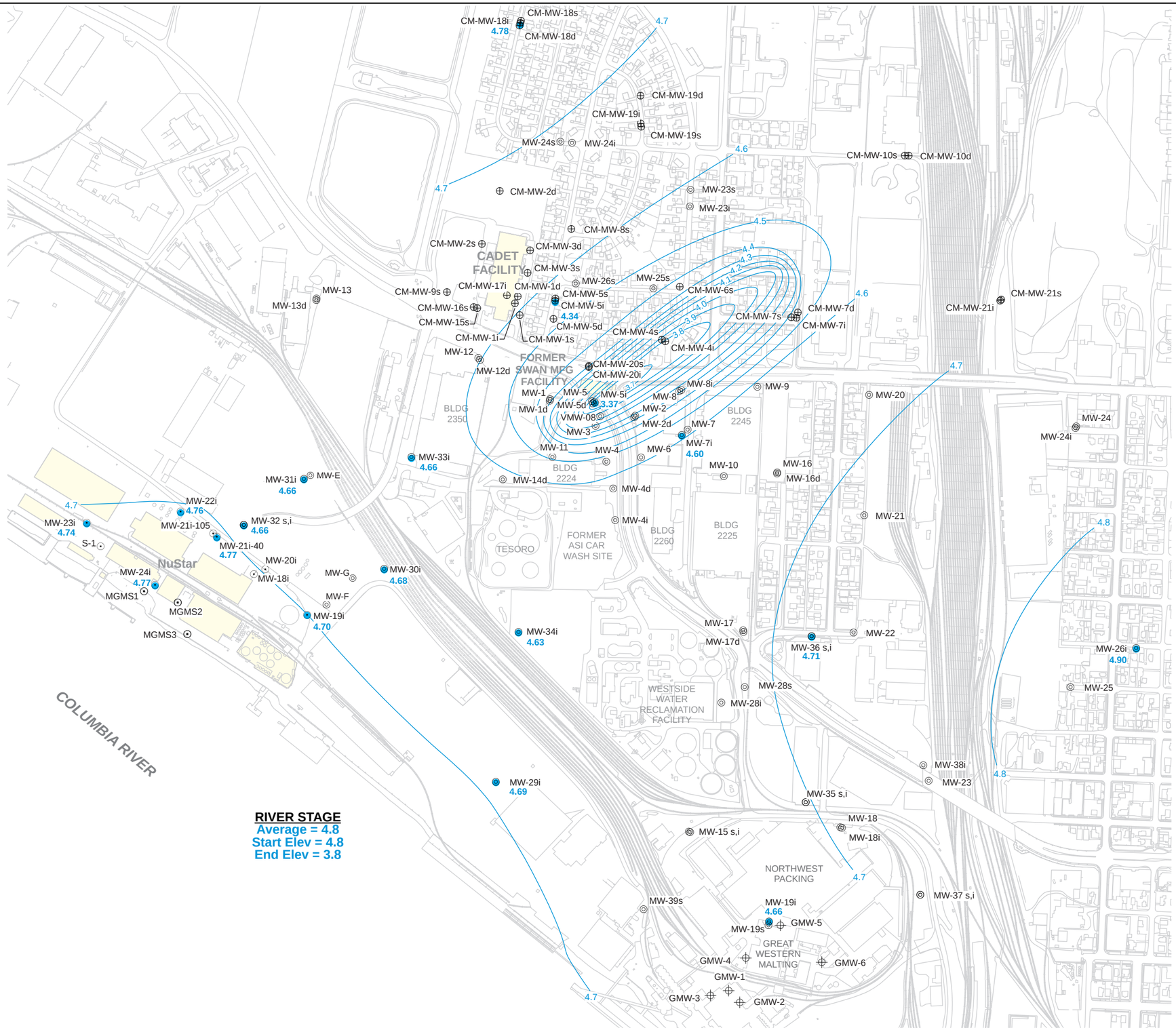

RIVER STAGE
Average = 4.8
Start Elev = 4.8
End Elev = 3.8

LEGEND:

- Swan Manufacturing (POV) Monitoring Well
- ST Services (NuStar) Monitoring Well
- Cadet Manufacturing (POV) Monitoring Well
- Great Western Malting Extraction Well
- Shaded Well Indicates Transducer Data Available
- 4.90 — Groundwater Elevation in Feet Relative to Mean Sea Level
- 4.8 — Groundwater Elevation Contour in Feet Relative to Mean Sea Level

GRADIENT:

MW-24i→MW-21i-40

$\frac{0.01}{450}$ = 0.000022 Ft./Ft.

MW-32i→MW-33i

$\frac{0.00}{1,100}$ = 0 Ft./Ft. (flat)

1) Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005
2) Swan facility data provided by Parametrix.
3) River stage data from NOAA Columbia River gauging stations:
   Vancouver ID: 9440083
   St. Helen's ID: 9439201
4) NuStar site is 3% of the distance from the Vancouver station to the St. Helen's station.
5) CRD = Columbia River Datum
6) NGVD29/47 = National Geodetic Vertical Datum of 1929.

N

0 600 1,200
Approximate Scale in Feet

Groundwater Elevation Contour Map
September 1, 2011 to November 19, 2011
Plateau (Approximately No Change) in River Stage

Groundwater Flow Evaluation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

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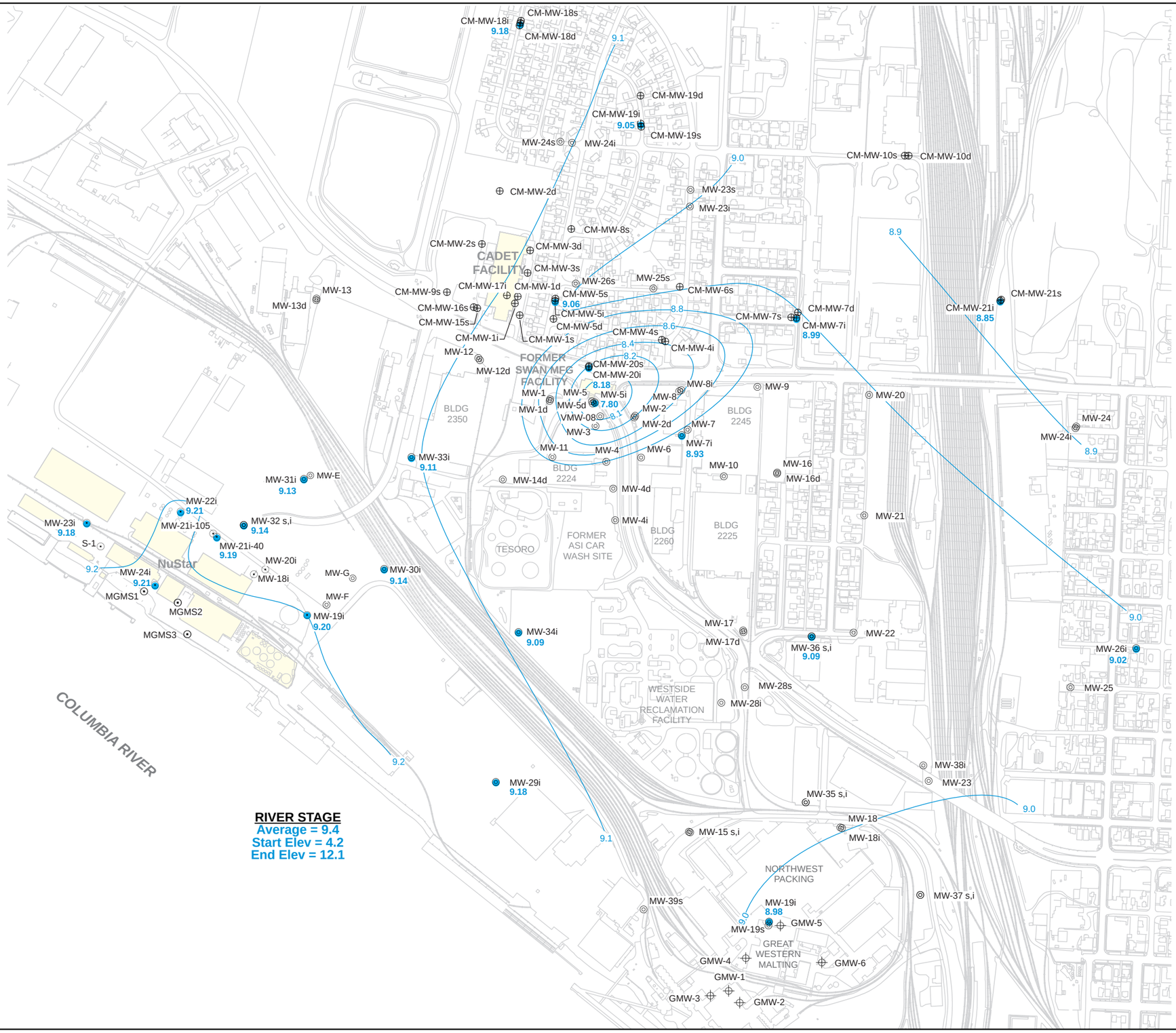

RIVER STAGE
Average = 9.4
Start Elev = 4.2
End Elev = 12.1

LEGEND:

- Swan Manufacturing (POV) Monitoring Well
- ST Services (NuStar) Monitoring Well
- Cadet Manufacturing (POV) Monitoring Well
- Great Western Malting Extraction Well
- Shaded Well Indicates Transducer Data Available
- 8.85 — Groundwater Elevation in Feet Relative to Mean Sea Level
- 8.90 — Groundwater Elevation Contour in Feet Relative to Mean Sea Level

GRADIENT:

MW-24i→MW-21i-40

$\frac{0.02}{450}$ = 0.000044 Ft./Ft.

MW-32i→MW-33i

$\frac{0.03}{1,100}$ = 0.000027 Ft./Ft.

1) Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005
2) Swan facility data provided by Parametrix.
3) River stage data from NOAA Columbia River gauging stations:
   Vancouver ID: 9440083
   St. Helen's ID: 9439201
4) NuStar site is 3% of the distance from the Vancouver station to the St. Helen's station.
5) CRD = Columbia River Datum
6) NGVD29/47 = National Geodetic Vertical Datum of 1929.

N

0 600 1,200
Approximate Scale in Feet

Groundwater Elevation Contour Map February 18, 2011 to April 2, 2011 Gradual Increase in River Stage

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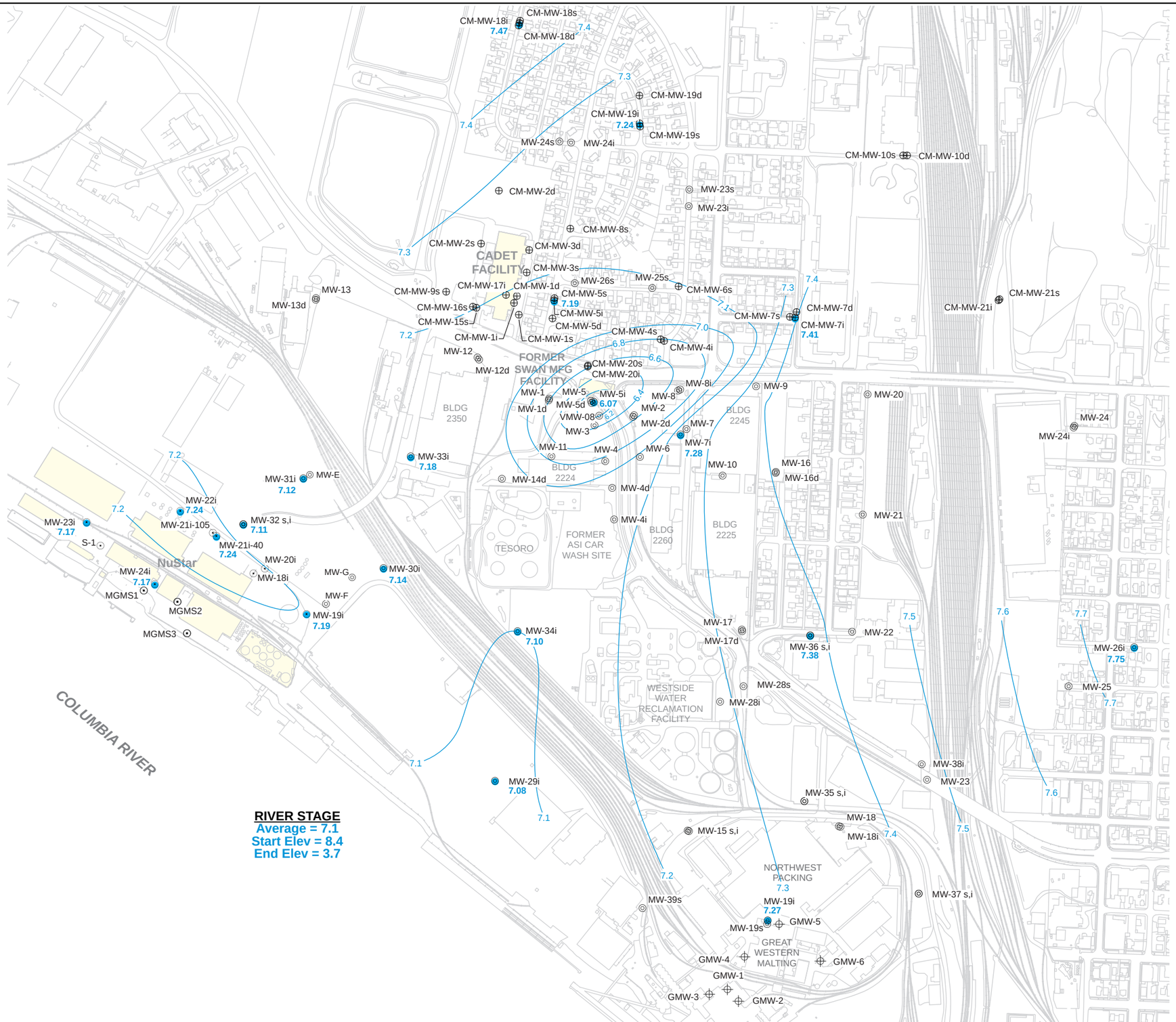

RIVER STAGE
Average = 7.1
Start Elev = 8.4
End Elev = 3.7

LEGEND:

- Swan Manufacturing (POV) Monitoring Well
- ST Services (NuStar) Monitoring Well
- Cadet Manufacturing (POV) Monitoring Well
- Great Western Malting Extraction Well
- Shaded Well Indicates Transducer Data Available
- 7.41 — Groundwater Elevation in Feet Relative to Mean Sea Level
- 7.4 — Groundwater Elevation Contour in Feet Relative to Mean Sea Level

GRADIENT:

MW-24i→MW-21i-40

$\frac{0.7}{450}$ = 0.00016 Ft./Ft. (towards the River)

MW-32i→MW-33i

$\frac{0.07}{1,100}$ = 0.000064 Ft./Ft. (towards the River)

1) Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005
2) Swan facility data provided by Parametrix.
3) River stage data from NOAA Columbia River gauging stations:
   Vancouver ID: 9440083
   St. Helen's ID: 9439201
4) NuStar site is 3% of the distance from the Vancouver station to the St. Helen's station.
5) CRD = Columbia River Datum
6) NGVD29/47 = National Geodetic Vertical Datum of 1929.

N

0 600 1,200
Approximate Scale in Feet

Groundwater Elevation Contour Map
July 20, 2011 to August 23, 2011
Gradual Decrease in River Stage

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NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

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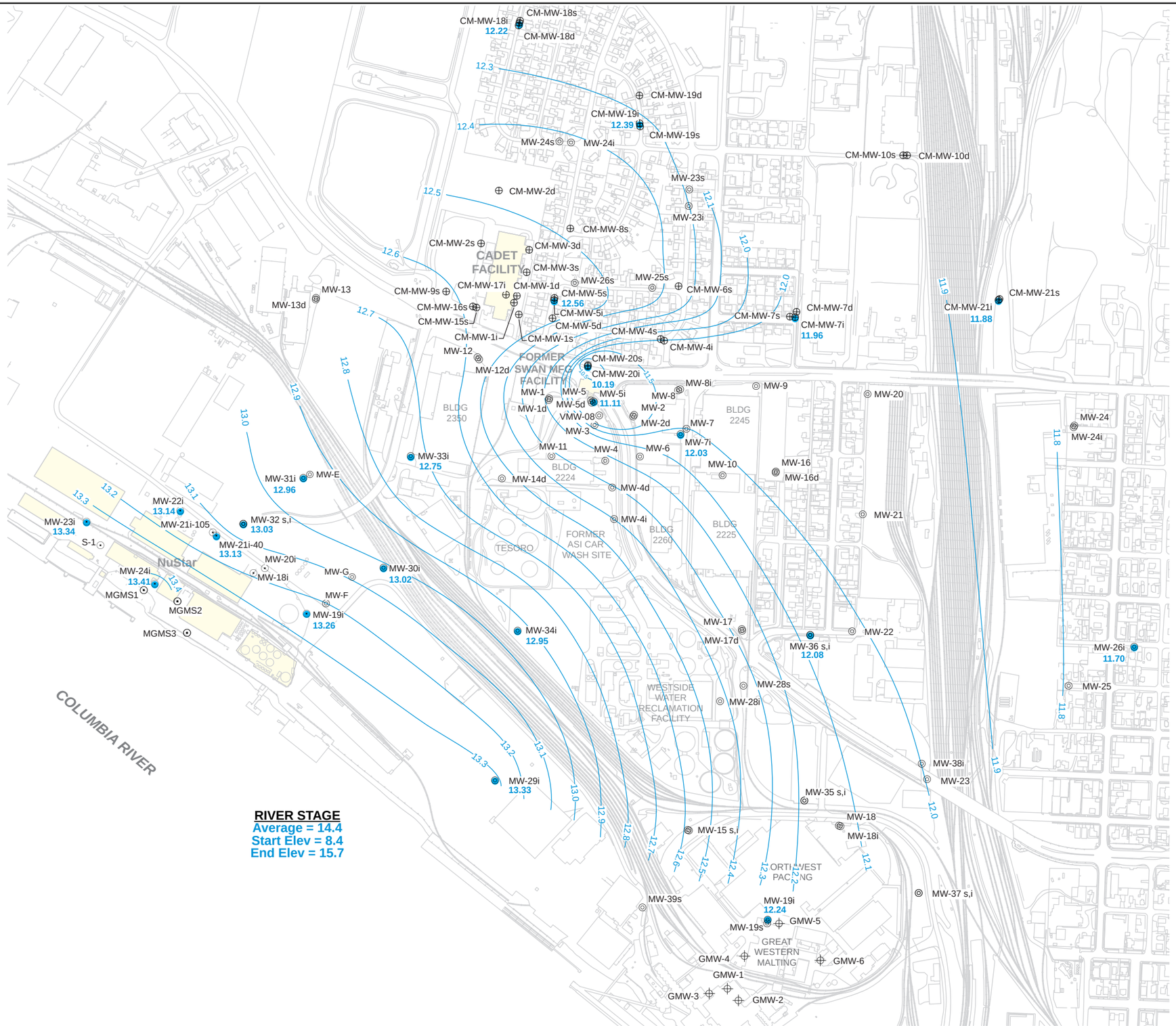

RIVER STAGE
Average = 14.4
Start Elev = 8.4
End Elev = 15.7

LEGEND:

- Swan Manufacturing (POV) Monitoring Well
- ST Services (NuStar) Monitoring Well
- Cadet Manufacturing (POV) Monitoring Well
- Great Western Malting Extraction Well
- Shaded Well Indicates Transducer Data Available
- 11.88 — Groundwater Elevation in Feet Relative to Mean Sea Level
- 11.90 — Groundwater Elevation Contour in Feet Relative to Mean Sea Level

GRADIENT:

MW-24i→MW-21i-40

$\frac{0.28}{450}$ = 0.00062 Ft./Ft.

MW-32i→MW-33i

$\frac{0.28}{1,100}$ = 0.00025 Ft./Ft.

1) Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005

2) Swan facility data provided by Parametrix.

3) River stage data from NOAA Columbia River gauging stations:
   Vancouver ID: 9440083
   St. Helen's ID: 9439201

4) NuStar site is 3% of the distance from the Vancouver station to the St. Helen's station.

5) CRD = Columbia River Datum

6) NGVD29/47 = National Geodetic Vertical Datum of 1929.

N

0 600 1,200

Approximate Scale in Feet

Groundwater Elevation Contour Map May 13, 2011 to May 18, 2011 Rapid Increase in River Stage

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NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

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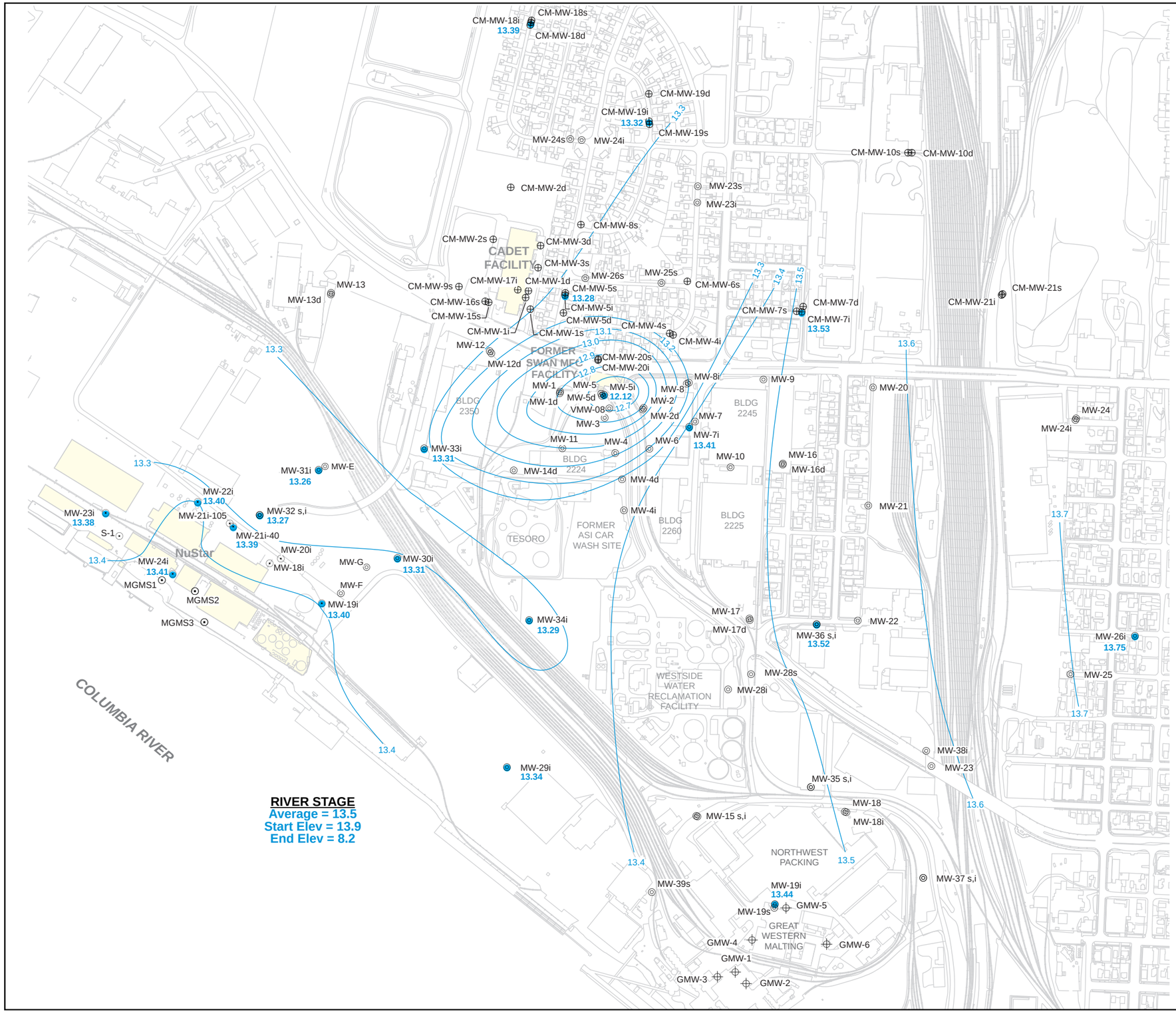

RIVER STAGE
Average = 13.5
Start Elev = 13.9
End Elev = 8.2

LEGEND:

- Swan Manufacturing (POV) Monitoring Well
- ST Services (NuStar) Monitoring Well
- Cadet Manufacturing (POV) Monitoring Well
- Great Western Malting Extraction Well
- Shaded Well Indicates Transducer Data Available
- 13.53 — Groundwater Elevation in Feet Relative to Mean Sea Level
- 13.60 — Groundwater Elevation Contour in Feet Relative to Mean Sea Level

GRADIENT:

MW-24i→MW-21i-40

$\frac{0.2}{450}$ = 0.000044 Ft./Ft.

MW-32i→MW-33i

$\frac{0.04}{1,100}$ = 0.000036 Ft./Ft. (towards the River)

1) Base Map, Legend and Scale from S.S. Papadopulos & Associates, Inc. Expert Report of Dimitrios Vlassopoulos Port of Vancouver v. Cadet Manufacturing Company, May 2005
2) Swan facility data provided by Parametrix.
3) River stage data from NOAA Columbia River gauging stations:
   Vancouver ID: 9440083
   St. Helen's ID: 9439201
4) NuStar site is 3% of the distance from the Vancouver station to the St. Helen's station.
5) CRD = Columbia River Datum
6) NGVD29/47 = National Geodetic Vertical Datum of 1929.

N

0 600 1,200
Approximate Scale in Feet

Groundwater Elevation Contour Map June 21, 2011 to July 20, 2011 Rapid Decrease in River Stage

Groundwater Flow Evaluation Report
NuStar Terminals Services, Inc. Vancouver Facility
Vancouver, Washington

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