Remedial Investigation and Risk Assessment Report
Vancouver Annex Terminal
Vancouver, Washington

Prepared for:
NuStar Terminals Operations Partnership L.P.

December 29, 2010
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Table of Contents

Tables

Figures

Appendices

1.0 Introduction

This Remedial Investigation (RI) and Risk Assessment (RA) Report (RI/RA Report) presents the results of the environmental investigations and risk assessment of the collected data at the NuStar Terminals Operations Partnership, L.P. (NuStar) Annex Terminal located at 5420 NW Fruit Valley Road in Vancouver, Washington (the Facility). A location map for the Facility is provided on Figure 1; a Facility site plan is provided on Figure 2.

Work at the Facility is being conducted with oversight from the State of Washington Department of Ecology (Ecology). An Agreed Order (No. 09-TC-S DE5250) was executed between NuStar and Ecology on November 6, 2008. Consistent with this order, an RI Work Plan was submitted to Ecology on January 23, 2009. Based upon Ecology comments on the Work Plan received on July 30, 2009, a revised Work Plan was submitted on October 14, 2009 (Ash Creek, 2009). The revised Work Plan was approved by Ecology on December 30, 2009. The Project Schedule requires the submittal of an RI and RA Report within one year of the approval of the RI Work Plan.

1.1 Objectives

The RI/RA Report has been prepared and is being submitted on behalf of NuStar to meet the requirements of the Agreed Order. The objectives of the RI were to characterize the environmental conditions at the Facility sufficiently to allow completion of an RA and evaluate whether remedial work is needed at the Facility.

1.2 Report Organization

The RI/RA Report includes the following main topics:

- Background: a description of the Facility, geology, and hydrogeology;
- Summary of Previous Investigations and Findings: a presentation previous site investigations from 2001-2010;
- Recent Investigation to Complete Remedial Investigation: a presentation of the scope, procedures, and results of recent environmental investigation at the Facility to complete the remedial investigation;
- Beneficial Land and Water Use Survey: a description of current and proposed land and water use in the vicinity of the Facility; and
- Site Conceptual Model: the physical and chemical conditions at the Facility, including identification of the potentially complete exposure pathways and receptors at and in the vicinity of the Facility and Risk Screening.

2.0 Background

This section briefly discusses the Facility setting, historical operations, regional geology and hydrogeology, and prior environmental activities at the Facility. Additional detail is provided in the following reports:

- *Phase II Environmental Site Assessment* (ESA; AMEC, 2002a);
- *Subsurface Investigation and Soil Removal Report* (AMEC, 2002b);
- *Results of Phase II Environmental Site Assessment* (SECOR, 2003);
- *Evaluation of Migration Potential Due to Proposed Clark Public Utilities Fruit Valley Well Field* (Ash Creek, 2007);
- *Results of Direct-Push Groundwater Assessment* (Ash Creek, 2008a); and
- *Groundwater Monitoring Report – Quarterly Monitoring 2007* (Ash Creek, 2008b).

Excerpts from some of these reports are contained in Appendices A and B for reference, as described below.

2.1 Facility Setting

2.1.1 Facility Description

The Facility is located in Vancouver, Washington (as shown on Figure 1). The NuStar property is approximately 31 acres and is roughly rectangular, with dimensions of approximately 800 by 1,800 feet. The terminal has been used to store and transfer liquid fertilizers, petroleum, alcohol, and fuel additives since 1957. The Facility is located in a mixed industrial-agricultural area and currently includes a tank farm containing jet fuel and methanol (seven aboveground storage tanks [ASTs] ranging in size from 30,000 gallons to 3,000,000 gallons); a covered truck refueling rack with two ASTs (approximately a 400-gallon AST and a 7,500-gallon AST containing anti-static additive [ASA] and fuel system icing inhibitor [FSII] Additive); and several buildings used for equipment storage and offices. A former underground storage tank (UST) associated with a vapor recovery system was also located on the Facility and was removed in 2001. The vapor recovery system and an associated oil/water separator (OWS) remain on-site. The surface of the Facility is comprised of graveled areas and grass fields, with asphalt-paved roads providing access to the fueling areas, ASTs, and office buildings.

2.1.2 Adjacent Properties

A berry farm owned by Mr. Merril Firestone is adjacent to the Facility to the north (referred to herein as the "Firestone Property"). Vacant land is present to the west and northwest of the Facility and industrial

property is located to the south. Undeveloped land or commercial/industrial facilities front the eastern side of Fruit Valley Road to the north, east, and south of the Facility.

2.2 Facility History

Support Terminals Operating Partnership, L.P. (STOP) purchased the Facility from Cenex Harvest States Cooperative (Cenex) in 2003. In March 2008, STOP changed its name to NuStar.

The property was developed in 1957 as a truck loading terminal. Records are unclear as to whether the Facility was developed by Cenex. Historically, chemicals and other products stored at the site included liquid fertilizers and refined petroleum products such as gasoline, diesel and kerosene, de-natured alcohol, and petroleum product additives. A slop tank is present in the eastern portion of the Facility (Figure 2) and this is typically where waste (such as from tank-bottom cleanouts or the OWS) would be stored prior to off-site disposal or recycling. There is no indication that materials from tank-bottom cleanouts were buried at the Facility.

Prior to or during Cenex's ownership, American Cyanamid conducted agricultural research—including the testing of herbicides and pesticides—in the southeastern portion of the Facility (Figure 2).

2.3 Geology

The regional geology and the Facility-specific geologic conceptual model are described below.

2.3.1 Regional Geology

The regional geology is summarized below and is based on reports prepared by Pacific Groundwater Group (PGG; 2001) and AMEC (2002a). The vicinity of the Facility is dominated by three primary units: Recent Alluvial deposits (referred to as the "Recent Alluvial Aquifer" [RAA]); the Pleistocene Alluvial deposits (the "Pleistocene Alluvial Aquifer" [PAA]); and the Troutdale Formation.

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

2.3.2 Facility-Specific Geology

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

The RAA underlying the Facility consists of silty, fine sand or sandy silt with variable layers of sand or silty sand to a depth of approximately 10 feet bgs. Below 10 feet bgs, the RAA consists of layers of fine- to medium-grained sand to a depth of approximately 50 to 60 feet bgs. The PAA is encountered below the RAA and consists of sand and/or gravel layers of varying thicknesses. The Troutdale Formation underlies the PAA and can be in excess of 1,000 feet thick. The base of the PAA is typically identified by the transition to an underlying conglomerate or consolidated/unconsolidated silty, sandy gravel of the Pleistocene Troutdale Formation.

2.4 Hydrogeology

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

2.4.1 Regional Hydrogeology

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

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

The Troutdale Gravel Aquifer (TGA) has been observed at a depth of approximately 200 feet at the CPU wellfield located 500 feet north of the Facility. It is approximately 50 feet thick and is underlain by a 100-foot thick clay confining layer. The Sand and Gravel Aquifer (SGA) of the Troutdale Formation is found beneath the confining layer. CPU has installed two production wells screened within the SGA at their wellfield.

2.4.2 Local Hydrogeology

The depth to first encountered groundwater at the Facility ranges from approximately 15 to 32 feet bgs (Table 1). This zone corresponds to the silty, fine- to medium-grained sand of the RAA. Deeper groundwater of the PAA is encountered at depths of approximately 50 to 70 feet bgs beneath the Facility (Ash Creek, 2008a).

Shallow groundwater flow at the Facility has remained, under static conditions, relatively flat with a slight gradient (0.0002 foot per foot [ft/ft]) to the southeast (AMEC, 2002a; SECOR, 2003; and Ash Creek, 2009). Groundwater contour maps prepared for previous investigations are contained in Appendix B for reference. As shown on Figure 3, groundwater elevations measured in September 2010 are consistent with previous observations.

3.0 Summary of Previous Investigations and Findings

Several investigations have been conducted at the Facility since 2001. The initial investigation addressed evidence of a possible fuel release during a UST decommissioning and resulted in further work to define the extent of potentially impacted soil and groundwater (AMEC 2002a, 2002b). In 2003, SECOR conducted a comprehensive Phase II ESA as a part of due diligence activities for Cenex during the property transaction to NuStar (SECOR, 2003). More recently, Ash Creek has completed several investigations to characterize current environmental conditions (Ash Creek, 2007, 2008a, and 2008b). The scope of each of these investigations is described below.

3.1 Summary of Previous Investigations

Environmental Site Assessment – April 2002. Petroleum-impacted soils were reportedly encountered during the decommissioning of an underground gasoline-vapor recovery tank. Cenex excavated several test pits to delineate the extent of the impacted soils and approximately 60 to 100 cubic yards (cy) of soil were then excavated. Cenex retained AMEC to conduct further investigations to assess soil and groundwater conditions at and near the former UST.

On April 10 and 11, 2002, AMEC conducted soil and groundwater sampling activities at the Facility to evaluate the potential subsurface impact in the vicinity of the former underground gasoline-vapor recovery tank. Twelve borings (GP-1 through GP-12) were completed by direct-push techniques or hand-operated rotohammer to depths ranging from 20 to 32 feet bgs. Figure 2 shows the locations of the borings. As shown on the figure, the borings were completed around the vapor recovery system and the former UST pit.

In addition to completing the subsurface investigation, AMEC coordinated the removal of the soil excavated from the former UST area by Cenex and backfilling of the excavation. Prior to filling of the excavation with clean fill, four confirmation soil samples were collected (AMEC, 2002b). The samples were analyzed for volatile organic compounds (VOCs) by U.S. Environmental Protection Agency (EPA) Method 8260B. The results did not indicate the presence of fuel constituents remaining in soil in the excavation; the confirmation soil sample data are summarized in Table 2.

Seven soil samples (one each from borings GP-2, GP-3, GP-5, GP-7, GP-8, GP-9, and GP-12) were analyzed for the presence of petroleum hydrocarbons using NWTPH-HCID. Petroleum hydrocarbons were not identified in the samples (Table 2). Results are summarized on Figure 4.

Groundwater samples were collected from locations GP-3 and GP-7 through GP-12. The groundwater samples were analyzed for the presence of total petroleum hydrocarbons (TPH) as gasoline (TPHg) and diesel (TPHd) using NWTPH-Gx and NWTPH-Dx, respectively; polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270-SIM; and/or VOCs by EPA Method 8260B. TPHg, TPHd, BTEX (benzene, toluene, ethylbenzene, and xylenes), and several PAH constituents were detected in the grab groundwater samples (Tables 4 and 5). Based on the results of the groundwater analyses, AMEC concluded that additional assessment was needed to better assess the extent of the fuel constituents (AMEC, 2002a).

Subsurface Investigation – December 2002. Further subsurface investigation was conducted to evaluate the extent of petroleum hydrocarbons in soil and groundwater in the vicinities of the former UST, the existing vapor recovery unit, and the existing and former truck loading racks. The investigation included completion of 25 direct-push borings (GP-13 through GP-37) to depths ranging from 24 to 50 feet bgs, and installation and sampling of four monitoring wells (MW-1 through MW-4). Locations of the borings and monitoring wells are shown on Figure 2.

Based on field screening results, soil samples selected from borings advanced within the former truck loading rack (GP-14 and GP-31 through GP-35) and from beneath the existing vapor recovery unit (GP-26) were submitted for chemical analysis. Soil samples were analyzed for one or more of the following:

- TPHg using Method NWTPH-GX, and TPHd and TPH as heavy oil (TPHho) using Method NWTPH-Dx;
- BTEX using EPA Method 8021B;
- PAHs using EPA Method 8270-SIM; and/or
- VOCs using EPA Method 8260B.

The laboratory results are summarized in Tables 2 (TPH and VOCs) and 3 (PAHs). Fuel-related constituents detected in soil samples were generally observed at depths of 6 feet or more and appear limited in extent (Figures 4 and 5).

Groundwater samples were collected from locations GP-21 through GP-25 and GP-28 through GP-30, and analyzed for one or more of the following:

- VOCs using EPA Method 8260B; and/or
- BTEX using EPA Method 8021B or EPA Method 8260B.

The laboratory results are summarized in Table 4 and detected concentrations are illustrated on Figures 6 and 7. Fuel constituents are primarily detected near/southeast of the vapor recovery unit and decrease rapidly with distance from the unit.

Groundwater samples were collected from the four monitoring wells (MW-1 through MW-4) and analyzed for one or more of the following:

- TPHg using Method NWTPH-Gx, and TPHd and TPHho using Method NWTPH-Dx;
- Selected VOCs (1,2-dibromoethane, 1,2-dibromoethene, BTEX, methyl tertiary-butyl ether [MTBE], naphthalene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, isopropylbenzene, and n-propylbenzene) using EPA Method 8021B; and/or
- Total and dissolved lead using EPA 200 Series Method.

The laboratory results are summarized in Tables 6 (TPH and VOCs) and 7 (PAHs and lead). BTEX concentrations are illustrated on Figure 7.

The subsurface investigation successfully delineated the extent of fuel-related constituents in soil and groundwater near the former UST, vapor recovery unit, and truck loading rack area. Lead concentrations in groundwater were non-detect, supporting that the fuel constituents in the subsurface are not a source of lead to groundwater (Table 7).

Phase II Environmental Site Assessment – June 2003. SECOR performed a comprehensive Phase II ESA during April 2003 in support of due diligence efforts during the property transfer from Cenex to NuStar. SECOR conducted research on the historical uses of the Facility to assist in developing the scope of the investigation. SECOR's research of historical operations indicated the following uses or potential areas of concern:

- Fuel storage in ASTs;
- Stormwater pond used to collect non-contact stormwater;
- Slop tank used to store oily wastes prior to recycling or disposal;
- Truck loading rack used to store fuel;
- Vapor recovery unit and OWS;

- Former UST; and
- Former pesticide/herbicide handling and storage areas associated with American Cyanamid's site usage.

SECOR implemented a Facility-wide investigation to assess the potential impacts of each of these Facility uses/areas of potential concern. Thirteen direct-push borings, three temporary monitoring wells, and 14 hand-auger borings were advanced across the Facility.

Soil samples were selected for laboratory analysis from locations SB-4, SB-8, SB-9, SB-11, HA-3, HA-5, and PMW-5 (Figure 2). Groundwater samples were collected from locations SB-1-GW, SB-3-GW, SB-4-GW, SB-8-GW through SB-11-GW, SB-18-GW, PMW-5W, and PMW-7W (Figure 2). In addition, the four on-site monitoring wells (MW-1 through MW-4) were re-sampled. Soil and groundwater samples were analyzed for one or more of the following:

- TPHg using Method NWTPH-Gx, and TPHd and TPHho using Method NWTPH-Dx;
- BTEX and VOCS using EPA Method 8020B;
- PAHs using EPA Method 8270M-SIM;
- Organochlorine pesticides using EPA Method 8081A;
- Organophosphorous pesticides using EPA Method 8141A;
- Chlorinated herbicides using EPA Method 8151A;
- Lead using EPA Method 6000/7140;
- Triazines using EPA Method 619; and/or
- Nitrate-Nitrogen Anions using EPA Method 300.0.

The laboratory results for hydrocarbons, BTEX, VOCs, and PAHs are summarized in Tables 2 (TPH and VOCs) and 3 (PAHs) for soil, and Tables 4 (TPH and VOCs) and 5 (PAHs) for groundwater. TPH and BTEX concentrations detected in soil are illustrated on Figures 4 and 5. TPH and BTEX concentrations detected in the groundwater samples collected from the direct-push boring locations are shown on Figures 6 and 7. As shown on the figures, significant areas of concern associated with fuel-related constituents in soil or groundwater were not identified outside of the former UST/vapor recovery unit area.

Detected concentrations of other analytes are located on concentration maps prepared by SECOR, contained in Appendix A for reference. Soil and groundwater samples were collected for pesticide, herbicides, triazines, and nitrogen analyses in areas where American Cyanamid historically operated. As shown on the figures in Appendix A, triazines, pesticides, and herbicides were not detected in soil or groundwater. Nitrates were not detected at concentrations that would be indicative of a source (Appendix A). Lead concentrations in groundwater appeared slightly elevated and are inconsistent with

previous analyses performed by AMEC for lead in groundwater at the Facility. It appears that the turbidity in the grab groundwater samples selected for lead analysis may have biased the results high and they do not appear to be representative of Facility conditions.

Site Investigations – 2006 to 2008. Ash Creek performed several investigations between 2006 and 2008 to assess the conditions at the Facility. The investigations included sampling of off-site wells, direct-push groundwater assessment of deeper groundwater at the Facility, and a year-long quarterly groundwater monitoring program. Below is a brief summary of the investigations.

- On September 26, 2006, two samples (IRIG-Firestone and House-Firestone) were collected off-site to evaluate the migration potential of groundwater constituents to the north of the Facility. The adjacent property to the north (the Firestone Property) is used to grow berry crops and shallow wells are used to supply the irrigation water for the property. Samples collected from the irrigation wells at the Firestone Property were analyzed for TPHg using NWTPH-Gx, TPHd using NWTPH-Dx, VOCs using EPA Method 8260B, and PAHs using EPA Method 8270 SIM. Laboratory results are summarized in Table 8 and the laboratory analytical report is located in Appendix C. None of the analyzed constituents were detected in the groundwater samples above method reporting limits (MRLs).
- On June 11, 2007, two direct-push probes (GP-1 and GP-2) were advanced to assess deeper groundwater conditions beneath the Facility. The push-probes were advanced to depths of between 65 and 72 feet, where the PAA unit was encountered. Samples collected from the deeper groundwater zone were analyzed for TPHg using NWTPH-Gx, TPHd using NWTPH-Dx, BTEX using EPA Method 8021B, and VOCs using EPA Method 8260B. Except for MTBE, detected at a concentration of 13.7 micrograms per liter (µg/L) at location GP-1, no other VOCs, TPH, or PAHs were detected in the direct-push explorations. Results of the sampling are shown on Figure 8.
- A one-year quarterly groundwater monitoring program was initiated in the second quarter of 2007. Second, third, and fourth quarter 2007 and first quarter 2008 monitoring events were completed by Ash Creek on May 25, August 24, and November 26, 2007, and February 27, 2008, respectively. Groundwater samples were analyzed for TPHg by method NWTPH-Gx, and TPHd and TPHo by method NW-TPH-Dx with silica gel cleanup, and BTEX and fuel oxygenates by EPA Method 8260B. Results from the quarterly monitoring are tabulated in Table 6; results from the 2008 sampling event are shown on Figure 8.

4.0 Recent Investigation to Complete Remedial Investigation

The following describes the scope of work and procedures performed to complete the RI for the Facility, and presents the results. Work was conducted in accordance with the Sampling and Analysis Plan (SAP) in Appendix D (which includes a Quality Assurance Project Plan [QAPP]).

4.1 Scope of Work

As described in Section 3.1, numerous investigations had been performed at the Facility between 2002 and 2008 and defined the lateral and vertical extents of TPH, BTEX, and other fuel oxygenates in soil and groundwater. Non-fuel-related constituents were not observed. Three potential data gaps were identified by Ecology and needed to be assessed to complete the RI and RA. The data gaps and the work scope to address were as follows:

1) Ecology requested additional monitoring of existing on-site wells to confirm results; two additional monitoring events (one each in the wet and dry season) were proposed in the approved RI Work Plan and conducted in March and September 2010.

2) Ecology requested verification of lead concentrations from the on-site monitoring wells; therefore groundwater samples from the two monitoring events were submitted for lead analyses.

3) Ecology requested the completion of one push-probe installation to assess intermediate zone groundwater and further confirm that lead is not present in Facility soil above regional background levels; a push-probe boring was installed southeast of the former UST location to assess lead in soil and collect intermediate zone groundwater for chemical analysis.

4.2 Procedures

The procedures for the field investigations are described briefly below and are detailed in the SAP (Appendix D).

4.2.1 Groundwater Monitoring

Groundwater monitoring of the four monitoring wells (MW-1 through MW-4) was conducted in March 2010 and September 2010. Groundwater monitoring activities included groundwater level measurement and collection of groundwater samples for chemical analysis. Measurements of the depth to water were made to the nearest 0.01 foot using an electronic probe. Prior to sampling, each monitoring well was purged using a submersible bladder pump, while water quality parameters (pH, temperature, and specific conductance) were recorded. Purging was considered complete when the field parameters stabilized or a minimum of three casing volumes were removed from the well. Following purging, groundwater samples were collected using the bladder pump and dedicated tubing.

The collected samples were analyzed for TPHg by Method NWTPH-Gx; TPHd and TPHo by Method NWTPH-Dx with silica gel cleanup; BTEX and fuel oxygenates by EPA Method 8260B; and dissolved lead by EPA Method 200.8. In addition, during the first groundwater monitoring event, each monitoring well was sampled for total lead using EPA Method Series 200.8.

4.2.2 Push-Probe Groundwater Investigation

A push-probe boring for soil and groundwater sampling was installed southeast of the former UST area, at location DP-1, shown on Figure 9. The investigation was conducted in accordance with Ash Creek standard operating procedures (SOPs) for direct-push explorations, included in Appendix D.

The boring was completed to a depth of 65 feet bgs using a Geoprobe™ rig. A soil sample was collected at depth of 5 feet bgs and was analyzed for total lead using EPA Method 6020. One grab groundwater sample was collected from the bottom depth of the boring and was analyzed for BTEX, MTBE, and fuel oxygenates by EPA Method 8260B, and dissolved lead by EPA Method 200.8.

4.3 Results

Results of the soil and groundwater sampling in March and September 2010 are discussed in the following sections.

4.3.1 Soil Results

Soil analytical results are presented in Table 1. Total lead was detected at 10.9 milligrams per kilogram (mg/kg) in the soil sample at DP-1, which is consistent with the regional background concentration and below the MTCA Method A cleanup level of 250 mg/kg.

4.3.2 Groundwater Results

Groundwater monitoring results are presented in Tables 6 and 7 for the VOCs/TPH and PAH results, respectively. Grab groundwater sample results from location DP-1 are shown in Table 4. Figures 9 and 10 display the BTEX/MTBE and TPH/lead results, respectively, on a Facility plan. Concentrations of dissolved-phase petroleum constituents in groundwater samples were consistent with previous events. With the exception of MTBE in MW-2 and TPHg in the March 2010 sample from MW-3, dissolved-phase petroleum constituents were below MTCA Method A cleanup levels. The September 2010 sample from well MW-3 was non-detect for TPHg (Table 6). MTBE was non-detect at monitoring wells MW-1, MW-3, and MW-4, defining the lateral extent of MTBE (Figure 9).

Dissolved lead was non-detect (Table 7). With the exception of one sample, total lead concentrations were either non-detect or below MTCA Method A levels. The total lead concentration in the groundwater sample collected from well MW-2 was at least two orders of magnitude higher than the dissolved lead concentration, suggesting that sediment entrained in the sample may have influenced the result. The total lead concentration in this well in 2003 was non-detect (Table 7).

Dissolved-phase constituents were not detected in the intermediate zone grab groundwater sample collected at DP-1 (Figure 11).

Concentration trends of benzene, MTBE, and TPHg in monitoring wells MW-1 through MW-4 are shown on Figures 12 through 14, respectively. The plots illustrate the significant decrease in constituent concentrations observed in the monitoring wells since 2003.

5.0 Beneficial Land and Water Use Survey

5.1 Summary of Land Use

The Facility is located in a mixed industrial-agricultural area and currently includes a tank farm. The surface of the Facility is comprised of graveled areas and grass fields, with asphalt-paved roads providing access to the fueling areas, ASTs, and office buildings. The Firestone Property, a fruit farm, is adjacent to the Facility to the north, vacant land is present to the west and northwest of the Facility, and industrial property is located to the south. Undeveloped land or commercial/industrial facilities front the eastern side of Fruit Valley Road to the north, east, and south of the Facility. No change in land use is anticipated.

5.2 Summary of Water Use

In 2010, CPU installed a domestic water supply wellfield on vacant land northwest of the Facility. The land is currently owned by the State of Washington Department of Fish and Wildlife (WDFW) and lies east of Vancouver Lake and approximately 500 feet northwest of the Facility (Figure 1). The wellfield consists of two production wells, both screened from 500 to 600 feet bgs in the SGA. One of the production wells was activated on August 17, 2010 and is extracting groundwater at a rate of 2,600 gpm. The second well will likely be activated at a similar rate in spring 2011. A third well is planned for installation in fall 2011 and will be screened at the same depth interval. At full capacity, the current water right of the wellfield is 7,000 gpm (Steve Prather, CPU, personal communication).

Drinking water for households and businesses in the vicinity of the Facility is primarily provided by a public water supply. Irrigation wells are present in the vicinity of the Facility and include irrigation wells at the Firestone Property located directly north of the Terminal. No constituents were detected in water samples collected from wells at the Firestone Property in 2003 and 2006.

5.3 Surface Water

The nearest surface water feature is Vancouver Lake, which is located 500 feet northwest of the Facility. The Columbia River is located approximately 1.75 miles south of the Facility.

6.0 Risk Assessment

The physical and chemical conditions at the Facility, and the nature and extent of chemicals of potential concern (COPCs) in soil and groundwater are evaluated in this section. Information regarding current and reasonably likely future land uses was used to develop a conceptual site model (CSM) describing potential human and ecological exposures at the Facility. Risk screening was performed to evaluate potential risk associated with COPCs at the Site.

6.1 Physical Setting

Soil at the Facility consists of silty, fine sand or sandy silt to a depth of approximately 10 feet bgs, with layers of fine- to medium-grained sand to a depth of approximately 50 to 60 feet bgs. Sand and/or gravel layers of varying thicknesses are encountered from 60 feet bgs to an unknown depth. The depth to first encountered groundwater at the Facility ranges from approximately 15 to 32 feet bgs (Ash Creek, 2008a). Shallow groundwater flow at the Facility has remained, under static conditions, relatively flat with a slight gradient (0.0002 ft/ft) to the southeast.

6.2 Nature and Extent

COPCs in soil and groundwater are identified in this section and the nature and extent of COPCs is presented. COPCs were identified by comparison of detected concentrations of each constituent to MTCA Method A cleanup levels. Constituents with one or more detections exceeding the MTCA Level A Standards are considered COPCs.

6.2.1 Soil

Concentrations of fuel-related constituents detected in surface soil samples (0 to 2 feet bgs) did not exceed MTCA Method A cleanup levels (Tables 2 and 3). The following constituents were detected in subsurface soil at concentrations above MTCA Level A Standards and are considered COPCs (Tables 2 and 3):

- TPHg;
- TPHd;
- BTEX;
- benzo(a)pyrene; and
- napthalene.

Fuel-related constituents are primarily confined to subsurface soil in the area around the storm pond, the UST area, and the vapor recovery unit (Figures 4 and 5). TPHg, TPHd, BTEX, and napthalene in subsurface soil occur in the vicinity of the vapor recovery unit and former UST area, and benzo(a)pyrene occurs in the vicinity of the former UST area. However, the extent of the COPCs in each area is limited to

the release areas. Fuel-related hydrocarbons were detected above MTCA Method A cleanup levels at one location in the stormwater pond and appear to be limited to the extent of the pond or smaller.

6.2.2 Groundwater

Dissolved-phase fuel-related constituents are primarily confined to the area around the former UST and the vapor recovery unit. With the exception of MTBE in one well, dissolved-phase petroleum constituents in groundwater did not exceed MTCA Method A cleanup levels in monitoring wells MW-1 through MW-4 in September 2010 (Figures 9 and 10). TPHg was detected in well MW-3 in March 2010 at a concentration above MTCA Method A cleanup levels. Lead concentrations were either not detected in groundwater or was detected at concentrations below MTCA Method A cleanup levels. Therefore, the COPCs in groundwater are considered to be:

- TPHg; and
- MTBE.

The extent of TPHg is limited to well MW-3, and has only intermittently been detected above the MTCA Method A cleanup levels since 2003. MTBE in shallow groundwater is limited to well MW-2. Dissolved-phase petroleum constituents were not detected in intermediate groundwater downgradient (southeast) of MW-2.

6.3 Exposure Pathway Analysis

Exposure pathways have been evaluated for both current and potential future on-Site and off-Site receptors. On-site receptors include industrial workers, construction workers, and excavation (utility) workers. Off-site receptors include current and potential future residents utilizing the CPU wellfield.

Potential exposure pathways are:

- Direct contact with soil;
- Soil leaching to groundwater;
- Constituents in subsurface soil to human receptors via inhalation of vapors;
- Direct contact with groundwater; and
- Ingestion of groundwater.

The following describes each of these pathways and identifies the potentially complete pathways. Figure 15 presents the conceptual site exposure model showing complete pathways.

Direct Contact with Subsurface Soil. The Facility is part of an active Petroleum Terminal. The release areas are within the Facility and are within a secured, fenced area of the terminal to which only Facility workers have access. Based on the investigation results, there are no off-site impacts to subsurface soil. Therefore, the direct contact pathway is considered potentially complete for on-site construction/excavation workers and is incomplete for on-site industrial workers and off-site receptors.

Soil Leaching to Groundwater. Dissolved-phase constituents have been detected in groundwater, indicating that historically this migration pathway was complete. However, concentrations of dissolved-phase constituents in groundwater have consistently decreased in Facility monitoring wells (Figures 12 through 14). These strongly decreasing trends indicate that residual hydrocarbons in the former source area are no longer a source to groundwater. This pathway is considered incomplete.

Volatilization to Indoor Air. There are no existing or proposed buildings in the vicinity of impacted soil or groundwater and this pathway is considered incomplete.

Direct Contact with Groundwater. Groundwater is 15 feet or greater bgs. This is below the typical construction depth, so direct contact with groundwater is considered a potentially complete exposure pathway.

Ingestion of Groundwater. As outlined in Section 5.2, Clark Public Utilities (CPU) has installed a domestic water supply wellfield approximately 500 feet northwest of the Facility of the Facility. Therefore, direct ingestion of groundwater is considered incomplete.

6.4 Risk Analysis

Direct Contact with Subsurface Soil. In the vicinity of the initial release, there is a potential for exposure of utility (excavation) workers to subsurface soils. However,on-site excavation activities are rare and standard operating procedures (SOPs) at the terminal limit potential exposure. Facility workers are aware of the potential for encountering impacted soils at the Facility and are required to wear personal protective equipment (PPE) which significantly reduces the potential for direct contact with Facility soils. Additionally, Facility workers are trained in the appropriate handling of petroleum products. Based on these protective measures, the potential presence of residual hydrocarbons in soil is not anticipated to present an unacceptable risk to on-Site excavation workers.

Ingestion of Groundwater. The extent of dissolved-phase constituents in groundwater has been characterized horizontally and vertically and is limited. Only one well near the release area has concentrations that exceed MTCA Method A cleanup levels for one constituent (MTBE). TPHg is only intermittently detected in another well (MW-3). The MTBE and TPHg detected in shallow groundwater at the Facility are not anticipated to reach the CPU production wells because a 100-foot thick clay confining layer is present between the shallow groundwater aquifers beneath the Facility (e.g., the RAA, PAA, and

TGA) and the SGA. The confining clay layer will prevent shallow groundwater from the Facility being drawn to the CPU wells; therefore, this is not considered a complete exposure pathway.

7.0 Summary and Conclusions

Investigations performed at the Facility since 2002 have characterized the extent of fuel-related constituents in the subsurface. Other constituents potentially handled at the Facility were not detected. Fuel-related constituents are primarily observed in the area of the vapor recover system and a former UST, both located in the central eastern portion of the Facility. Fuel-related constituents have not been detected in surface soil at concentrations exceeding MTCA Method A cleanup levels and are limited in extent in subsurface soil. Based on the strongly decreasing trends in groundwater in on-site wells, the residual hydrocarbons in subsurface soil do not represent a continuing source to groundwater.

Development of a CSM indicated the following potentially complete exposure pathways:

- Direct contact with subsurface soil for on-site excavation workers; and
- Ingestion of groundwater.

On-site excavation activities are rare and SOPs at the terminal limit potential exposure. Additionally, Facility workers are trained in the appropriate handling of petroleum products and wear appropriate PPE when working in areas where petroleum may be encountered. Therefore, the potential presence of residual hydrocarbons in soil is not anticipated to present an unacceptable risk to on-Site excavation workers.

MTBE in groundwater exceeds the MTCA Method A cleanup levels in one shallow groundwater well. Concentrations are stable to decreasing in well MW-2 and MTBE would not migrate from the site without the influence of external forces. The CPU has initiated extraction from a wellfield located approximately 500 feet to the north of the Facility. Groundwater is extracted from wells screened at depths of 500 to 600 feet within the SGA Formation. A 100-foot clay confining layer is present between the shallow groundwater of the Facility and the production aquifer; therefore, production from the CPU wells is not anticipated to draw groundwater from the Facility. Therefore, this is not considered a complete exposure pathway.

Based on the assessments conducted to complete the RI and RA for the site, no unacceptable risk was identified and no further action is warranted.

8.0 References

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Pacific Groundwater Group (PGG), 2001. Clark Public Utilities Lakeshore Wellfield Exploration and Testing Program. February 2001.

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

Well Number	Top of Casing Elevation (feet above MSL)[1]	Date of Measurement	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
MW-1	NS	05/14/02	16.00	NS
	26.66	05/25/07	14.92	11.74
	26.66	08/24/07	18.67	7.99
	26.66	11/26/07	17.91	8.75
	26.66	02/27/08	16.92	9.74
	26.66	03/30/10	17.09	9.57
	26.66	09/01/10	19.19	7.47
MW-2	NS	05/14/02	27.46	NS
	38.21	05/25/07	26.46	11.75
	38.21	08/24/07	30.17	8.04
	38.21	11/26/07	29.42	8.79
	38.21	02/27/08	28.50	9.71
	38.21	03/30/10	28.66	9.55
	38.21	09/01/10	30.74	7.47
MW-3	NS	05/14/02	28.15	NS
	39.11	05/25/07	27.17	11.94
	39.11	08/24/07	31.04	8.07
	39.11	11/06/07	30.36	8.75
	39.11	02/27/08	28.71	10.40
	39.11	03/30/10	29.55	9.56
	39.11	09/01/10	31.65	7.46
MW-4	NS	05/14/02	29.40	NS
	40.17	05/25/07	28.35	11.82
	40.17	08/24/07	32.12	8.05
	40.17	11/06/07	31.40	8.77
	40.17	02/27/08	30.40	9.77
	40.17	03/30/10	30.77	9.40
	40.17	09/01/10	32.62	7.55

Notes:

1. Survey elevations determined by Statewide Land Surveying, October, 2007.
2. feet above MSL = Feet above mean sea level.
3. feet BTOC = Feet below top of casing.
4. NS = Not surveyed.

Table 2
Historical Soil Analytical Results: TPH and VOCs
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

				Concentrations in mg/kg (ppm)															
Sample Location	Sample Date	Depth	TPH-HCID	TPHg	TPHd	TPHho	Benzene	Toluene	Ethylbenzene	Xylenes	1,2-Dibromo-ethane	1,2-Dichloro-ethane	Methyl tert-butyl ether (MTBE)	Naphthalene	1,2,4-Trimethyl-benzene	1,3,5-Trimethyl-benzene	Isopropyl-benzene	n-Propyl-benzene	n-Butyl-benzene	Chloroform
Soil Borings																				
GP-2	04/10/02-4/11/02	10-12	--	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP-3	04/10/02-4/11/02	10-12	--	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP-5	04/10/02-4/11/02	17-19	--	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP-7	04/10/02-4/11/02	14-16	--	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP-8	04/10/02-4/11/02	6-8	--	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP-9	04/10/02-4/11/02	16-18	--	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP-12	04/10/02-4/11/02	22-24	--	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP14	05/09/02	10-12	DET [9.]	3,230	19,700	<1,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP16	05/09/02	10-12	ND [8.]	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW2	05/09/02	25-26.5	ND [8.]	314	<25	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP26	06/26/02	6-8	--	5,850	--	--	<2.5	9.74	91.3	825	<2.5	<2.5	<10	124	891	293	29.7	125	--	--
GP27	06/26/02	10-12	--	4.96	--	--	<0.0050	<0.0050	<0.0050	<0.1	<0.05	<0.05	<0.2	<0.5	<0.1	<0.05	<0.2	<0.05	--	--
GP31	06/26/02	22-24	--	<2.5	<25	<50	<0.0050	<0.0050	<0.0050	<0.0050	--	--	--	--	--	--	--	--	--	--
GP32	06/26/02	6.5-8	--	910	2,530	<50	<5	<5	<5	16	--	--	--	--	--	--	--	--	--	--
GP33	06/26/02	8-10	--	363	31,500	<2,500	<0.500	<0.500	7.2	33.9	--	--	--	--	--	--	--	--	--	--
GP34	06/26/02	6-8	--	728	13,600	<1,000	<0.500	<0.500	0.717	16.9	--	--	--	--	--	--	--	--	--	--
GP35	06/26/02	8-10	--	10.3	<25	<50	<0.0050	<0.0050	<0.0050	<0.0050	--	--	--	--	--	--	--	--	--	--
SB-2	04/17/03	4	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-2	04/17/03	22	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-4	04/17/03	3	ND [8.]	--	<25	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-4	04/17/03	27	ND [8.]	--	<25	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-5	04/17/03	11	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-6	04/16/03	3	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-6	04/16/03	16	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-7	04/17/03	12	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-8	04/17/03	8	DET [9.]	1,020	7,890	<1,000	<0.500	<0.500	<0.500	7.45	--	--	--	6.14	31	20.4	<1	3.22	3.54	<0.5
SB-8	04/17/03	16	DET [9.]	369	1,440	<50	<0.500	<0.500	<0.500	<1,000	--	--	--	6.47	1.67	<0.5	1.13	0.837	<2.5	0.539
SB-9	04/18/03	12	DET [9.]	504	1,890	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-9	04/18/03	15	DET [9.]	168	1,210	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-11	04/16/03	2.5	ND [8.]	--	<25	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-11	04/16/03	14	ND [8.]	--	<25	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-12	04/22/03	3	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-12	04/18/03	12	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-13	04/22/03	2	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-13	04/22/03	5	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hand Augers																				
HA-1	04/17/03	3	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HA-1	04/17/03	6	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HA-2	04/18/03	2	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HA-2	04/18/03	5	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HA-3	04/17/03	2	--	--	--	--	<0.1	<0.1	<0.1	<300	--	--	--	<0.2	<0.1	<0.1	<0.2	<0.1	<0.5	<0.1
HA-3	04/17/03	5.5	--	--	--	--	<0.1	<0.1	<0.1	<300	--	--	--	<0.2	<0.1	<0.1	<0.2	<0.1	<0.5	<0.1
HA-4	04/18/03	2	ND [8.]	--	--	--	<0.1	--	--	--	--	--	--	--	--	--	--	--		
HA-4	04/18/03	5	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
HA-5	04/18/03	3	DET [9.]	3,320	4,780	<50	<5.0	10.5	48.5	500	--	--	--	76.4	341	109	<10	39.1	<25	6.6
HA-5	04/18/03	5	DET [9.]	2,290	10,700	<250	6.7	216	177	1,204	--	--	--	141	576	176	20.8	83.3	34	<5
Washington DOE MTCA Method A cleanup level				100/30 [11.]	2,000	2,000	0.03	7	6	9	NA	NA	NA	5	NA	NA	NA	NA	NA	NA

Please refer to notes at end of table.

Table 2
Historical Soil Analytical Results: TPH and VOCs
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

				Concentrations in mg/kg (ppm)																
Sample Location	Sample Date	Depth	TPH-HCID	TPHg	TPHd	TPHho	Benzene	Toluene	Ethylbenzene	Xylenes	1,2-Dibromo-ethane	1,2-Dichloro-ethane	Methyl tert-butyl ether (MTBE)	Naphthalene	1,2,4-Trimethyl-benzene	1,3,5-Trimethyl-benzene	Isopropyl-benzene	n-Propyl-benzene	n-Butyl-benzene	Chloroform
Hand Augers																				
HA-6	04/18/03	2	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HA-6	04/18/03	5	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HA-7	04/14/03	6	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HA-8	04/14/03	6	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Soil Sample from Advancement of Temporary Monitoring Wells																				
PMW-5	04/16/03	8	ND [8.]		31	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PMW-5	04/16/03	10	DET [9.]	--	146	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PMW-6	04/16/03	3	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PMW-6	04/16/03	12	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PMW-7	04/16/03	3	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PMW-7	04/16/03	16	ND [8.]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Soil Samples from Excavation Confirmation																				
N. Wall	5/20/2002	10	--	--	--	--	<0.100	<0.100	<0.100	<0.2	--	--	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.5	<0.1
N. Wall	5/20/2002	3	--	--	--	--	<0.100	<0.100	<0.100	<0.2	--	--	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.5	<0.1
E. Wall	5/21/2002	10	--	--	--	--	<0.100	<0.100	<0.100	<0.2	--	--	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.5	<0.1
E. Wall	5/21/2002	3	--	--	--	--	<0.100	<0.100	<0.100	<0.2	--	--	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.5	<0.1
Washington DOE MTCA Method A cleanup level [12.]				100/30 [11.]	2,000	2,000	0.03	7	6	9	NA	NA	NA	5	NA	NA	NA	NA	NA	NA

Notes:

1. TPH-HCID = Total petroleum hydrocarbons hydrocarbon identification by NW-TPH-HCID
2. TPHg = Total petroleum hydrocarbons in the gasoline carbon range by NW-TPH-Gx method.
3. TPHd = Total petroleum hydrocarbons in the diesel carbon range by NW-TPH-Dx method with silica gel cleanup.
4. TPHho = Total petroleum hydrocarbons in the heavy oil carbon range by NW-TPH-Dx method with silica gel cleanup.
5. mg/kg (ppm) = Milligrams per kilogram (parts per million).
6. -- = Not analyzed or not available.
7. < = Not detected at or above the specified laboratory method reporting limit (MRL).
8. ND= Not detected; MRL not available.
9. DET = Gasoline-, diesel-, and/or heavy oil-range hydrocarbons was detected using NWTPH-HCID. Follow-up analysis was completed.
10. **Boldface** values represent concentration that exceeds MTCA Method A cleanup level.
11. TPHg cleanup level dependent on presence of benzene in soil. Cleanup level = 30 mg/kg if benzene is present and 100 mg/kg if benzene is not present.
12. Washington DOE MTCA = Washington Department of Ecology Model Toxics Control Act.
13. NA = Cleanup level not available.

Table 3
Historical Soil Analytical Results: PAHs and Lead
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

			Concentrations in mg/kg (ppm)																
Sample Location	Sample Date	Depth (feet bgs)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)-anthracene	Benzo(a)pyrene	Benzo(b)-fluoranthene	Benzo(ghi)-perylene	Benzo(k)-fluoranthene	Chrysene	Dibenzo(a,h)-anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)-pyrene	Napthalene	Phenanthrene	Pyrene	Lead
GP-31	06/26/02	22-24	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	--
GP-32	06/26/02	6.5-8	1.73	<0.268	0.968	0.828	0.343	0.283	0.142	0.316	0.646	0.065	1.74	2.87	0.15	19.80	6.75	2.05	--
GP-33	06/26/02	8-10	6.27	<0.335	8.35	0.0458	0.0146	0.0144	<0.0134	<0.0134	0.0863	<0.0134	<0.670	8.65	<0.0134	12.80	33.40	0.989	--
GP-34	06/26/02	6-8	4.34	<0.335	<3.35	0.485	0.198	0.162	0.090	0.170	0.386	0.037	1.38	5.91	0.094	11.90	19.10	3.33	--
GP-35	06/26/02	8-10	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	--
SB-4	04/17/03	3	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	--
SB-4	04/17/03	27	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	--
SB-8	04/17/03	8	3.85	<1.68	<2.68	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134	<0.670	7.03	<0.134	5.20	23.50	3.09	--
SB-8	04/17/03	16	6.72	<0.268	<0.402	<0.0268	<0.0268	<0.0268	<0.0268	<0.0268	<0.0268	<0.0268	<0.134	1.14	<0.0268	4.44	4.02	0.553	--
SB-9	04/18/03	12	<0.670	<0.670	268	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.067	1.92	<0.0134	3.49	4.24	0.248	--
SB-9	04/18/03	15	0.104	<0.0586	<0.0402	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	0.275	<0.0134	1.42	0.595	0.040	--
SB-11	04/16/03	2.5	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	--
SB-11	04/16/03	14	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	--
Hand Augers																			
HA-5	04/18/03	3	<6.7	<6.7	0.398	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	0.078	<6.7	<0.067	101	3.12	0.198	--
HA-5	04/18/03	5	<6.7	<6.7	0.334	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	0.081	<6.7	<0.067	114	2.76	0.198	--
Soil Sample from Advancement of Temporary Monitoring Wells																			
PMW-5	04/16/03	8	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	--
PMW-5	04/16/03	10	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	<0.0134	0.035	--
DP-1	03/30/10	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10.9
Washington DOE MTCA Method A cleanup level [7]			NA	NA	NA	0.1 [8]	0.1	0.1 [8]	NA	0.1 [8]	0.1 [8]	0.1 [8]	NA	NA	0.1 [8]	5	NA	NA	250
Toxicity relative to benzo(a)pyrene [9]			NA	NA	NA	0.10	1	0.10	NA	0.10	0.01	0.10	NA	NA	0.10	NA	NA	NA	NA

Notes:

1. PAHs = Polycyclic Aromatic Hydrocarbons by EPA 8270 SIM.
2. mg/kg (ppm) = Milligrams per kilogram (parts per million).
3. **Boldface** values represent concentration that exceeds MTCA Method A cleanup level.
4. < = Not detected at or above the specified laboratory method reporting limit (MRL).
5. -- = Not analyzed.
6. NA = Cleanup level not available.
7. Washington DOE MTCA Method A cleanup level = Washington Department of Ecology Model Toxics Control Act Method A cleanup level.
8. 0.1 mg/kg is the cleanup level for the summation of carcinogenic PAHs adjusted for toxicity relative to benzo(a)pyrene.
9. From WAC173-340, Table 708-2.

Table 4
Historical Grab Groundwater Sample Analytical Results: TPH and VOCs
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

				Concentrations in mg/L (ppm)																
Sample Location	Sample Date	Depth (feet bgs)	TPH-HCID	TPHg	TPHd	TPHho	Benzene	Toluene	Ethyl-benzene	Xylenes	Methyl tert-butyl ether (MTBE)	Tert-Amyl Methyl Ether (TAME)	Naphthalene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Isopropyl-benzene	n-Propylbenzene	n-Butyl-benzene	sec-Butyl-benzene	Chloroform	Dissolved Lead
Groundwater Samples from Soil Borings																					
GP-1	04/10/02-04/11/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP-2	04/10/02-04/11/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP-3	04/10/02-04/11/02	24	--	25.1	ND	--	5.2	1.03	1.41	1.258	--	--	0.14	0.338	0.128	--	0.113	--	--	--	--
GP-4	04/10/02-04/11/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP-5	04/10/02-04/11/02	22	--	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP-6	04/10/02-04/11/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP-7	04/10/02-04/11/02	24	--	60.2	ND	--	3.97	16.2	2.17	9.69	--	--	0.212	0.914	0.228	--	0.113	--	--	--	--
GP-8	04/10/02-04/11/02	23	--	--	--	--	15	32.9	4.51	19.57	--	--	0.462	2.11	0.55	--	0.268	--	--	--	--
GP-9	04/10/02-04/11/02	24	--	0.536	--	--	ND	ND	0.00135	0.01153	--	--	0.0782	0.0102	0.0114	--	0.0031	0.0017	--	--	--
GP-10	04/10/02-04/11/02	23	--	159	ND	--	4.44	28.1	5.09	23.07	--	--	0.476	2.79	0.728	--	0.358	--	--	--	--
GP-11	04/10/02-04/11/02	32	--	--	--	--	14.2	48.3	8.25	36.6	--	--	1.91	6.4	1.76	--	0.835	--	--	--	--
GP-12	4/11/2002	32	--	--	--	--	0.698	1.64	0.363	0.999	--	--	--	0.11	0.0318	--	0.0244	--	--	--	--
GP-13	05/09/02-05/10/02	--	--	--	--	--	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	--	--	--	--	--
GP-14	5/9/2002	--	--	--	--	--	<0.001	<0.001	<0.001	0.00518	<0.001	--	<0.002	0.00219	<0.001	<0.002	<0.001	<0.005	<0.001	<0.001	--
GP-15	05/09/02-05/10/02	--	--	--	--	--	<0.0005	<0.0005	0.0019	0.0186	--	--	--	--	--	--	--	--	--	--	--
GP-16	5/9/2002	--	--	--	--	--	<0.0005	<0.0005	0.00515	0.0522	--	--	--	--	--	--	--	--	--	--	--
GP-17	05/09/02-05/10/02	--	--	--	--	--	0.0243	0.00056	0.00186	0.0146	--	--	--	--	--	--	--	--	--	--	--
GP-18	05/09/02-05/10/02	--	--	--	--	--	0.00064	0.00053	0.00051	0.00411	--	--	--	--	--	--	--	--	--	--	--
GP-19	05/09/02	34	--	--	--	--	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	--	--	--	--	--
GP-20	05/09/02	34	--	--	--	--	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	--	--	--	--	--
GP-21	05/10/02	34	--	--	--	--	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	--	--	--	--	--
GP-22	05/10/02	34	--	--	--	--	5.81	29.2	6.31	28.6	--	--	--	--	--	--	--	--	--	--	--
GP-23	05/10/02	34	--	--	--	--	0.00544	0.101	0.0667	0.302	--	--	--	--	--	--	--	--	--	--	--
GP-24	05/10/02	24	--	--	--	--	0.00094	0.0144	0.00846	0.0424	--	--	--	--	--	--	--	--	--	--	--
GP-25	05/10/02	24	--	--	--	--	0.00062	0.00882	0.00398	0.0193	--	--	--	--	--	--	--	--	--	--	--
GP-28	06/26/02	26	--	--	--	--	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	--	--	--	--	--
GP-29	06/26/02	50	--	--	--	--	0.538	6.14	1.55	7.14	--	--	--	--	--	--	--	--	--	--	--
GP-30	06/26/02	26	--	--	--	--	<0.0005	0.000626	0.000507	<0.001	--	--	--	--	--	--	--	--	--	--	--
SB-1	04/17/03	36	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-2	04/17/03	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-3	04/18/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-4	04/17/03	--	ND	--	<0.526	<1.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-5	04/17/03	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-6	04/18/03	24	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-7	04/17/03	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-8	04/17/03	--	DET[6.]	--	20.9	<1.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-9	04/18/03	--	DET[6.]	--	66.2	<1.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-10	04/18/03	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-11	04/16/03	--	ND	--	<0.500	<1.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-12	04/18/03	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-18	04/18/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GP-1	06/11/07	70-72	--	--	--	--	<0.001	<0.001	<0.001	<0.002	0.0137	<0.001	<0.002	<0.001	<0.001	<0.002	<0.001	--	--	--	--
GP-2	06/11/07	64-66	--	--	--	--	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.001	<0.001	<0.002	<0.001	--	--	--	--
DP-1 GRAB	03/30/10	60.7-64.7	--	--	--	--	<0.0005	<0.0005	<0.0005	<0.0015	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00100
Groundwater Samples from Temporary Monitoring Wells																					
PMW-5	04/16/03	10-20	DET[6.]	--	1.88	<0.943	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PMW-6	04/16/03	5-20	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PMW-7	04/16/03	9-24	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Groundwater Sample from Irrigation Well																					
IRRIG WELL	04/17/03	--		--	--	--	<0.001	<0.001	<0.001	<0.002	<0.001	--	<0.002	<0.001	<0.001	<0.002	<0.001	<0.005	<0.001	<0.001	--
Washington DOE MTCA Method A cleanup level[12.]				0.800[11.]	0.5	0.5	0.005	1	0.7	1	0.02	NA	0.16	NA	NA	NA	NA	NA	NA	NA	0.015

Notes:

1. TPH-HCID = Total petroleum hydrocarbons hydrocarbon identification by method NWTPH-HCID.
2. TPHg = Total petroleum hydrocarbons in the gasoline carbon range by NW-TPH-Gx method.
3. TPHd = Total petroleum hydrocarbons in the diesel carbon range by NW-TPH-Dx method.
4. TPHho = Total petroleum hydrocarbons in the heavy oil carbon range by NW-TPH-Dx method.
5. Benzene, toulene, ethylbenzene, and total xylenes (BTEX) analysis per EPA Method 8260B.
6. Volatile organic compounds (VOCs) analysis per EPA Method 8260B.
7. DET = Gasoline-, diesel-, and/or heavy oil-range hydrocarbons was detected using NWTPH-HCID. Follow-up analysis was completed.
8. ND = Not detected; method reporting limit (MRL) not available.
9. < = Not detected at or above the specified laboratory method reporting limit (MRL).
10. mg/L (ppm) = Milligrams per liter (parts per million).
11. TPHg cleanup level dependent on presence of benzene in groundwater. Cleanup level = 0.800 mg/L if benzene is present and 1.00 mg/L if benzene is not present.
12. Washington DOE MTCA = Washington Department of Ecology Model Toxics Control Act.
13. **Boldface** values represent concentration that exceeds MTCA Method A cleanup level.
14. NA = Cleanup level not available.

Table 5
Historical Grab Groundwater Sample Analytical Results: PAHs
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

			Concentrations in mg/L (ppm)															
Sample Location	Sample Date	Depth (feet bgs)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(ghi)-perylene	Benzo(k)-fluoranthene	Chrysene	Dibenzo(a,h)-anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)-pyrene	Napthalene	Phenanthrene	Pyrene
Groundwater Samples from Soil Borings																		
SB-4	04/17/03	--	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
SB-8	04/17/03	--	0.0112	<0.00468	<0.00468	<0.00468	<0.00468	<0.00468	<0.00468	<0.00468	<0.00468	<0.00936	<0.00468	0.0179	<0.00468	0.642	0.0323	<0.00468
SB-9	04/18/03	--	<0.00789	<0.00421	0.00404	<0.00105	<0.00105	<0.00105	<0.00105	<0.00105	<0.00105	<0.00211	<0.00105	0.00209	<0.00105	0.728	0.0389	0.00235
SB-11	04/16/03	--	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010	0.000266	<0.00010	<0.00010
GP-1	06/11/07	70-72	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.000192	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962
GP-2	06/11/07	64-66	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.000192	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962	<0.0000962
Groundwater Samples from Temporary Monitoring Wells																		
PMW-5	04/16/03		<0.00010	<0.00010	<0.00015	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010	0.00034	<0.00010	<0.00010
Washington DOE MTCA Method A cleanup level [6]			NA	NA	NA	0.0001 [7]	0.0001	0.0001 [7]	NA	0.0001 [7]	0.0001 [7]	0.0001 [7]	NA	NA	0.0001 [7]	0.16	NA	NA
Toxicity relative to benzo(a)pyrene [8]			NA	NA	NA	0.10	1	0.10	NA	0.10	0.01	0.10	NA	NA	0.10	NA	NA	NA

Notes:

1. PAHs by EPA Method 8270SIM.
2. mg/L (ppm) = Milligrams per liter (parts per million).
3. **Boldface** values represent concentration that exceeds MTCA Method A cleanup level.
4. < = Not detected at or above the specified laboratory method reporting limit (MRL).
5. NA = Cleanup level not available.
6. Washington DOE MTCA Method A cleanup level = Washington Department of Ecology Model Toxics Control Act Method A cleanup level.
7. 0.0001 mg/L is the cleanup level for the summation of carcinogenic PAHs adjusted for toxicity relative to benzo(a)pyrene.
8. From WAC173-340, Table 708-2.

Table 6
Analytical Results from Groundwater Monitoring Wells: TPH and VOCs
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

			Concentrations in mg/L (ppm)																				
Well Number	Sample Date	Screened Interval (feet bgs)	TPHg	TPHd	TPHho	Benzene	Toluene	Ethylbenzene	Xylenes	1,2-Dibromoethane	1,2-Dichloroethane	Ethanol	tert-Butyl alcohol	Ethyl tert-Butyl Ether (ETBE)	Diisopropyl Ether (DIPE)	Methyl tert-butyl ether (MTBE)	Tert-Amyl Methyl Ether (TAME)	Naphthalene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Isopropyl-benzene	n-Propylbenzene	n-Butyl-benzene	sec-Butyl-benzene	Chloroform
MW-1	05/14/02	14.5-24.5	<0.080	0.455 [5.]	<0.500	<0.0005	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	--	--	--	<0.002	--	<0.002	<0.001	<0.0005	<0.002	<0.0005	--	--	--
	05/19/03		--	--	--	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001					<0.001		<0.002	<0.001	<0.001	<0.002	<0.001	<0.05	<0.001	<0.001
	05/25/07		<0.080	<0.238	<0.476	<0.0002	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.150	<0.025	<0.001	<0.001	<0.002	<0.001	<0.002	<0.001	<0.0005	<0.002	<0.0005	--	--	--
	08/24/07		<0.1	<0.238	<0.476	<0.001	<0.002	<0.002	<0.006	<0.0005	<0.0005	<0.100	<0.020	<0.0005	<0.0005	<0.0005	<0.0005	<5.0	<0.001	<0.001	<0.002	<0.001	--	--	--
	11/26/07		<0.080	<0.236	<0.472	<0.001	<0.002	<0.002	<0.006	<0.0005	<0.0005	<0.100	<0.020	<0.0005	<0.0005	<0.0005	<0.0005	<5.0	<0.001	<0.001	<0.002	<0.001	--	--	--
	02/27/08		<0.080	<0.294	<0.588	<0.0005	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.100	<0.0010	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--
	03/31/10		<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	<0.0005	<0.0005	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	09/01/10		<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	<0.0005	<0.0005	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MW-2	05/14/02	20-35	41.4	<0.250	<0.500	4.35	2.68	1.84	8.72	<0.025	<0.025	--	--	--	--	0.7	--	0.106	0.665	0.194	<100	0.071	--	--	--
	05/19/03		--	--	--	0.534	0.00975	0.194	0.876	<0.05	<0.05	--	--	--	--	0.0776	--	0.015	0.16	0.0624	0.0099	0.0158	0.0033	<0.05	<0.05
	05/25/07		0.439	<0.238	<0.476	0.071	0.00114	0.0361	0.0453	<0.0005	<0.0005	<0.150	<0.025	<0.001	<0.001	0.0182	<0.001	<0.002	0.04	0.0335	0.003	0.00249	--	--	--
	08/24/07		0.102	<0.238	<0.476	<0.001	<0.002	<0.002	<0.006	<0.0005	<0.0005	<0.100	<0.020	<0.0005	<0.0005	0.059	<0.0005	<0.05	<0.001	<0.001	0.0032	<0.001	--	--	--
	11/26/07		<0.080	<0.236	<0.472	<0.001	<0.002	<0.002	<0.006	<0.0005	<0.0005	<0.100	<0.020	<0.0005	<0.0005	0.083	<0.0005	<0.05	<0.001	<0.001	<0.002	<0.001	--	--	--
	02/27/08		0.0817	<0.294	<0.588	0.005	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.100	<0.0010	<0.0005	<0.0005	0.015	<0.0005	<0.0005	<0.0005	<0.0005	0.00034 J	<0.0005	--	--	--
	03/31/10		<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	<0.0005	<0.0005	<0.005	<0.005	<0.0005	<0.0005	0.045	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00051	<0.0005
	09/01/10		<0.250	<0.250	<0.500	0.0016	<0.0005	<0.0005	<0.0015	<0.0005	<0.0005	<0.005	<0.005	<0.0005	<0.0005	0.081	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00051	<0.0005
MW-3	05/14/02	24.5-34.5	4.5	<0.250	<0.500	0.0419	0.0096	0.293	0.521	<0.001	<0.001	--	--	--	--	<4.00	--	0.0489	0.296	0.106	0.0213	0.0591	--	--	--
	05/19/03		--	--	--	0.0908	0.0097	0.338	0.5382	<0.05	<0.05	--	--	--	--	0.0037	--	0.0308	0.315	0.0895	0.0194	0.0623	--	--	--
	05/25/07		0.361	<0.238	<0.476	<0.0005	<0.0005	0.0132	0.0145	<0.0005	<0.0005	<0.150	<0.025	<0.001	<0.001	<0.002	<0.001	<0.002	0.0107	0.00348	0.00532	0.0093	0.0068	<0.05	<0.05
	08/24/07		<0.1	<0.238	<0.476	<0.001	<0.002	<0.002	<0.006	<0.0005	<0.0005	<0.100	<0.020	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	<0.001	<0.001	<0.002	<0.001	--	--	--
	11/26/07		<0.080	<0.236	<0.472	0.0011	<0.002	0.0066	<0.006	<0.0005	<0.0005	<0.100	<0.020	<0.0005	<0.0005	0.0069	<0.0005	<0.05	<0.001	<0.001	0.0031	0.0012	--	--	--
	02/27/08		2.14	0.387 [6.]	<0.500	<0.0005	<0.0005	0.17	0.17	<0.0005	<0.0005	<0.100	<0.0010	<0.0005	<0.0005	<0.0005	<0.0005	0.0064	0.21	0.051	0.022	0.056	--	--	--
	03/31/10		2.10	<0.250	<0.500	<0.0005	<0.0005	0.018	0.021	<0.0005	<0.0005	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	0.0018	0.24	<0.0005	0.019	0.050	0.0052	0.012	<0.0005
	09/01/10		<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	<0.0005	<0.0005	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MW-3 DUP	02/27/08	24.5-34.5	1.85	0.342	<0.485	0.0011	<0.0005	0.19	0.2	<0.0005	<0.0005	<0.100	<0.0010	<0.0005	<0.0005	<0.0005	<0.0005	0.0076	0.23	0.058	0.026	0.066	--	--	--
	03/31/10		1.90	<0.250	<0.500	<0.0015	<0.0015	0.018	0.020	<0.0015	<0.0015	<0.015	<0.007	<0.0015	<0.0015	<0.0015	<0.0015	0.0019	0.27	<0.0015	0.018	0.048	0.0050	0.012	<0.0015
	09/01/10		<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	<0.0005	<0.0005	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MW-4	05/14/02	20-35	<0.080	0.358 [5.]	<0.500	<0.0005	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	--	--	--	--	<0.002	--	<0.002	<0.001	<0.0005	<0.002	<0.0005	--	--	--
	05/19/03		--	--	--	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	--	--	--	--	<0.001	--	<0.002	<0.001	<0.001	<0.002	<0.001	--	--	--
	05/25/07		<0.080	<0.238	<0.476	<0.0002	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.150	<0.025	<0.001	<0.001	<0.002	<0.001	<0.002	<0.001	<0.0005	<0.002	<0.0005	<0.05	<0.001	<0.001
	08/24/07		<0.1	<0.238	<0.476	<0.001	<0.002	<0.002	<0.006	<0.0005	<0.0005	<0.100	<0.020	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	<0.001	<0.001	<0.002	<0.001	--	--	--
	11/26/07		<0.080	<0.236	<0.472	<0.001	<0.002	<0.002	<0.006	<0.0005	<0.0005	<0.100	<0.020	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	<0.001	<0.001	<0.002	<0.001	--	--	--
	02/27/08		<0.080	<0.248	<0.495	<0.0005	<0.0005	<0.0005	<0.001	<0.0005	<0.0005	<0.100	<0.0010	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--
	03/31/10		<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	<0.0005	<0.0005	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	09/01/10		<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0015	<0.0005	<0.0005	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Washington DOE MTCA Method A cleanup level [9.]			0.800 [8.]	0.5	0.5	0.005	1	0.7	1	NA	0.005	NA	NA	NA	NA	0.02	NA	0.16	NA	NA	NA	NA	NA	NA	NA

Notes:

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

Table 7
Analytical Results from Groundwater Monitoring Wells: PAHs and Lead
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

			Concentrations in mg/L (ppm)																	
Well Number	Sample Date	Screened Interval (feet bgs)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(ghi)-perylene	Benzo(k)-fluoranthene	Chrysene	Dibenzo(a,h)-anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)-pyrene	Napthalene	Phenanthrene	Pyrene	Total Lead	Dissolved Lead
MW-1	05/19/03	14.5-24.5	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000238	<0.001
	03/31/10		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.00100	<0.00100
	09/01/10		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.00100
MW-2	05/01/03	20-35	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0153	<0.00010	<0.00010	<0.001	<0.001
	03/31/10		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.103**	<0.00100
	09/01/10		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.00100
MW-3	05/19/03	24.5-34.5	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0242	<0.00010	<0.00010	<0.001	<0.001
	03/31/10		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.00100	<0.00100
	09/01/10		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.00100
MW-4	05/19/03	20-35	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000156	<0.001
	03/31/10		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00138	<0.00100
	09/01/10		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.00100
Washington DOE MTCA Method A cleanup level [6]			NA	NA	NA	0.0001 [7]	0.0001	0.0001 [7]	NA	0.0001 [7]	0.0001 [7]	0.0001 [7]	NA	NA	0.0001 [7]	0.16	NA	NA	0.015	0.015
Toxicity relative to benzo(a)pyrene [8]			NA	NA	NA	0.10	1	0.10	NA	0.10	0.01	0.10	NA	NA	0.10	NA	NA	NA	NA	NA

Notes:
1. PAHs by EPA Method 8270SIM.
2. mg/L (ppm) = Milligrams per liter (parts per million).
3. **Boldface** values represent concentration that exceeds MTCA Method A cleanup level.
4. < = Not detected at or above the specified laboratory method reporting limit (MRL).
5. NA = Cleanup level not available.
6. Washington DOE MTCA Method A cleanup level = Washington Department of Ecology Model Toxics Control Act Method A cleanup level.
7. 0.0001 mg/L is the cleanup level for the summation of carcinogenic PAHs adjusted for toxicity relative to benzo(a)pyrene.
8. From WAC173-340, Table 708-2.

Table 8
Firestone Property Groundwater Analytical Results: TPH, VOCs, and PAHs
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

		Concentrations in mg/L (ppm)																
Sample Location	Sample Date	TPHg	TPHd	TPHho	Benzene	Toluene	Ethyl-benzene	Xylenes	Methyl tert-butyl ether (MTBE)	Tert-Amyl Methyl Ether (TAME)	Naphthalene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Isopropyl-benzene	n-Propylbenzene	n-Butyl-benzene	sec-Butyl-benzene	Chloroform
IRIG-Firestone	9/26/2006	<0.080	<0.238	<0.476	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.002	<0.001	<0.005	<0.001	<0.001
House-Firestone	9/26/2006	<0.080	<0.238	<0.476	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.002	<0.001	<0.005	<0.001	<0.001
Washington DOE MTCA Method A cleanup level [11.]		0.8 [10.]	0.500	0.500	0.005	1	0.700	1	0.02	NA	0.16	NA	NA	NA	NA	NA	NA	NA

		Concentrations in mg/L (ppm)															
Well Number	Sample Date	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(ghi)-perylene	Benzo(k)-fluoranthene	Chrysene	Dibenzo(a,h)-anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)-pyrene	Napthalene	Phenanthrene	Pyrene
IRIG-Firestone	09/26/06	<0.0000943	<0.0000943	<0.0000943	<0.0000943	<0.0000943	<0.0000943	<0.0000943	<0.0943	<0.0943	<0.189	<0.0943	<0.0943	<0.0943	<0.0000943	<0.0000943	<0.0000943
House-Firestone	09/26/06	<0.0000943	<0.0000943	<0.0000943	<0.0000943	<0.0000943	<0.0000943	<0.0000943	<0.0943	<0.0943	<0.189	<0.0943	<0.0943	<0.0943	<0.0000943	<0.0000943	<0.0000943
Washington DOE MTCA Method A cleanup level [11.]		NA	NA	NA	0.0001 [13.]	0.0001	0.0001 [13.]	NA	0.0001 [13.]	0.0001 [13.]	0.0001 [13.]	NA	NA	0.0001 [13.]	0.16	NA	NA
Toxicity Relative to benzo(a)pyrene [14]		NA	NA	NA	0.1	1	0.1	NA	0.1	0.1	0.1	NA	NA	0.1	NA	NA	NA

Notes:

1. TPHg = Total petroleum hydrocarbons in the gasoline carbon range by NW-TPH-Gx method.
2. TPHd = Total petroleum hydrocarbons in the diesel carbon range by NW-TPH-Dx method.
3. TPHho = Total petroleum hydrocarbons in the heavy oil carbon range by NW-TPH-Dx method.
4. Benzene, toulene, ethylbenzene, and total xylenes (BTEX) analysis per EPA Method 8260B.
5. Volatile organic compounds (VOCs) analysis per EPA Method 8260B.
6. Polycyclic aromatic hydrocarbons (PAHs) analysis per EPA Method 8270SIM.
7. -- = Not analyzed.
8. < = Not detected at or above the specified laboratory method reporting limit (MRL).
9. mg/L (ppm) = Milligrams per liter (parts per million).
10. TPHg cleanup level dependent on presence of benzene in groundwater. Cleanup level = 0.800 mg/L if benzene is present and 1.00 mg/L if benzene is not present.
11. Washington DOE MTCA Method A cleanup level = Washington Department of Ecology Model Toxics Control Act Method A cleanup level.
12. NA = Cleanup level not available.
13. 0.0001 mg/L is the cleanup level for the summation of carcinogenic PAHs adjusted for toxicity relative to benzo(a)pyrene.
14. From WAC173-340, Table 708-2.

Base map prepared from USGS 7.5-minute quadrangle of Vancouver, WA, dated 1990, as provided by Topozone.

0 2,000 4,000

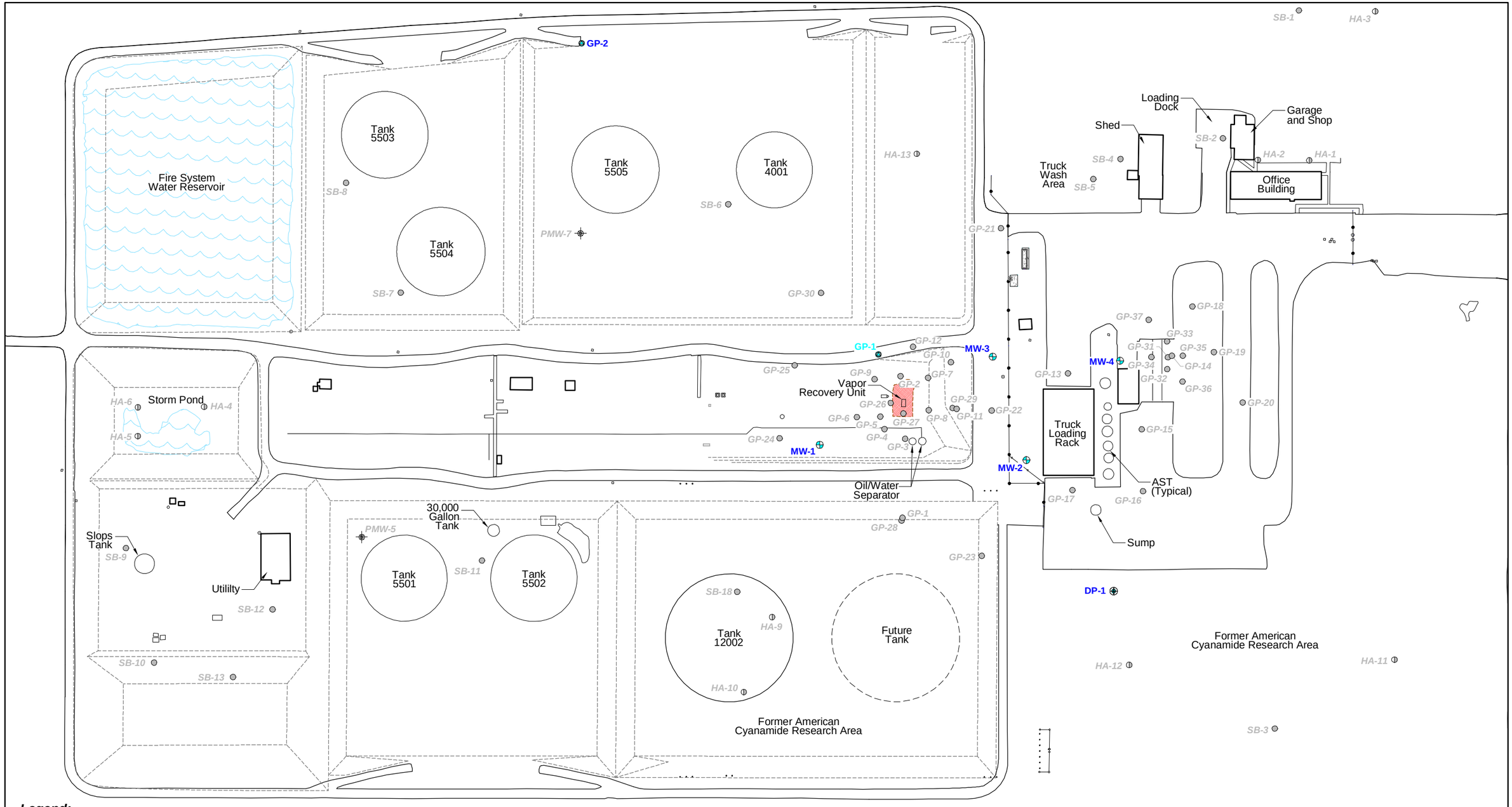
Scale in Feet

N

Facility Location Map

Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Ash Creek Associates, Inc. Environmental and Geotechnical Consultants	Project Number 1569-00	Figure 1
	December 2010	



Legend:

- **DP-1** Grab Groundwater Sample Location
- **MW-1** Groundwater Monitoring Well Location
- **GP-1** Deeper Direct-Push Geoprobe Location
- *GP-1* Historical Direct-Push Boring Location (Approximate)
- *PMW-5* Historical Temporary Well Location (Approximate)
- *HA-1* Historical Hand Auger Location (Approximate)

Excavation

N

0 100 200

Scale in Feet

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

Facility Site Plan

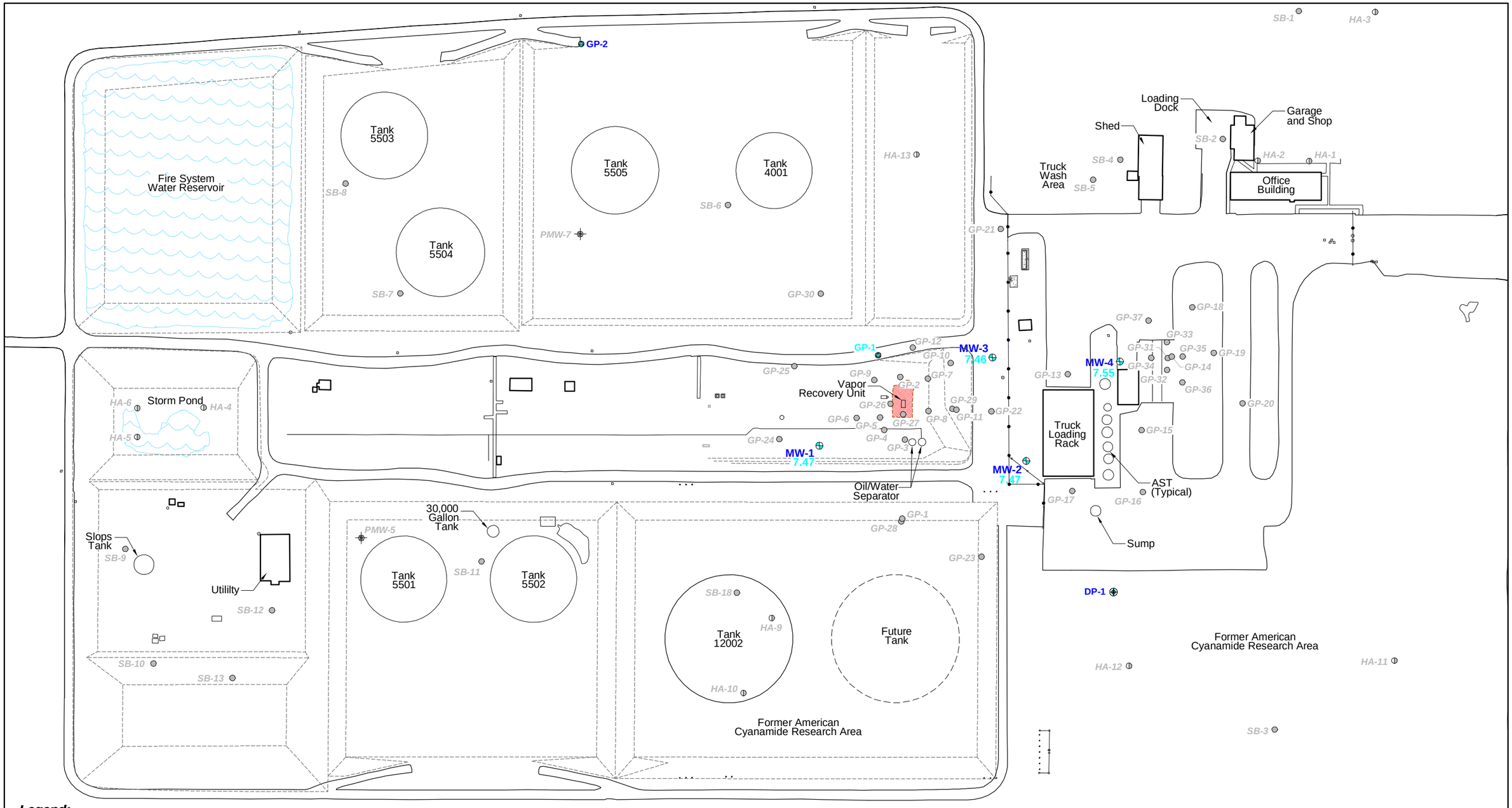
Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1569-00

December 2010

Figure 2



Legend:

- **MW-1** 7.47 — Groundwater Monitoring Well Location and Groundwater Elevation in Feet Above Mean Sea Limit (MSL)
- **GP-1** — Grab Groundwater Sample Location
- **DP-1** — Direct-Push Geoprobe Location
- Excavation
- GP-1 — Historical Direct-Push Boring Location (Approximate)
- PMW-5 — Historical Temporary Well Location (Approximate)
- HA-1 — Historical Hand Auger Location (Approximate)

N

0 100 200

Scale in Feet

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

Relative Groundwater Elevations - September 2010

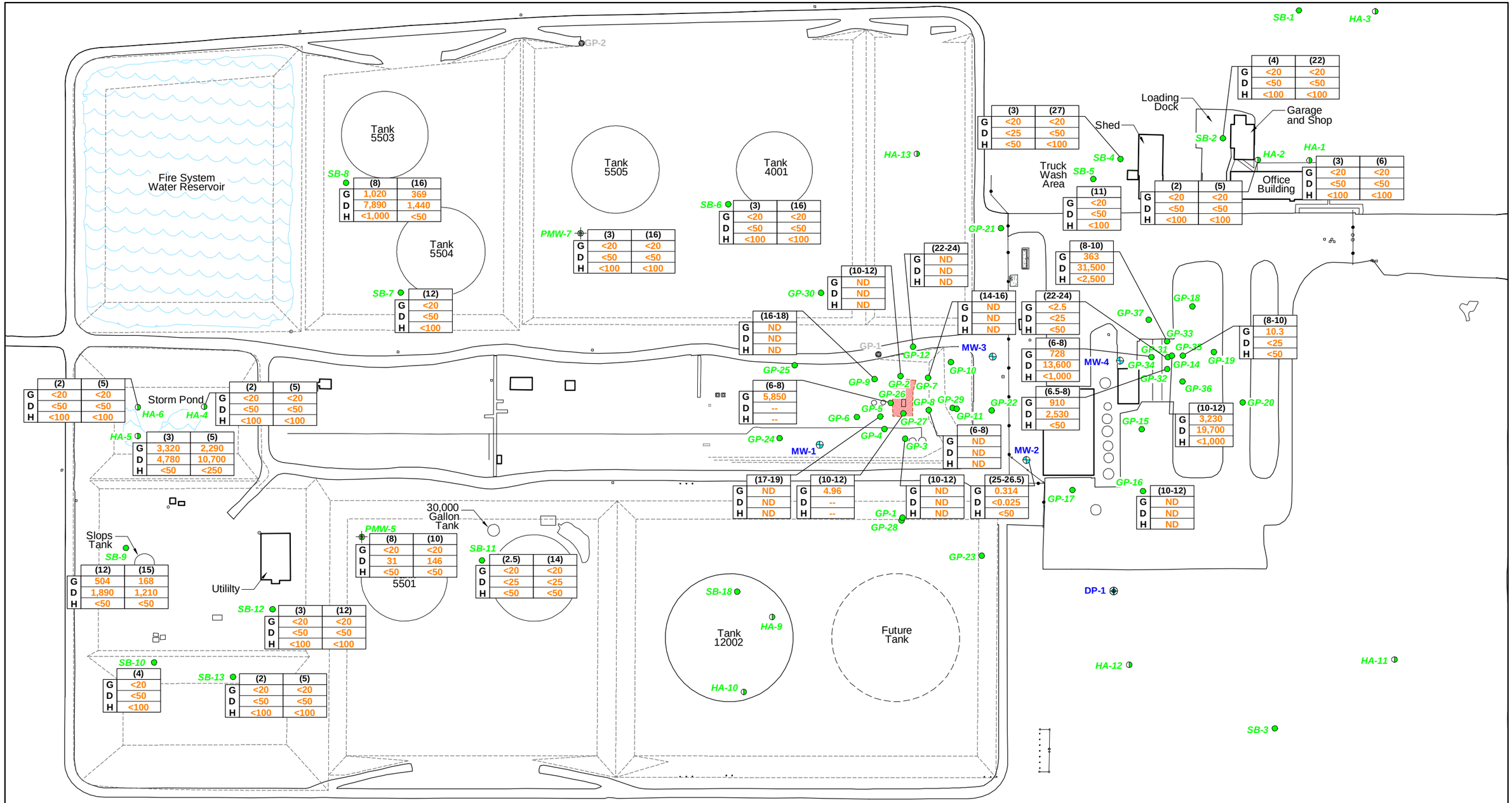
Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1569-00

December 2010

Figure 3



Legend:

- DP-1 — Grab Groundwater Sample Location
- MW-1 — Groundwater Monitoring Well Location
- GP-1 — Deeper Direct-Push Geoprobe Location
- GP-1 — Historical Direct-Push Boring Location (Approximate; Sampled 2002-2003)
- PMW-5 — Historical Temporary Well Location (Approximate; Sampled April 2003)
- HA-1 — Historical Hand Auger Location (Approximate; Sampled April 2003)

(6.5-8) / G 910 / D 2,530 / H <50

- Sample Depth in Feet
- Concentration in mg/kg
- Analyte Sampled

G = Total Petroleum Hydrocarbons Gasoline-Range
D = Total Petroleum Hydrocarbons Diesel-Range
H = Total Petroleum Hydrocarbons Heavy Oil-Range
-- = Not Analyzed
ND = Not Detected Above Laboratory Method Reporting Limit

Excavation

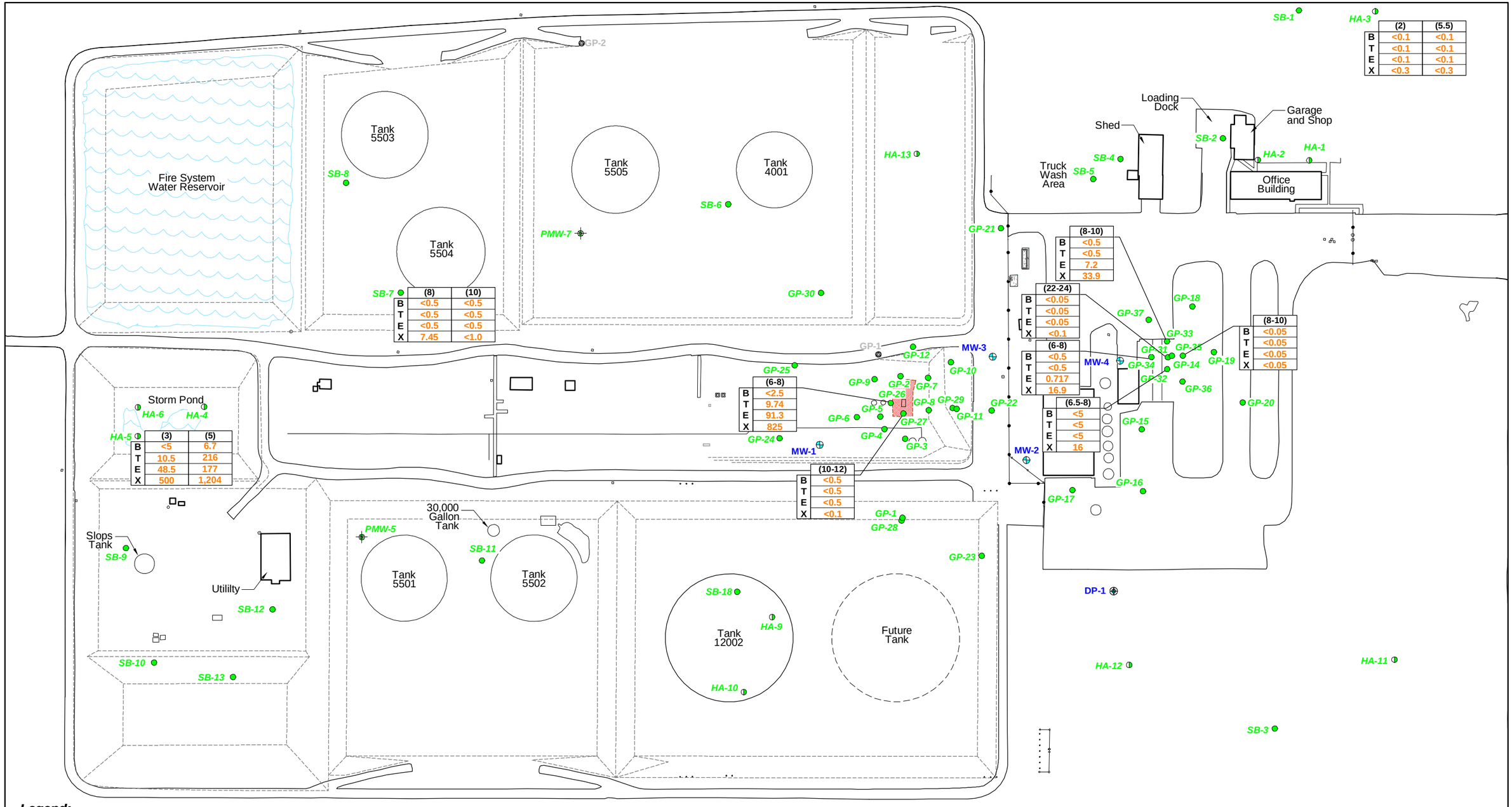
NOTE: Base map completed from a number of sources including but not limited to; Figure VAN1-21-002 provided by NuStar (1/8/2007) and a Monitoring Well Survey by Statewide Land Surveying, Inc (10/30/2007). Locations of roads and containments are approximate.

2002/2003 TPH Concentrations in Soil

Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1569-00
December 2010
Figure 4



Legend:

- DP-1 — Grab Groundwater Sample Location
- MW-1 — Groundwater Monitoring Well Location
- GP-1 — Deeper Direct-Push Geoprobe Location
- GP-1 — Historical Direct-Push Boring Location (Approximate; Sampled 2002-2003)
- PMW-5 — Historical Temporary Well Location (Approximate; Sampled April 2003)
- HA-1 — Historical Hand Auger Location (Approximate; Sampled April 2003)

(6.5-8)	Sample Depth in Feet
B <5	Concentration in mg/kg
T <5	
E <5	
X 16	Analyte Sampled

B = Benzene
T = Toluene
E = Ethylbenzene
X = Total Xylenes
-- = Not Analyzed
ND = Not Detected Above Laboratory Method Reporting Limit

Excavation

N

0 100 200
Scale in Feet

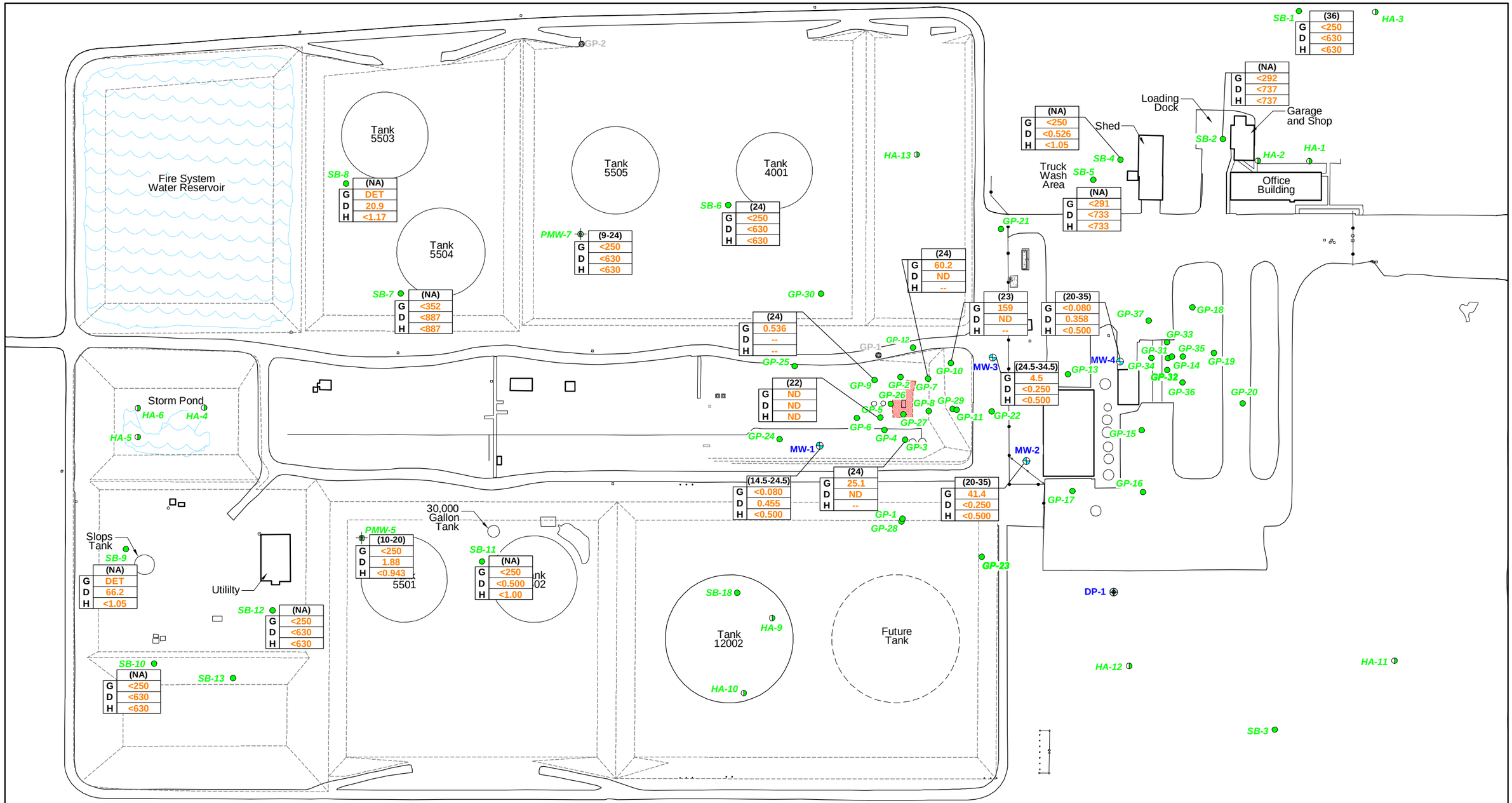
NOTE: Base map completed from a number of sources including but not limited to; Figure VAN1-21-002 provided by NuStar (1/8/2007) and a Monitoring Well Survey by Statewide Land Surveying, Inc (10/30/2007). Locations of roads and containments are approximate.

2002/2003 BTEX Concentrations in Soil

Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1569-00
December 2010
Figure 5



Legend:

- DP-1 — Grab Groundwater Sample Location
- MW-1 — Groundwater Monitoring Well Location (Sampled May 2002)
- GP-1 — Deeper Direct-Push Geoprobe Location
- GP-1 — Historical Direct-Push Boring Location (Approximate; Sampled 2002-2003)
- PMW-5 — Historical Temporary Well Location (Approximate; Sampled April 2003)
- HA-1 — Historical Hand Auger Location (Approximate; Sampled April 2003)

(23) / G 910 / D 2,530 / H <50

- Sample Depth in Feet
  NA = Depth Not Available
- Concentration in mg/L
- Analyte Sampled
  G = Total Petroleum Hydrocarbons Gasoline-Range
  D = Total Petroleum Hydrocarbons Diesel-Range
  H = Total Petroleum Hydrocarbons Heavy Oil-Range
  -- = Not Analyzed
  ND = Not Detected Above Laboratory Method Reporting Limit
  DET = Detection of TPHg, TPHd, or TPHho using NWTPH-HCID.

Excavation

N

0 100 200
Scale in Feet

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

2002/2003 TPH Concentrations in Groundwater

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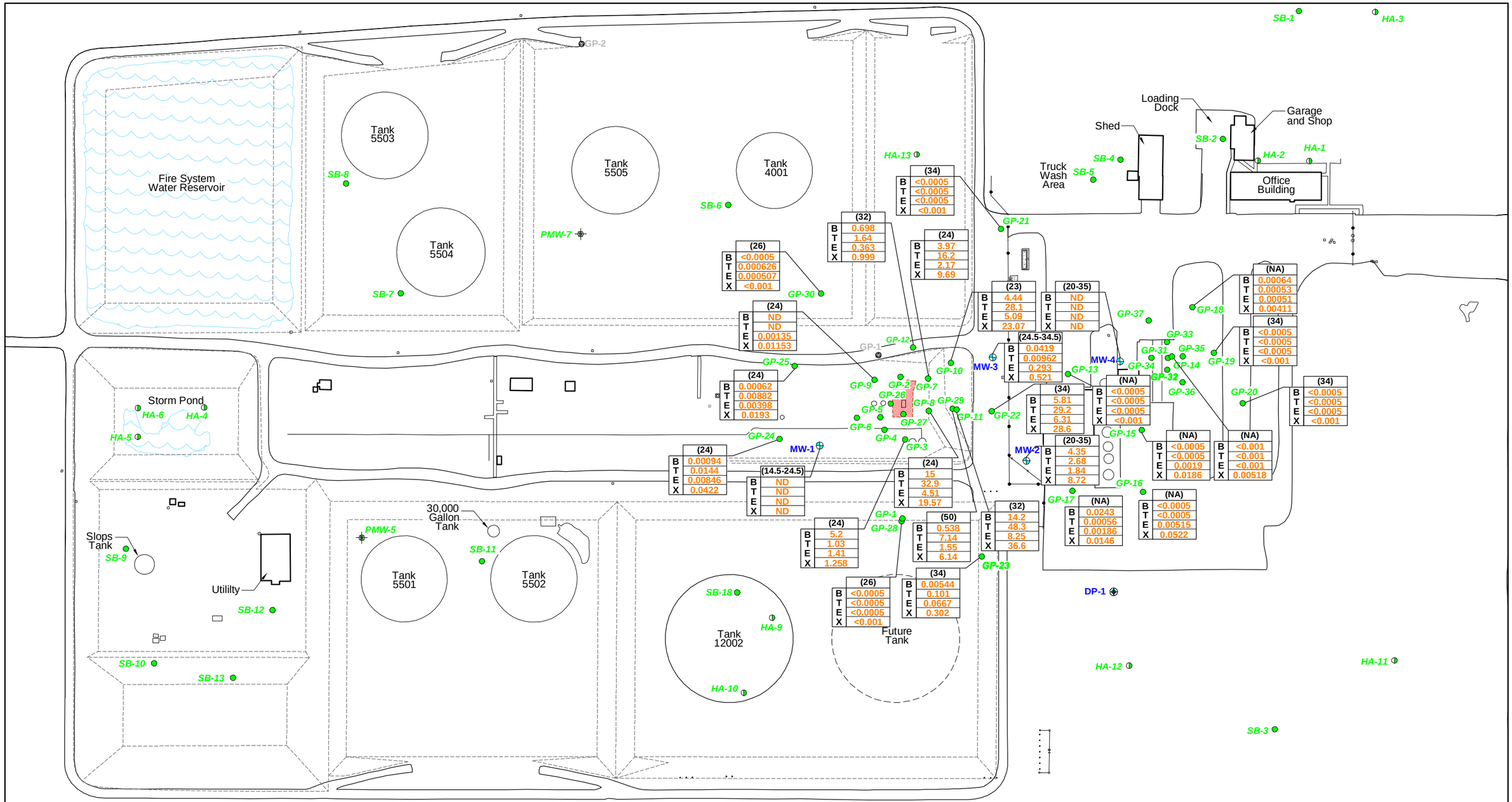
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1569-00
December 2010
Figure 6



Legend:

- DP-1 — Grab Groundwater Sample Location
- MW-1 — Groundwater Monitoring Well Location
- GP-1 — Deeper Direct-Push Geoprobe Location
- *GP-1* — Historical Direct-Push Boring Location (Approximate; Sampled 2002-2003)
- *PMW-5* — Historical Temporary Well Location (Approximate; Sampled April 2003)
- *HA-1* — Historical Hand Auger Location (Approximate; Sampled April 2003)

(6.5-8)
B <5
T <5
E <5
X 16

Sample Depth in Feet
NA = Depth Not Available

Concentration in mg/L

Analyte Sampled
B = Benzene
T = Toluene
E = Ethylbenzene
X = Total Xylenes
-- = Not Analyzed
ND = Not Detected Above Laboratory Method Reporting Limit

Excavation

N

0 100 200
Scale in Feet

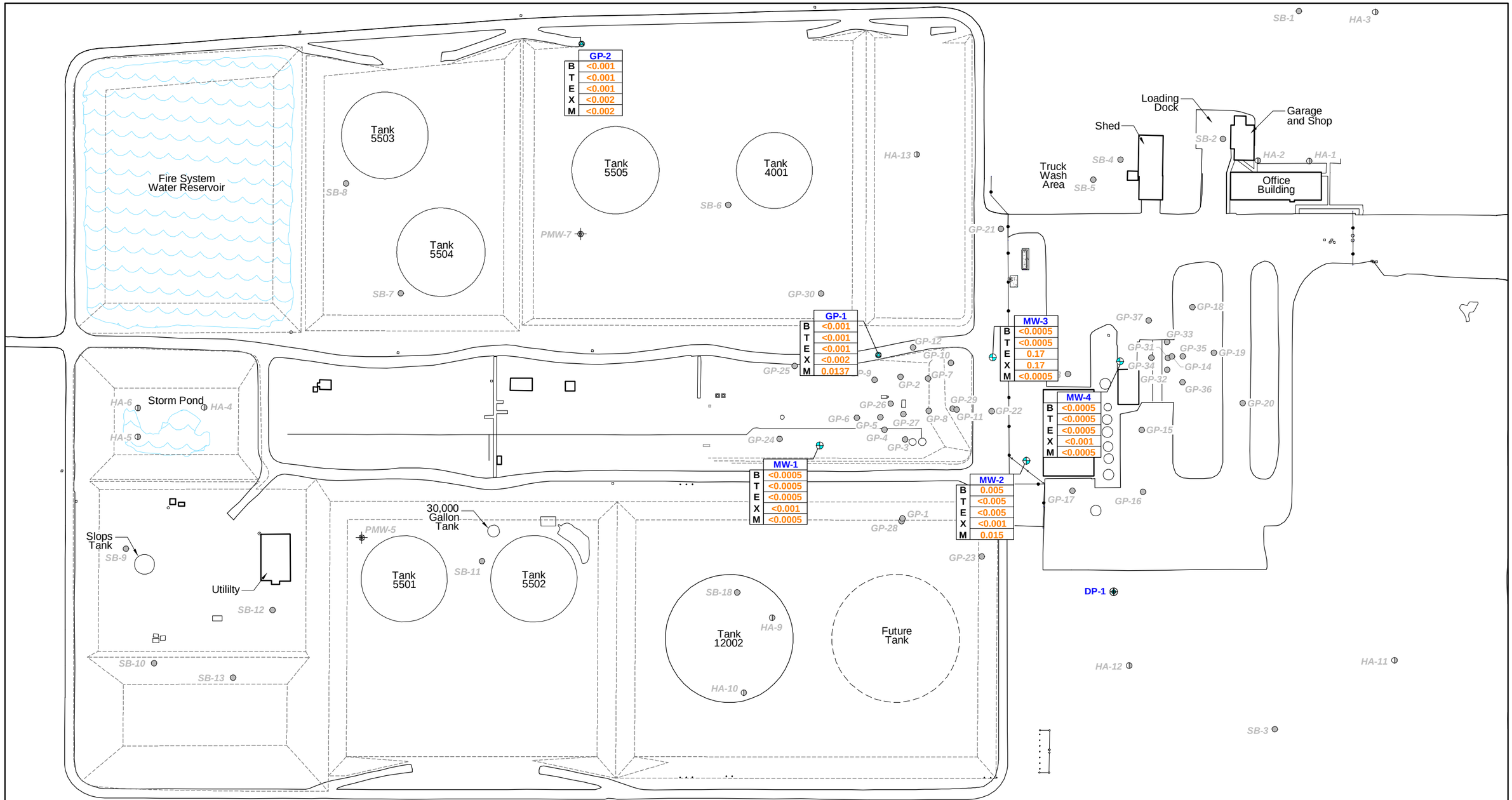
NOTE: Base map completed from a number of sources including but not limited to; Figure VAN1-21-002 provided by NuStar (1/8/2007) and a Monitoring Well Survey by Statewide Land Surveying, Inc (10/30/2007). Locations of roads and containments are approximate.

2002/2003 BTEX Concentrations in Groundwater

Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1569-00
December 2010
Figure 7



Legend:

- DP-1 — Grab Groundwater Sample Location
- MW-1 — Groundwater Monitoring Well Location
- GP-1 — Deeper Direct-Push Geoprobe Location (Sampled 6/11/07)
- GP-1 — Historical Direct-Push Boring Location (Approximate)
- PMW-5 — Historical Temporary Well Location (Approximate)
- HA-1 — Historical Hand Auger Location (Approximate)

GP-2	
B	<0.001
T	<0.001
E	<0.001
X	<0.002
M	<0.002

- GP-2 — Location Identification
- <0.001 — Concentration in mg/L
- B, T, E, X, M — Analyte Sampled
  - B = Benzene
  - T = Toluene
  - E = Ethylbenzene
  - X = Total Xylenes
  - M = Methyl Tert-Butyl Ether
  - -- = Not Analyzed

N

0 100 200

Scale in Feet

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

2007/2008 BTEX and MTBE Concentrations in Groundwater

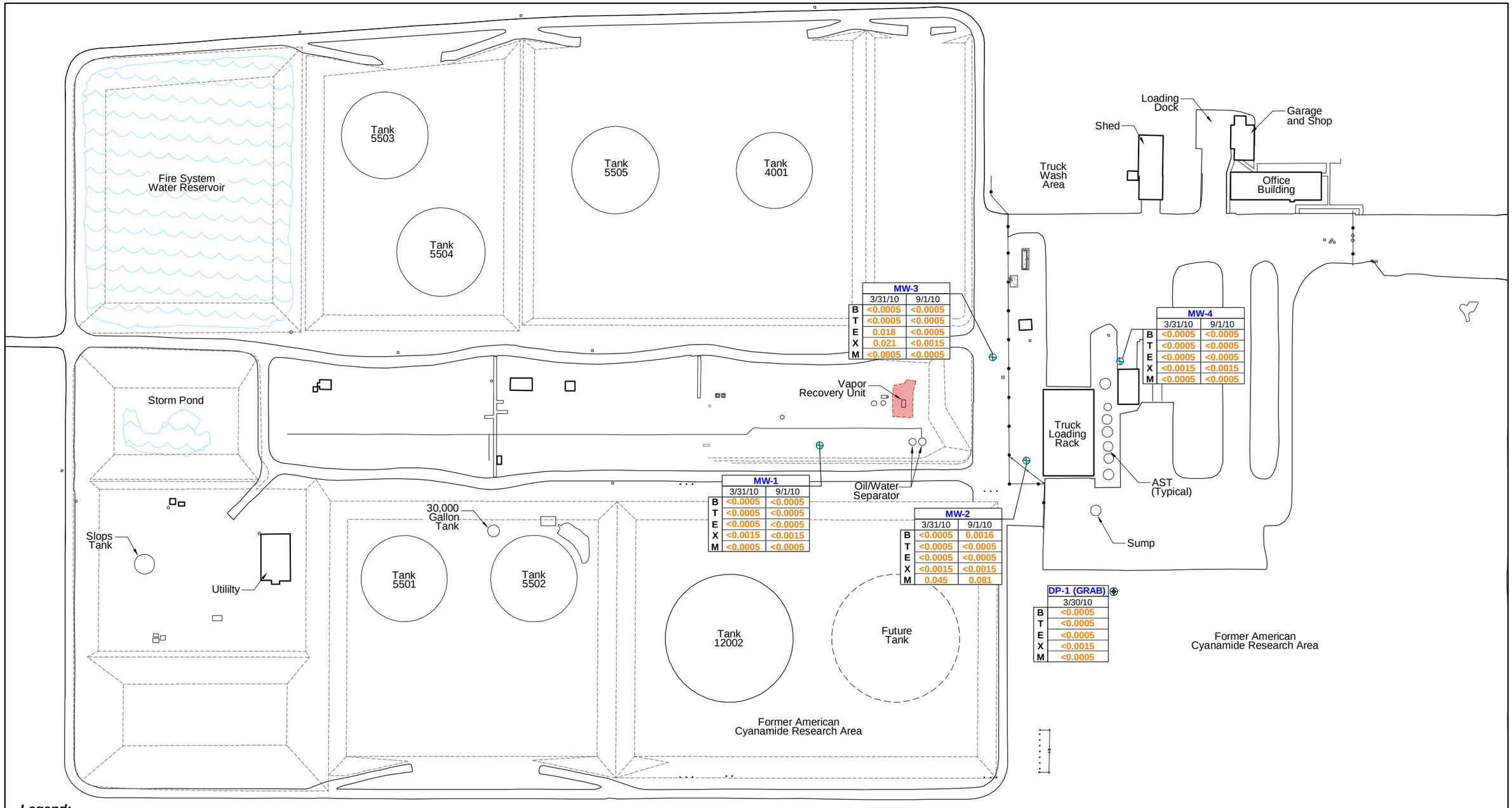
Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1569-00

December 2010

Figure 8



Legend:

MW-1 — Groundwater Monitoring Well Location

DP-1 — Grab Intermediate Zone Groundwater Sample Location

Excavation

MW-1		
	3/31/10	9/1/10
B	<0.0005	<0.0005
T	<0.0005	<0.0005
E	<0.0005	<0.0005
X	<0.0015	<0.0015
M	<0.0005	<0.0005

Sampling Date

Concentration in mg/L

Analyte Sampled
B = Benzene
T = Toluene
E = Ethylbenzene
X = Total Xylenes
M = Methyl Tert-Butyl Ether
-- = Not Analyzed

N

0 100 200

Scale in Feet

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

2010 BTEX and MTBE Concentrations in Groundwater

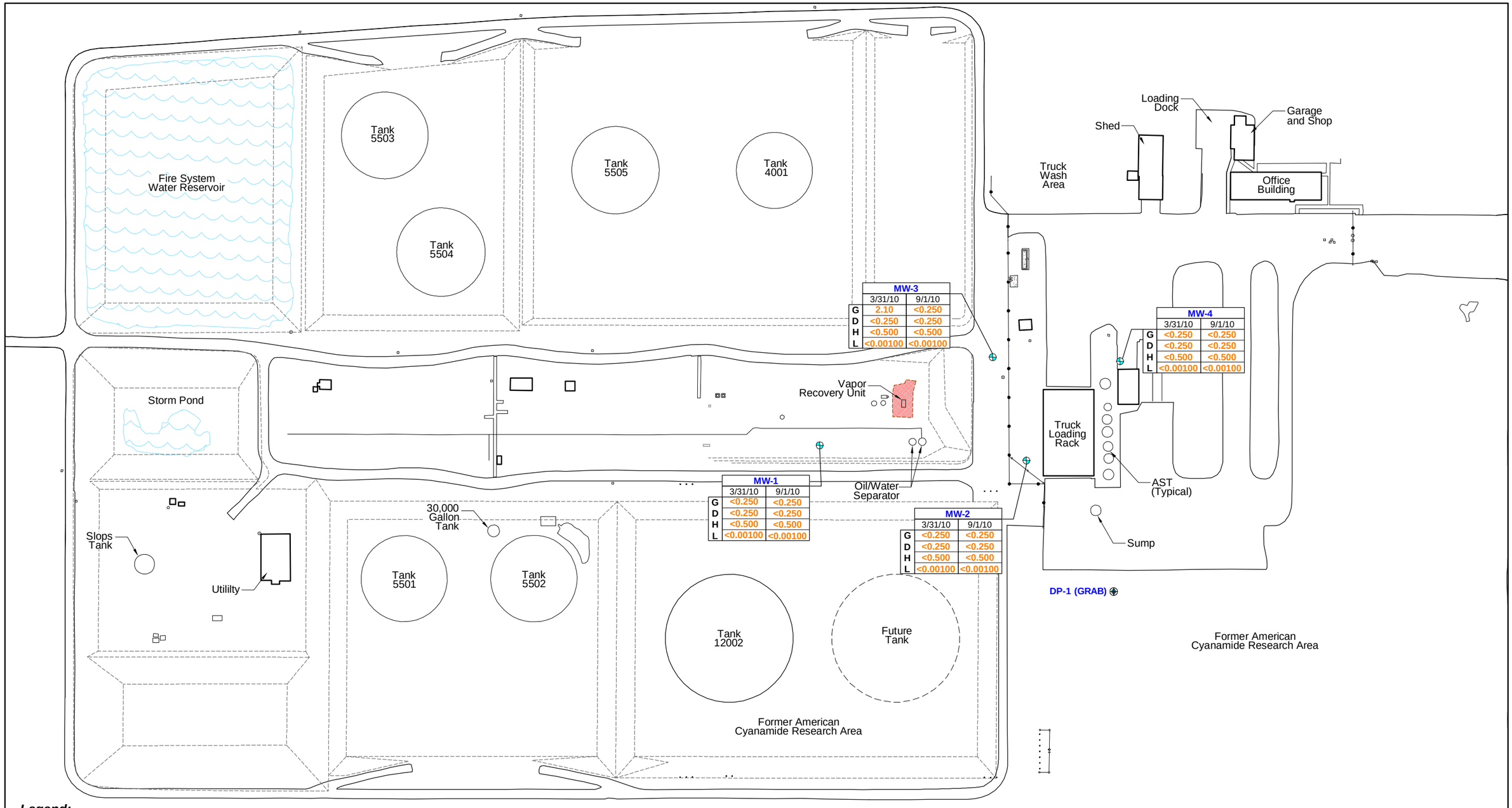
Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1569-00

December 2010

Figure 9



Legend:

MW-1 ⊕ Groundwater Monitoring Well Location

DP-1 ⊕ Grab Intermediate Zone Groundwater Sample Location

Excavation

MW-1		
	3/31/10	9/1/10
G	<0.250	<0.250
D	<0.250	<0.250
H	<0.500	<0.500
L	<0.00100	<0.00100

Sampling Date

Concentration in mg/L

Analyte Sampled

G = Total Petroleum Hydrocarbons Gasoline-Range
D = Total Petroleum Hydrocarbons Diesel-Range
H = Total Petroleum Hydrocarbons Heavy Oil-Range
L = Dissolved Lead
-- = Not Analyzed

N

0 100 200

Scale in Feet

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

2010 TPH and Lead Concentrations in Groundwater

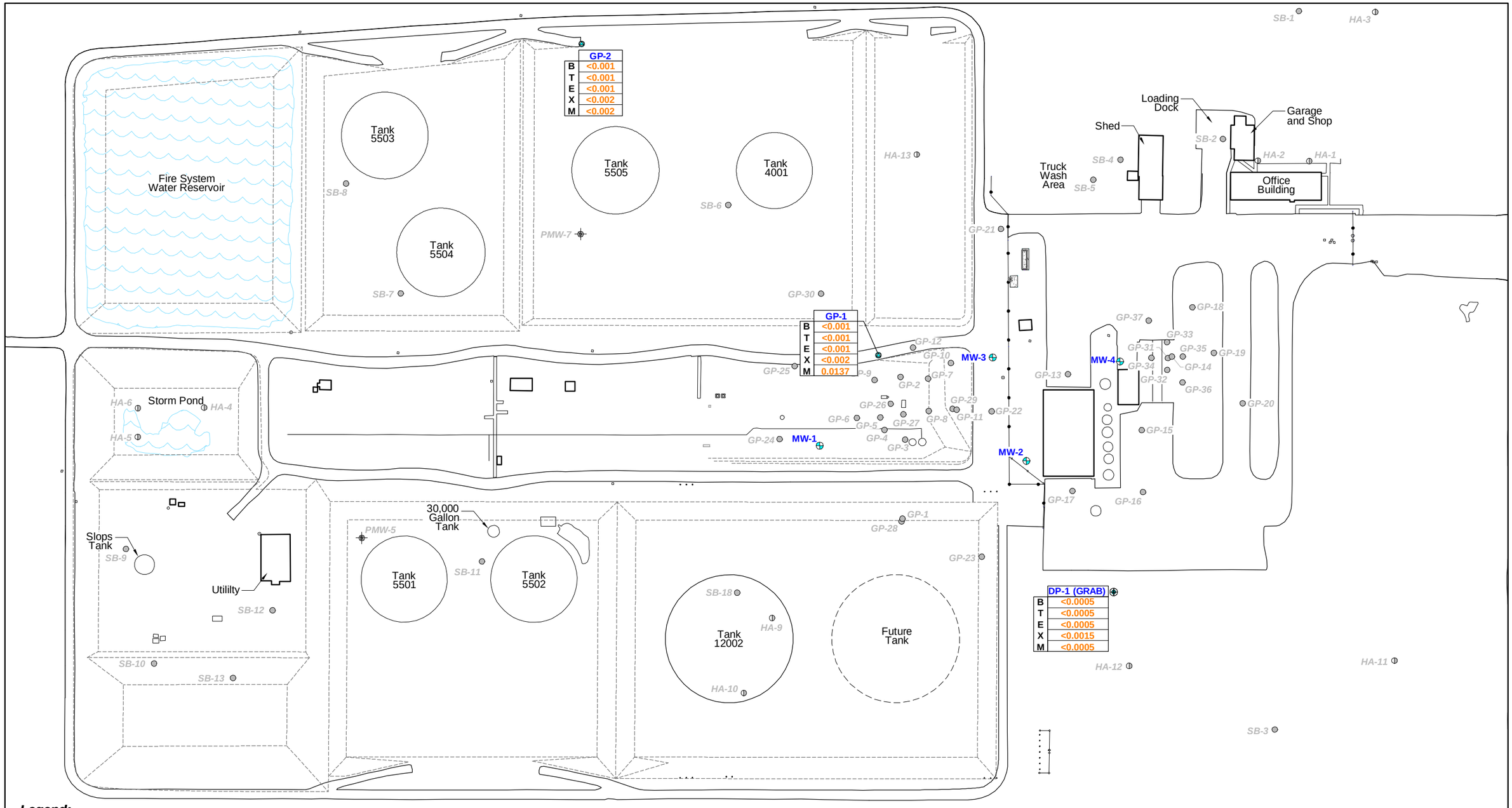
Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1569-00

December 2010

Figure 10



Legend:

- DP-1 Grab Groundwater Sample Location (Sampled 3/10/10)
- MW-1 Groundwater Monitoring Well Location
- GP-1 Deeper Direct-Push Geoprobe Location (Sampled 6/11/07)
- GP-1 Historical Direct-Push Boring Location (Approximate)
- PMW-5 Historical Temporary Well Location (Approximate)
- HA-1 Historical Hand Auger Location (Approximate)

GP-2-1	
B	<0.001
T	<0.001
E	<0.001
X	<0.002
M	<0.002

Location Identification

Concentration in mg/L

Analyte Sampled
B = Benzene
T = Toluene
E = Ethylbenzene
X = Total Xylenes
M = Methyl Tert-Butyl Ether
-- = Not Analyzed

N

0 100 200

Scale in Feet

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

Intermediate Zone Groundwater Results - BTEX and MTBE

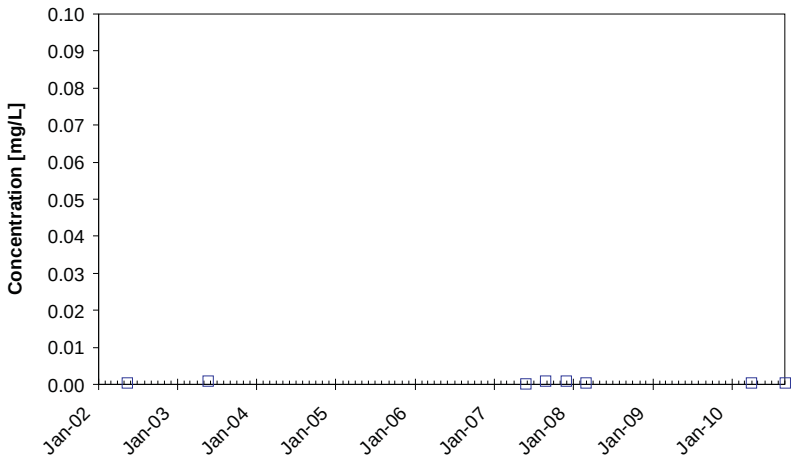
Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

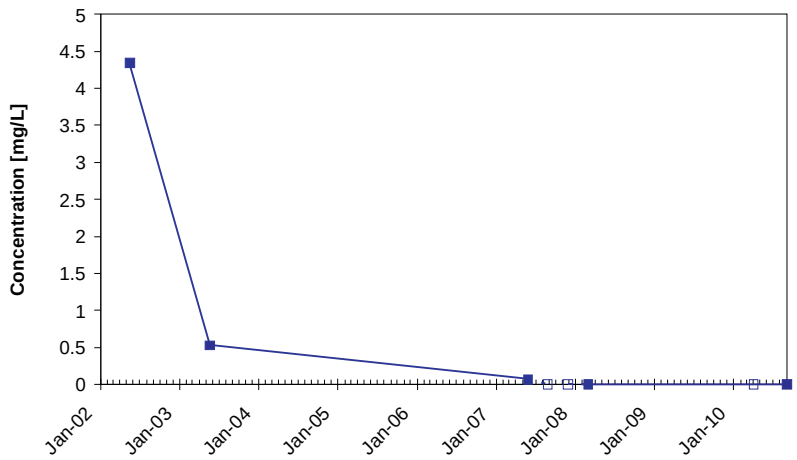
Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

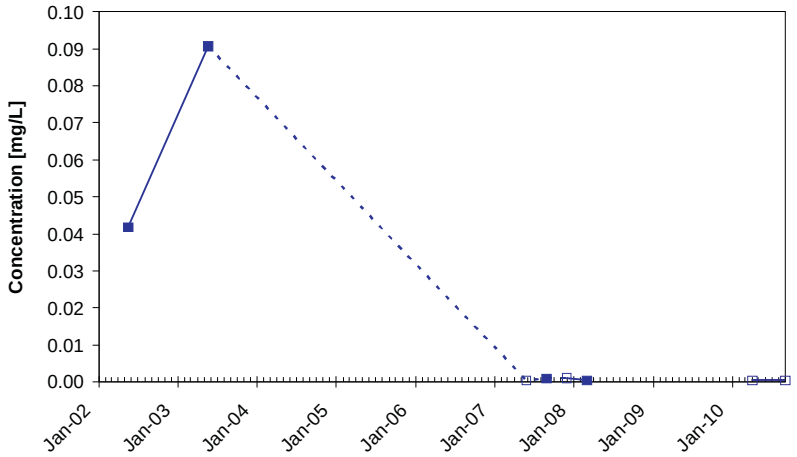
Project Number 1569-00

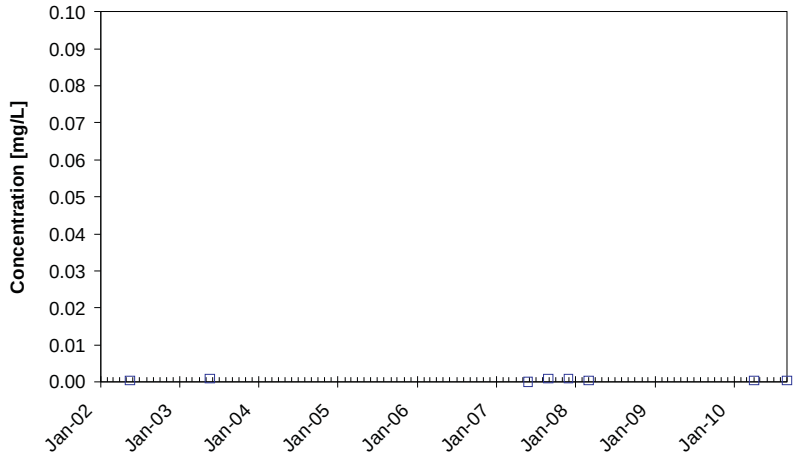
December 2010

Figure 11









Legend:

- Detected Analyte Concentration
- Non-Detect (Laboratory Reporting Limit)
- Concentration Trend
- Inferred Concentration Trend

Benzene Concentration Trends in Monitoring Wells

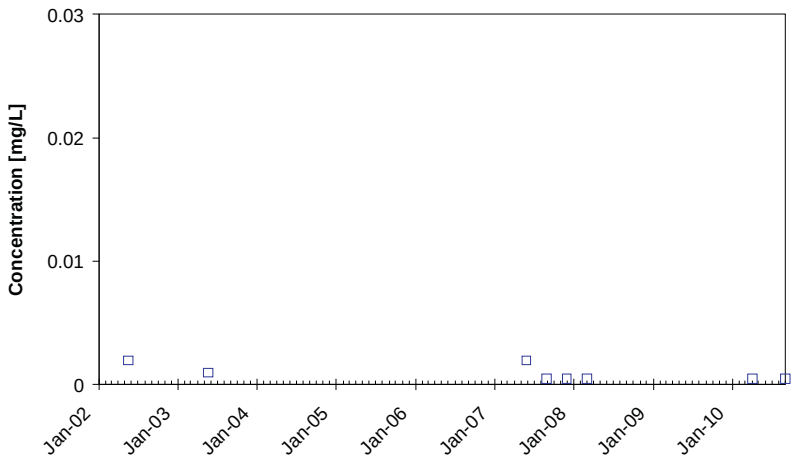
Remedial Investigation and Risk Assessment Report

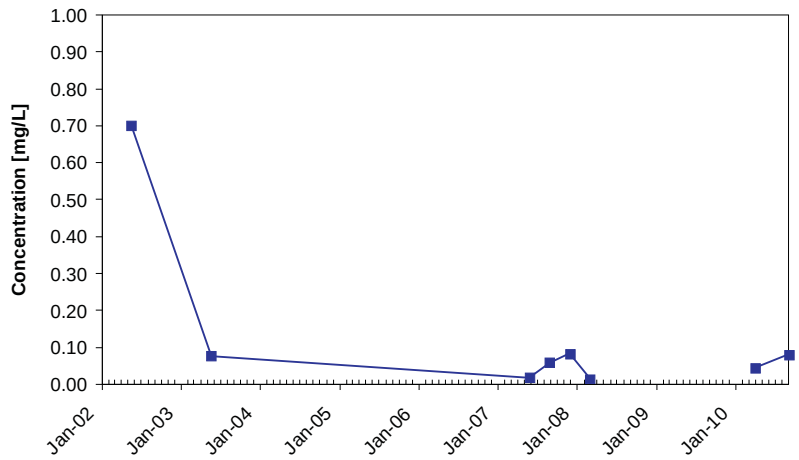
NuStar Terminals Operations Partnership, L.P. - Annex Terminal

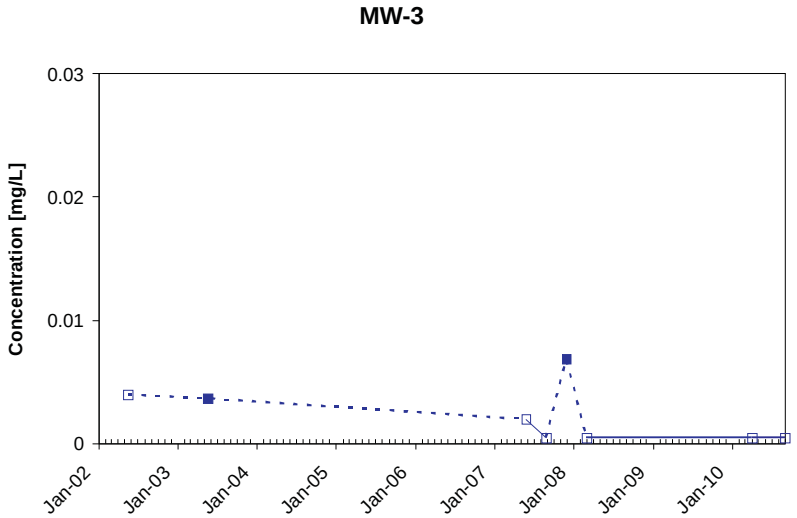
Vancouver, Washington

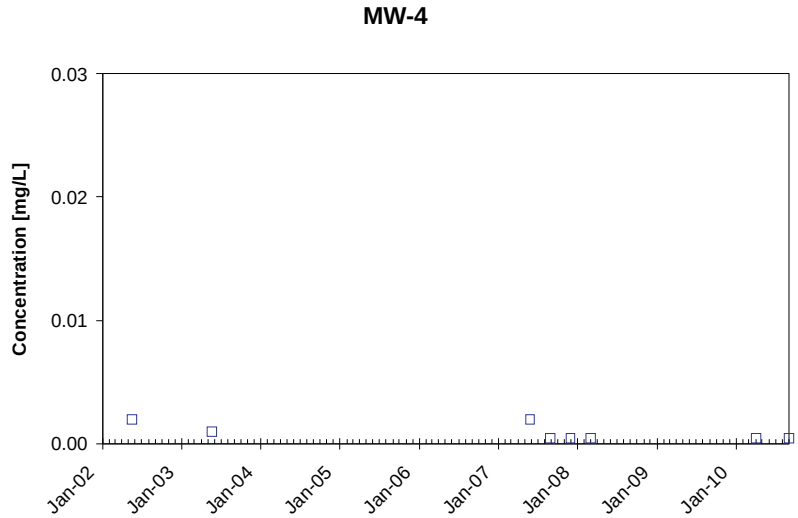
Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1569-00	Figure
December 2010		12









Legend:

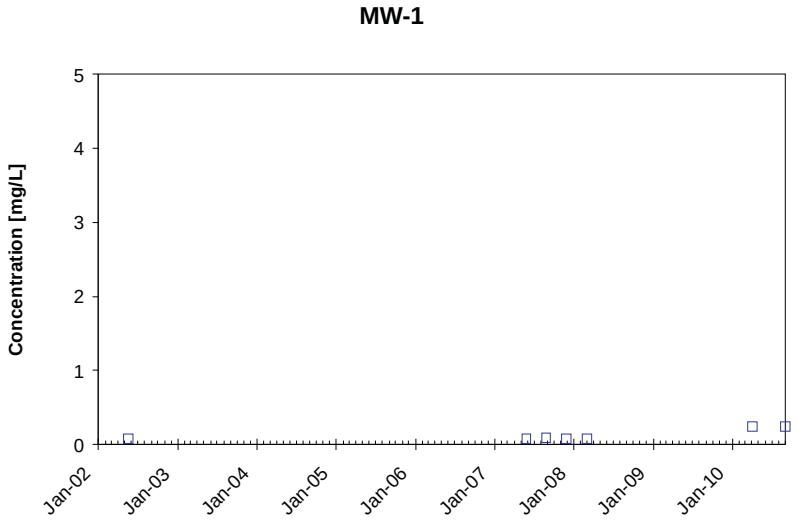
- Detected Analyte Concentration
- Non-Detect (Laboratory Reporting Limit)
- Concentration Trend
- Inferred Concentration Trend

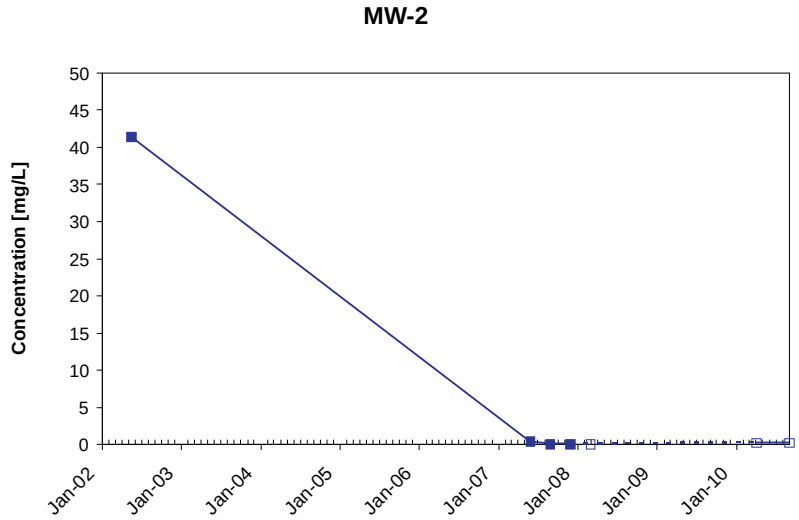
MTBE Concentration Trends in Monitoring Wells

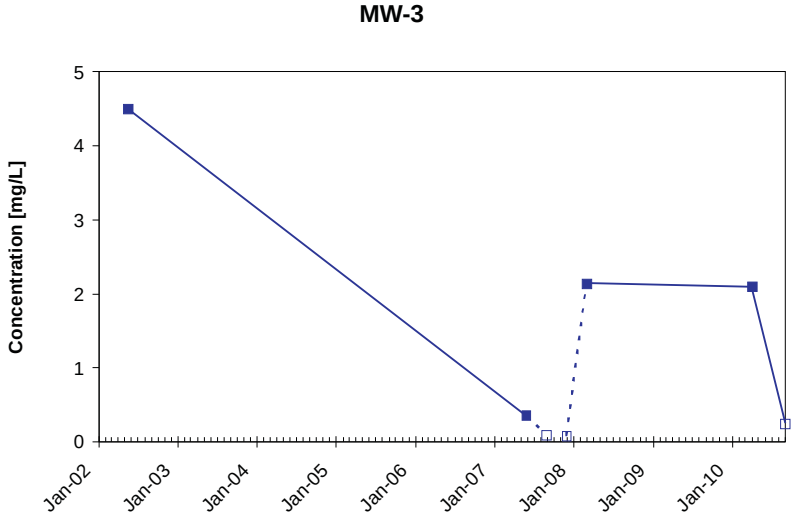
Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

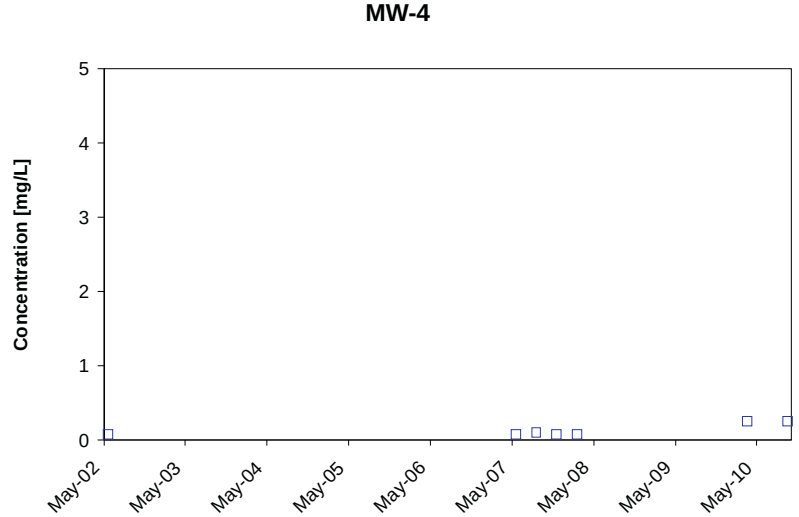
Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1569-00	Figure
December 2010		13









Legend:

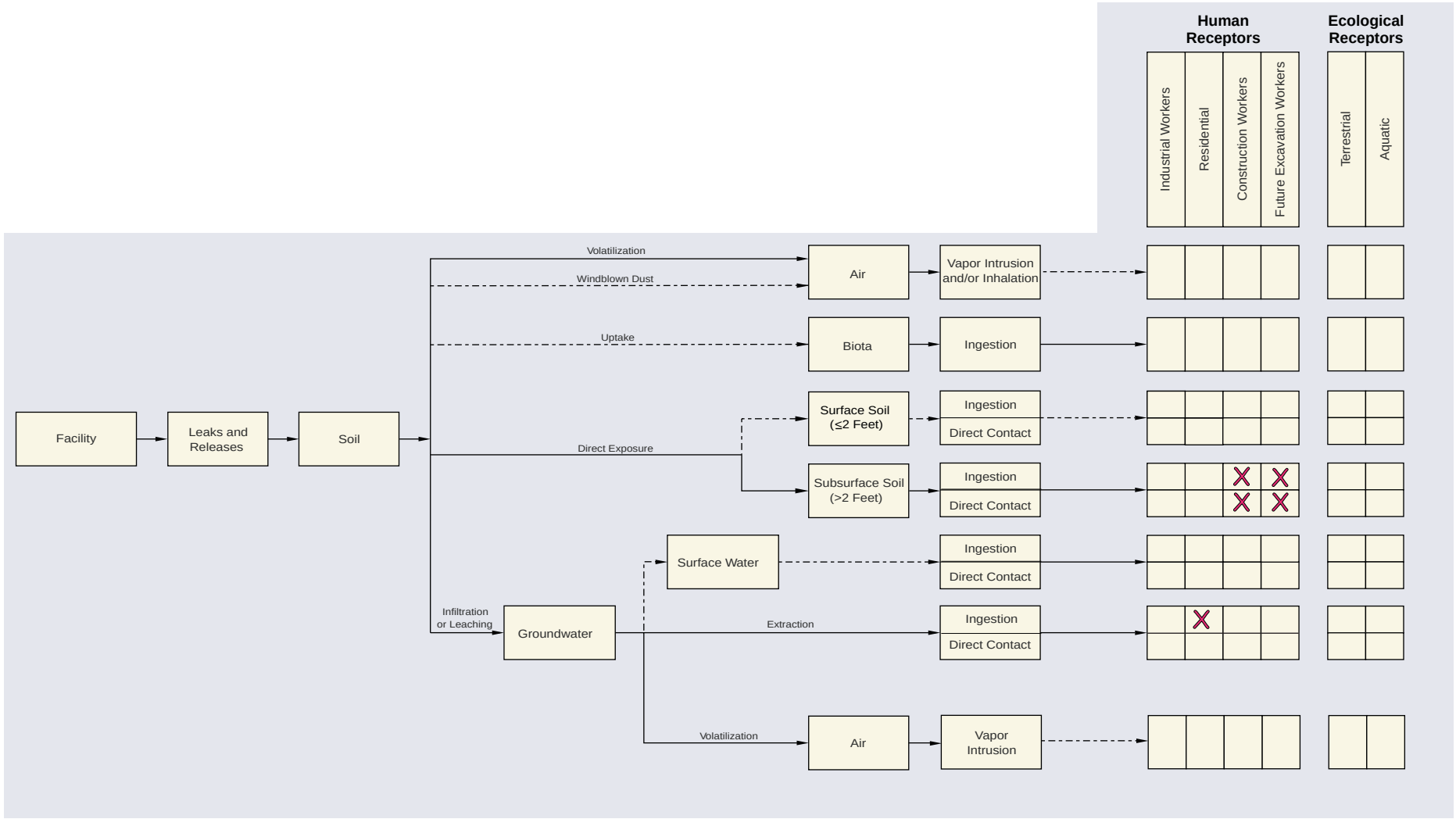
- Detected Analyte Concentration
- Non-Detect (Laboratory Reporting Limit)
- Concentration Trend
- Inferred Concentration Trend

TPHg Concentration Trends in Monitoring Wells

Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1569-00	Figure
December 2010		14



Legend:

X — Potentially Complete Exposure Pathway

- - - - ► — Contaminant Pathway not Present or Complete

Conceptual Site Exposure Model

Remedial Investigation and Risk Assessment Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1355-02	Figure
December 2010		15

Appendix A

Concentration Maps from SECOR and AMEC Reports

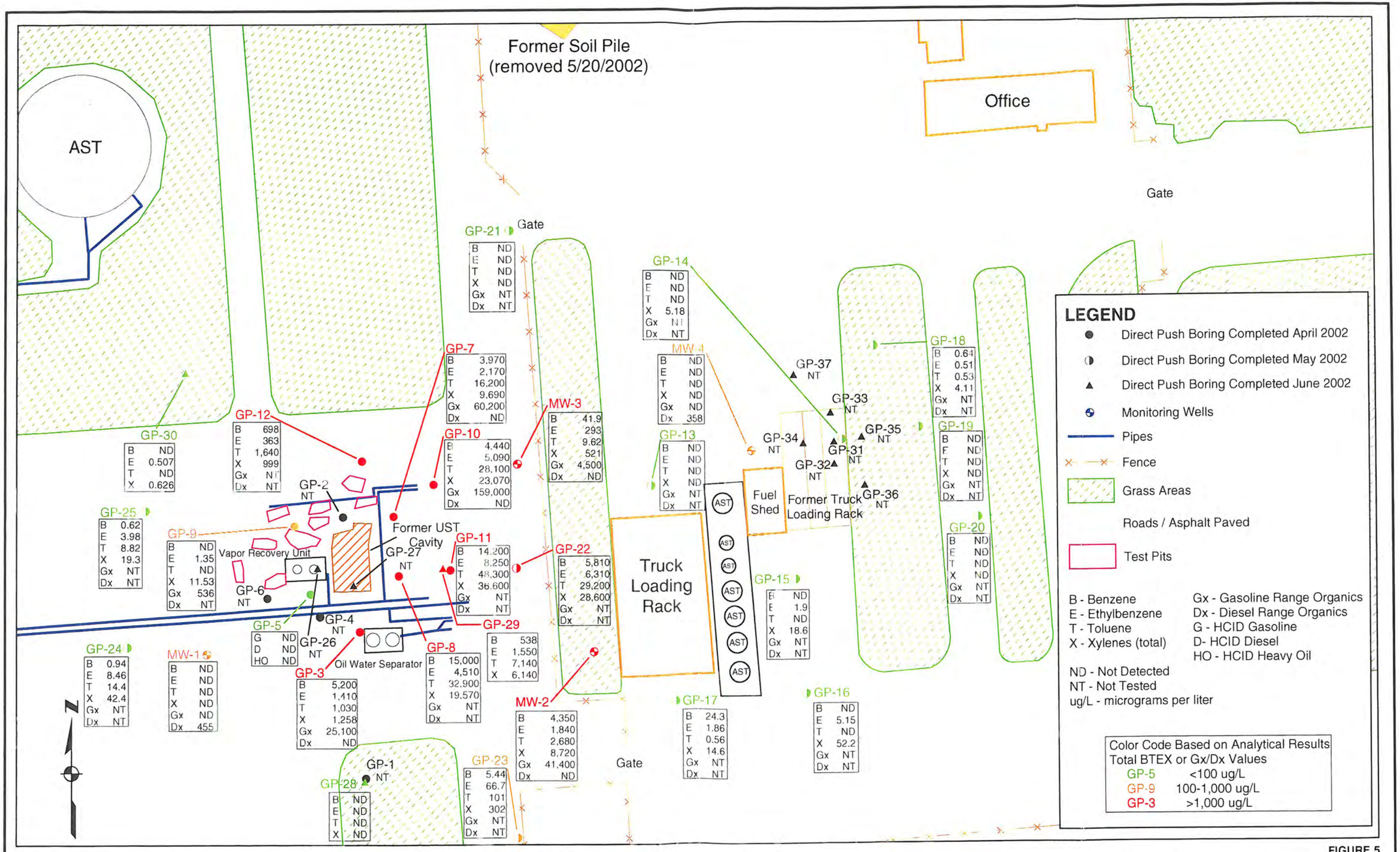


FIGURE 5

amec
7376 SW Durham Road
Portland, OR, U.S.A. 97224

W.O.	1-61M-11061-0 T2
DESIGN	BEL
DRAWN	BRJ
DATE	SEPTEMBER 2002

CENEX HARVEST STATES COOPERATIVES
5420 N.W. FRUIT VALLEY ROAD
VANCOUVER, WASHINGTON

BTEX, TPH-Gx, TPH-Dx, RESULTS FOR GROUNDWATER FROM DIRECT PUSH & MONITORING WELL BORINGS

K:\11000\11000\11061\dwg\arcview\Phase II RI\Figure 5 - Fuel Results - May & June 2002.mxd

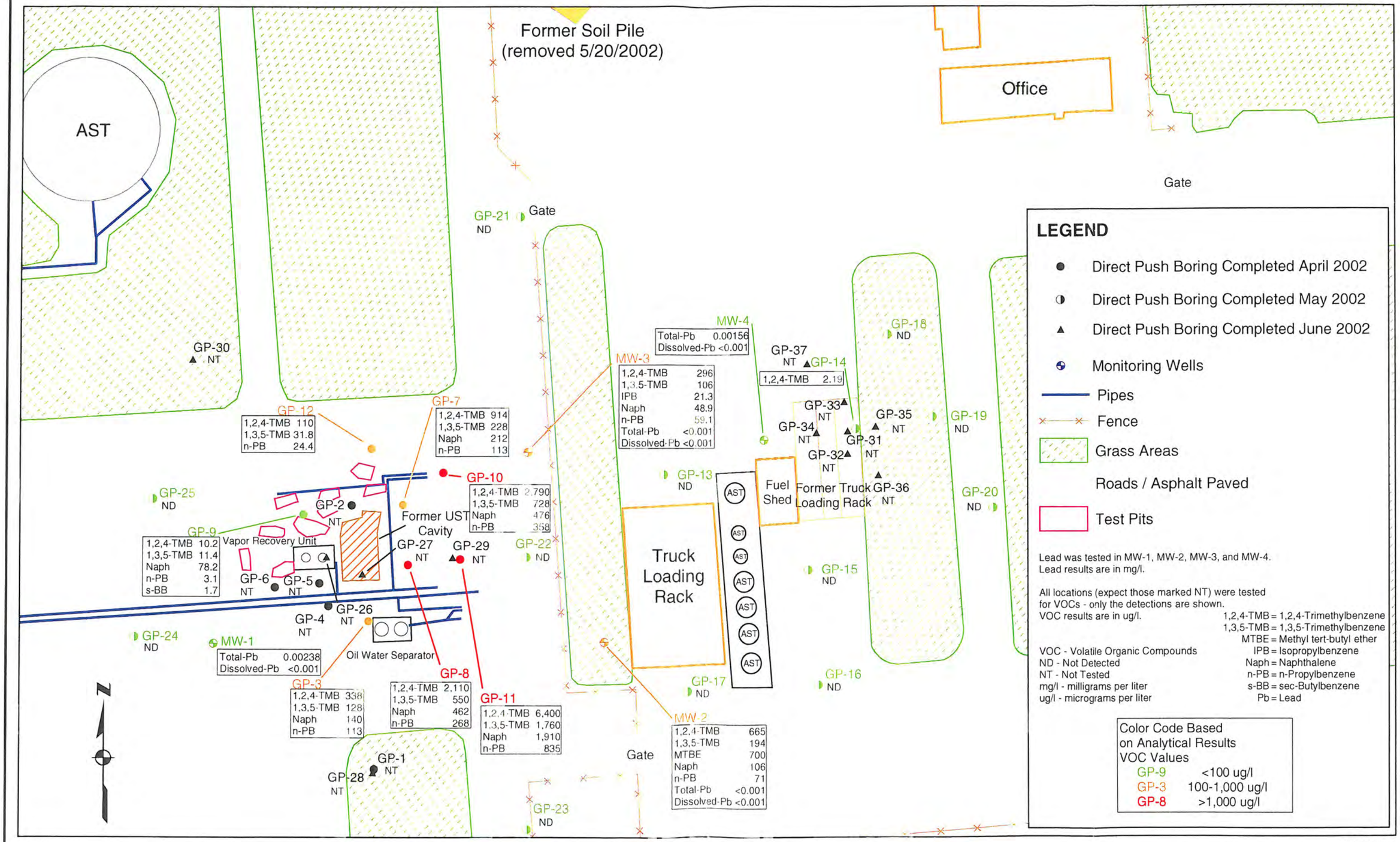


FIGURE 6

amec

7376 SW Durham Road
Portland, OR, U.S.A. 97224

W.O	1-61M-11061-0 T2
DESIGN	BEL
DRAWN	BRJ
DATE	SEPTEMBER 2002

CENEX HARVEST STATES COOPERATIVES
5420 N.W. FRUIT VALLEY ROAD
VANCOUVER, WASHINGTON

VOC and Pb RESULTS FOR GROUNDWATER FROM DIRECT PUSH & MONITORING WELL BORINGS

K:\11000\11000\11061\dwg\arcview\Phase II RI\Figure 6 - VOC and Pb Results - April & May & June 2002.mxd

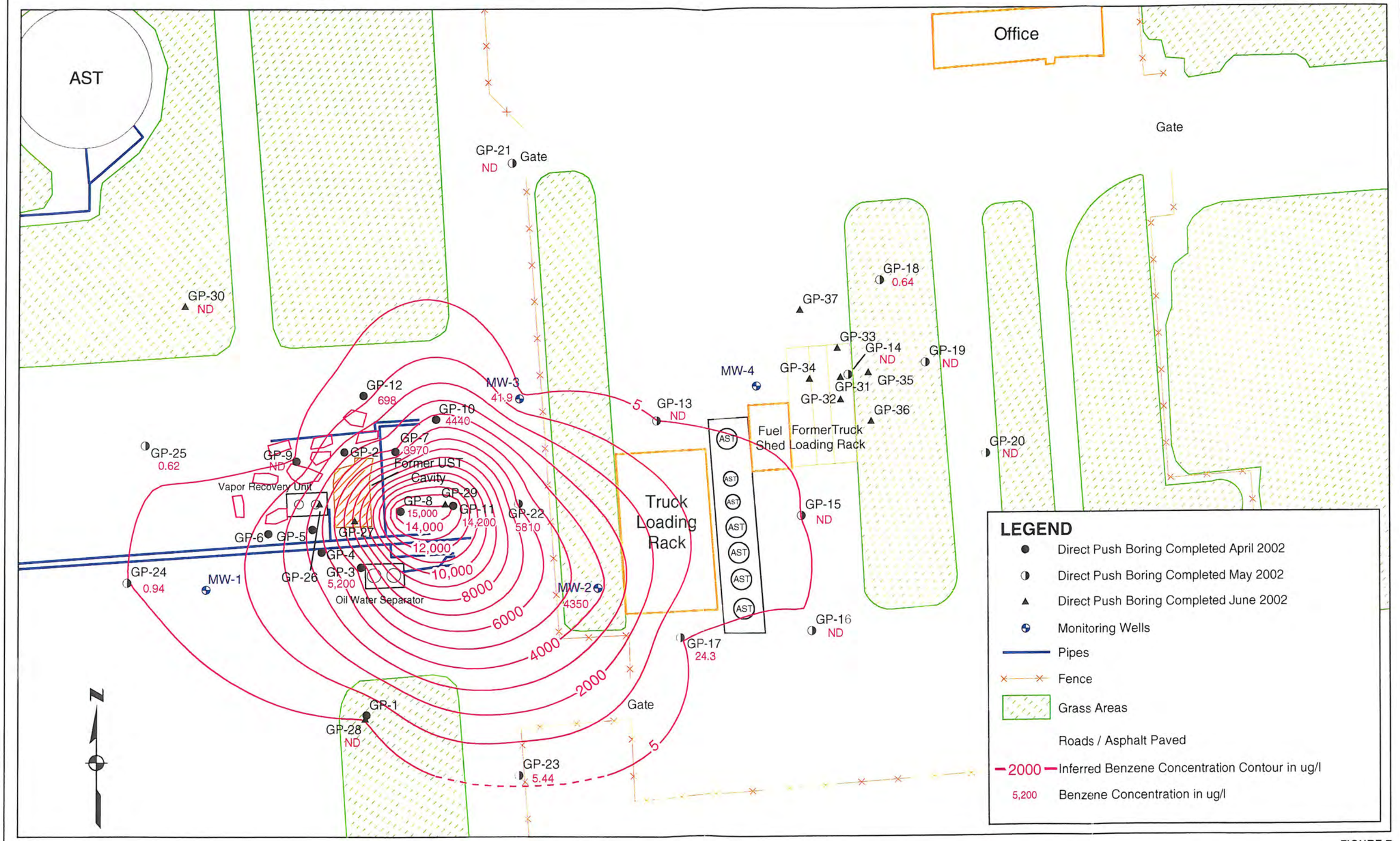


FIGURE 7

0 25 50 100 Feet

1 inch equals 50 feet

amec

7376 SW Durham Road
Portland, OR, U.S.A. 97224

W.O.	1-61M-1-061-0 T2
DESIGN	BEL
DRAWN	BRJ
DATE	SEPTEMBER 2002

CENEX HARVEST STATES COOPERATIVES
5420 N.W. FRUIT VALLEY ROAD
VANCOUVER, WASHINGTON

BENZENE CONCENTRATIONS AND INFERRED CONTOUR FOR APRIL - JUNE 2002

K:\11000\11000\11061\dwg\arcview\Phase II RI\Figure 7 - Benzene Contour - April - May - June 2002.mxd

ANALYTE	
TPH–HCID	HYDROCARBON IDENTIFICATION
TPH–G	TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
TPH–D	TOTAL PETROLEUM HYDROCARBONS AS DIESEL
OCP	ORGANO–CHLORINE PESTICIDES
OPP	ORGANO–PHOSPHORUS PESTICIDES
CH	CHLORINATED HERBICIDES
TZ	TRIAZINES
VOCs	VOLATILE ORGANIC COMPOUNDS
B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	XYLENES
MTBE	METHYL–TERTIARY–BUTYL–ETHER
N	NAPHTHALENE
1,2,3–TMB	1,2,4–TRIMETHYL BENZENE
1,3,5–TMB	1,3,5–TRIMETHYL BENZENE
IPB	ISOPROPYL BENZENE
N–PB	N–PROPYL BENZENE
CF	CHLOROFORM
OTHER VOCs	OTHER VOLATILE ORGANIC COMPOUNDS
PAHs	POLYAROMATIC COMPOUNDS
AN	ACENAPHTHENE
AT	ANTHRACENE
CHRYS	CHRYSENE
F	FLUORENE
N	NAPHTHALENE
PHEN	PHENANTHRENE
PY	PYRENE
Pb	TOTAL LEAD

SB-8	ug/L
TPH–D	20,900
PAHs	
AN	11.2
F	17.9
N	642
PHEN	32.3

SB-1	ug/L
TPH–HCID	ND
OCP	ND
OPP	ND
CH	ND
TZ	ND

SB-2	ug/L
TPH–HCID	ND

SB-4	ug/L
TPH–HCID	ND
PAHs	ND

SB-7	ug/L
TPH–HCID	ND

SB-6	ug/L
TPH–HCID	ND

PMW-7	ug/L
TPH–HCID	ND

SB-5	ug/L
TPH–HCID	ND

PMW-6	ug/L
TPH–HCID	ND

MW-3	ug/L
VOCs	
B	90.8
T	9.65
E	338
X	538.2
MTBE	3.7
N	30.8
1,2,3–TMB	315
1,3,5–TMB	89.5
IPB	19.4
N–PB	62.3
OTHER VOCs	ND
OTHER PAHs	ND

MW-4	ug/L
VOCs	ND
PAHs	ND

SB-9	ug/L
TPH–D	66,200
Pb	1,780
PAHs	
AT	4.04
F	20.9
N	728
PHEN	38.9
PY	2.35
OTHER PAHs	ND

SB-11	ug/L
TPH–HCID	ND
N	0.266
OTHER PAHs	ND

MW-1	ug/L
VOCs	ND
PAHs	ND

SB-18	ug/L
TPH–HCID	ND

SB-12	ug/L
TPH–HCID	ND

PMW-5	ug/L
TPH–D	1,880
N	0.34
OTHER PAHs	ND

MW-2	ug/L
VOCs	
B	534
T	9.75
E	194
X	876
MTBE	77.6
N	15.0
1,2,3–TMB	160
1,3,5–TMB	62.4
IPB	19.4
N–PB	15.8
OTHER VOCs	ND
OTHER PAHs	ND

SB-3	ug/L
OCP	ND
OPP	ND
CH	ND
TZ	ND

12,000 GALLON AST #2 DIESEL
HA-3 HAZARDOUS WASTE STORAGE
AMERICAN CYANAMID LABORATORY
LOADING DOCK
GARAGE & SHOP
FORMER HEATING OIL UST
OFFICE BUILDING
SHED
TRUCK WASH AREA
TANK 912 #2 DIESEL
TANK 914 REGULAR
TANK 917 PREMIUM UNLEADED
TANK 913 KEROSENE
TANK 910 #2 DIESEL
TANK 911 FERTILIZER
FIRE SYSTEM WATER RESERVIOR
AMERICAN CYANAMID TEST AREA
HA-13
HA-7
HA-8
HA-9
HA-10
HA-11
HA-12
HA-1
HA-2
HA-4
HA-5
HA-6
STORM POND
FLUSHWATER OUTFALL AREA
PIPELINES TO PORT OF VANCOUVER
(2 X 12" ø PIPELINES)
VAPOR RECOVERY UNIT
OIL/WATER SEPARATOR
20,000 GALLON TANK
TRUCK LOADING RACK
ASTs
FORMER TRUCK RACK LOCATION
275 GAL. ASTs
SUMP
UTILITY
SLOPS TANK
DRUM STORAGE AREA
FILL AREA
IW
MW-1
MW-2
MW-3
MW-4
PMW-5
PMW-6
PMW-7
SB-1
SB-2
SB-3
SB-4
SB-5
SB-6
SB-7
SB-8
SB-9
SB-10
SB-11
SB-12
SB-13
SB-18
N
NOT TO SCALE

LEGEND

- PMW-1 — TEMPORARY MONITORING WELL LOCATION
- MW-5 — GROUNDWATER MONITORING WELL LOCATION
- SB-1 — AREA OF KNOWN RELEASES SOIL BORING/GROUNDWATER SAMPLE LOCATION
- SB-1 — AREA OF CONCERN SOIL BORING/GROUNDWATER SAMPLE LOCATION
- HA-1 — AREA OF KNOWN RELEASES HAND AUGER SAMPLE LOCATION
- HA-1 — AREA OF CONCERN HAND AUGER SAMPLE LOCATION
- IW — IRRIGATION WELL LOCATION

SECOR
International Incorporated
7730 SW MOHAWK STREET
TUALATIN, OREGON 97062
(503) 691–2030/692–7074 (FAX)

GROUNDWATER ANALYTICAL RESULTS MAP (APRIL 2003)

CENEX TERMINAL
5420 FRUIT VALLEY ROAD
VANCOUVER, WASHINGTON

FIGURE: 5

JOB#: 150T.09413.00.0004 APPR: DWN: KPM DATE: 06/02/03

N:/CENEX

DWG: 150T–9413–45A–0403.dwg

Appendix B

Historical Groundwater Elevation and Contour Maps

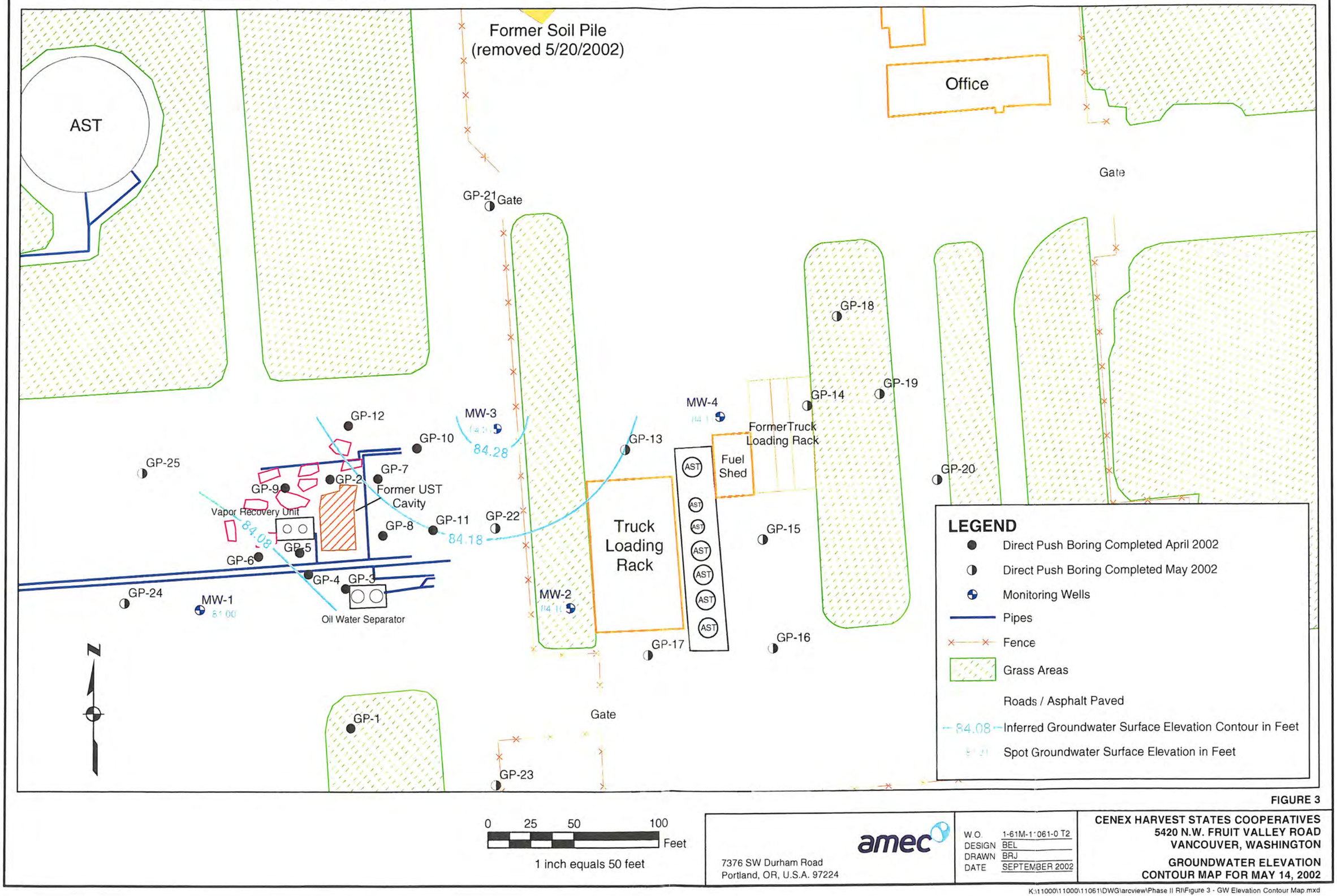


FIGURE 3

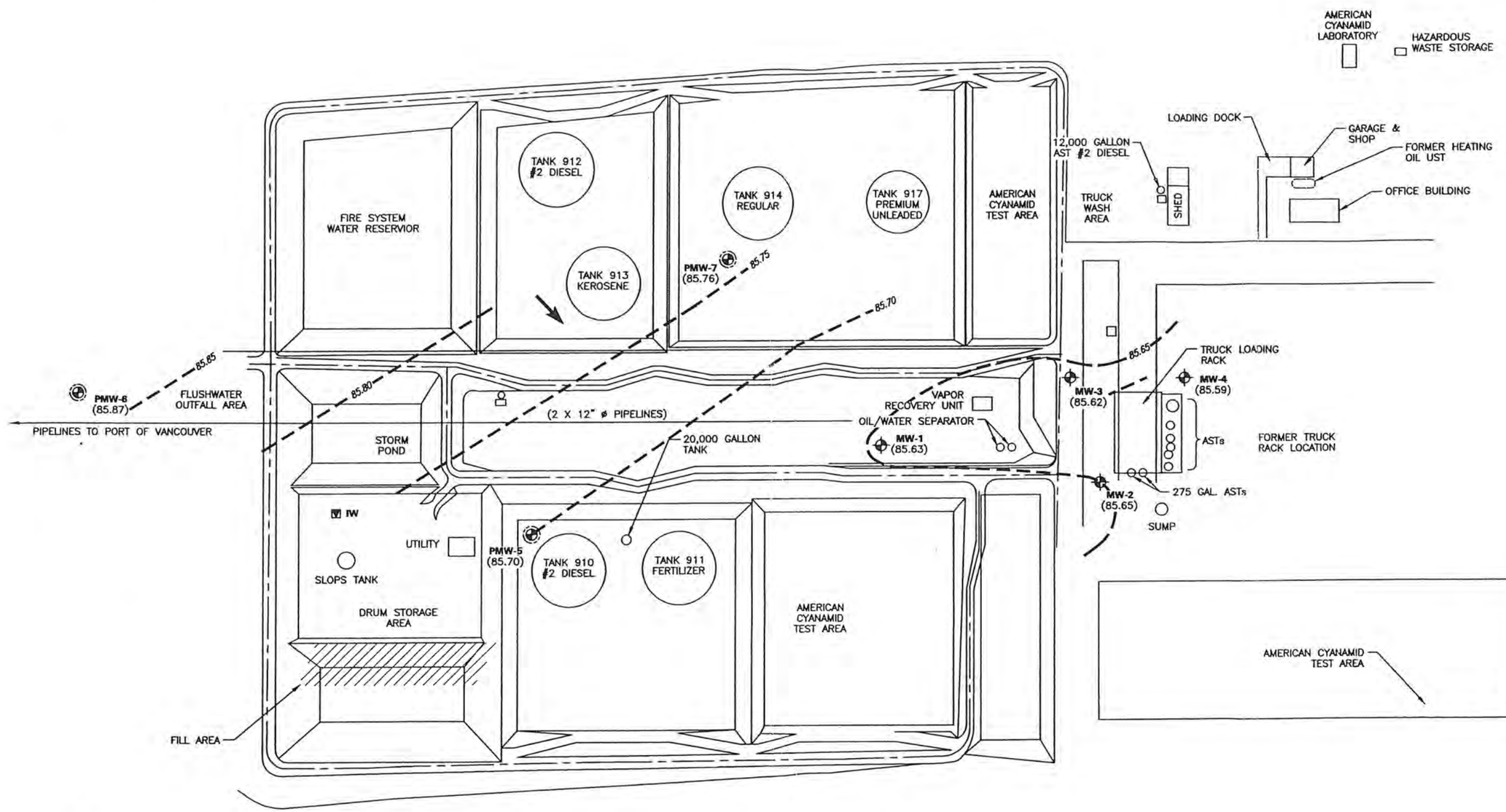
amec
7376 SW Durham Road
Portland, OR, U.S.A. 97224

W.O.	1-61M-1-061-0 T2
DESIGN	BEL
DRAWN	BRJ
DATE	SEPTEMBER 2002

CENEX HARVEST STATES COOPERATIVES
5420 N.W. FRUIT VALLEY ROAD
VANCOUVER, WASHINGTON

GROUNDWATER ELEVATION CONTOUR MAP FOR MAY 14, 2002

K:\11000\11000\11061\DWG\arcview\Phase II RI\Figure 3 - GW Elevation Contour Map.mxd



LEGEND

PMW-1	TEMPORARY MONITORING WELL LOCATION
MW-5	GROUNDWATER MONITORING WELL LOCATION
IW	IRRIGATION WELL LOCATION
←	INFERRED GROUNDWATER FLOW DIRECTION
– – –	INFERRED GROUNDWATER ELEVATION CONTOUR (FEET)
(85.87)	RELATIVE GROUNDWATER ELEVATION (FEET)
(NM)	NOT MEASURED

NOTES

CONTOUR INTERVAL = 0.05 FT

GROUNDWATER GRADIENT: 0.0002 FT/FT

GROUNDWATER ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL

• INDICATES GROUNDWATER ELEVATION NOT USED TO GENERATE CONTOURS.

SECOR
International Incorporated
7730 SW MOHAWK STREET
TUALATIN, OREGON 97062
(503) 691-2030/692-7074 (FAX)

GROUNDWATER ELEVATION CONTOUR MAP

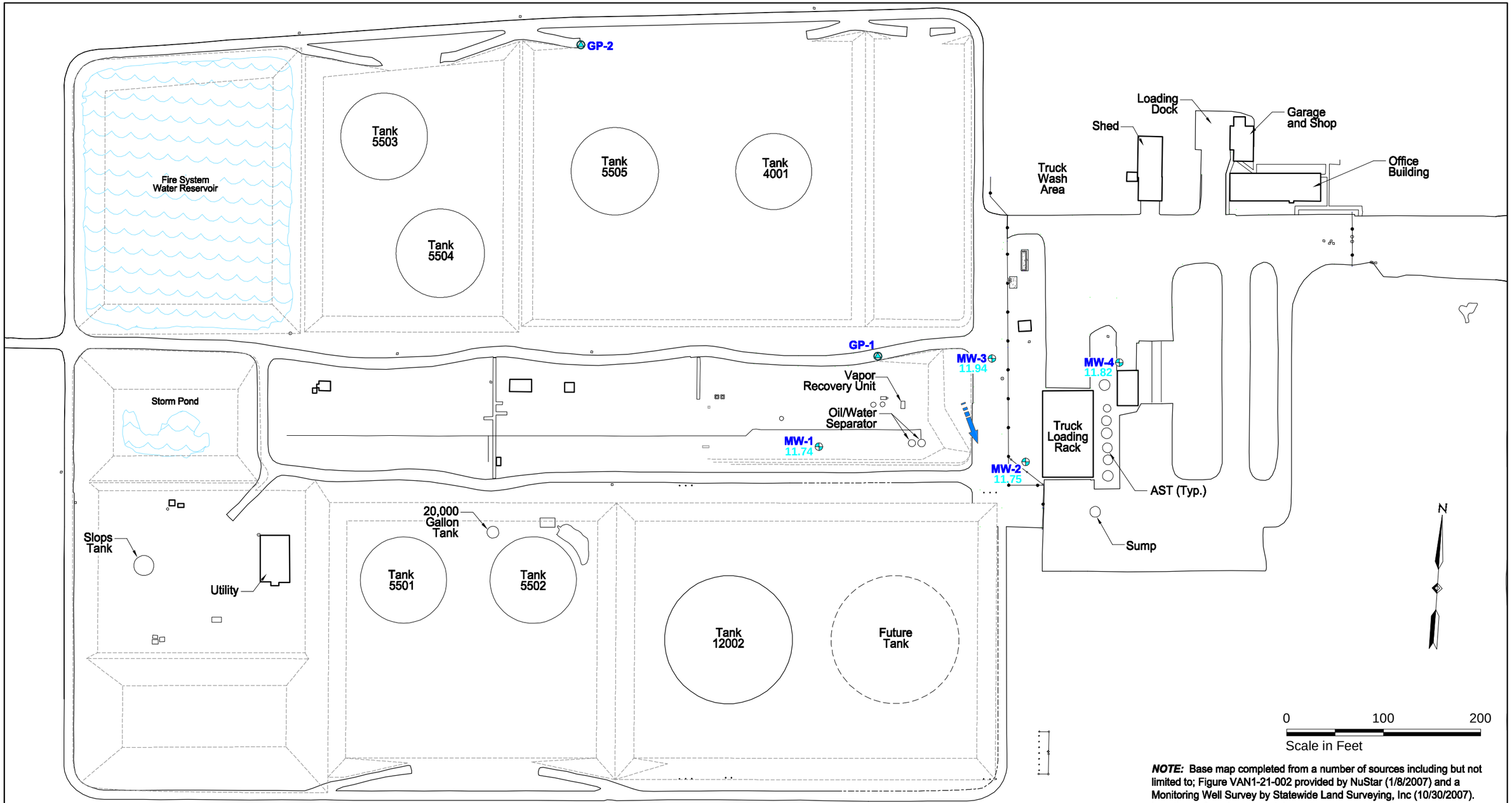
CENEX TERMINAL
5420 FRUIT VALLEY ROAD
VANCOUVER, WASHINGTON

FIGURE: **3**

JOB#: 150T.09413.00.0004 APPR: DWN: KPM DATE: 06/02/03

N:/CENEX

DWG: 150T-9413-43-0403.dwg



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

Legend:

MW-1 / 11.74 — Groundwater Monitoring Well Location and Groundwater Elevation in Feet Above Mean Sea Limit (MSL)

May 2007 Groundwater Elevation in Feet

GP-1 — Direct-Push Geoprobe Location

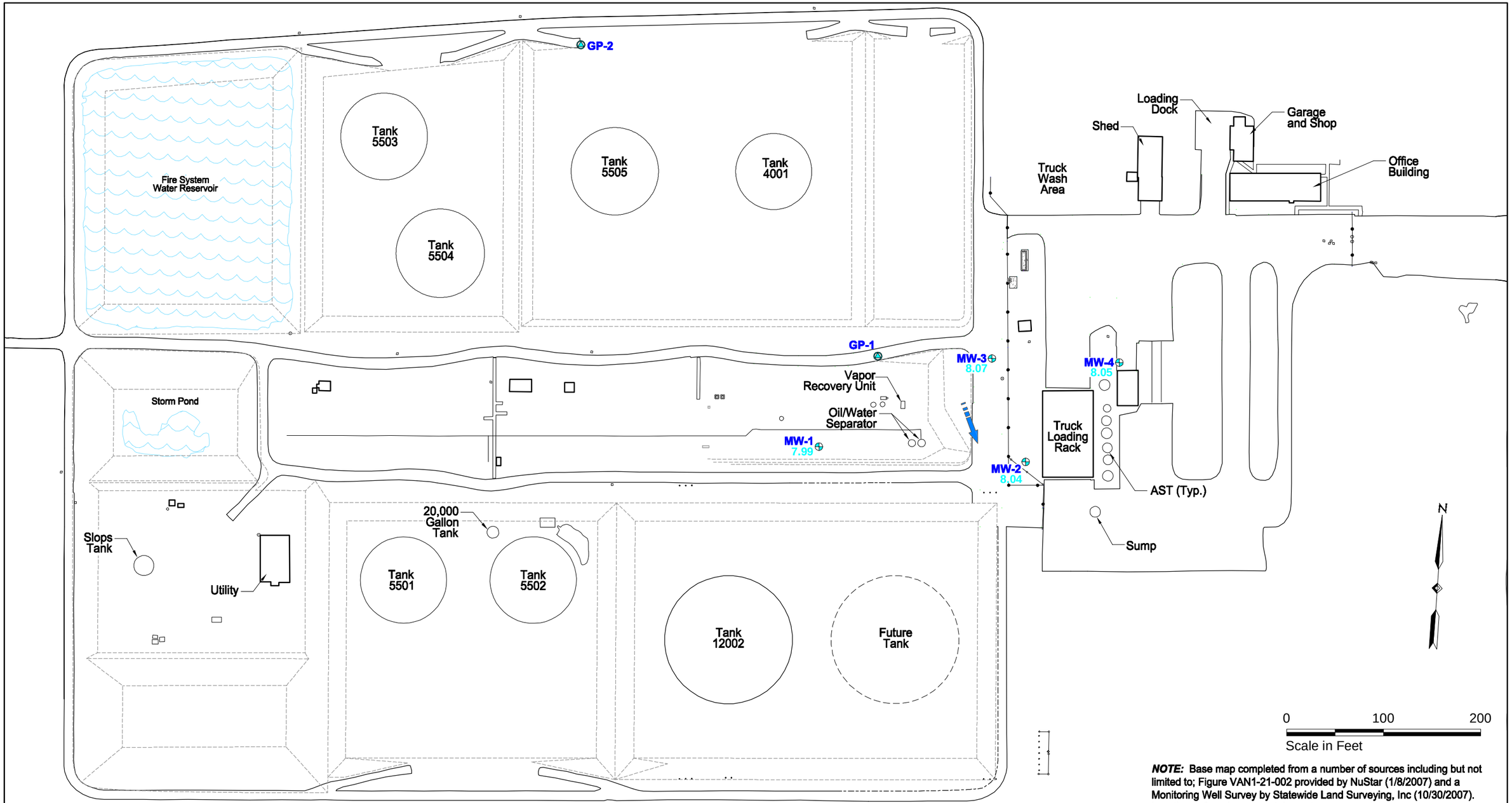
Estimated Groundwater Flow Direction

Relative Groundwater Elevations - May 2007

Quarterly Groundwater Monitoring Report
Support Terminal Operating Partnership, LP Vancouver Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1126-02	Figure
January 2008		3



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

Legend:

MW-1 7.99 — Groundwater Monitoring Well Location and Groundwater Elevation in Feet Above Mean Sea Limit (MSL)

August 2007 Groundwater Elevation in Feet

GP-1 — Direct-Push Geoprobe Location

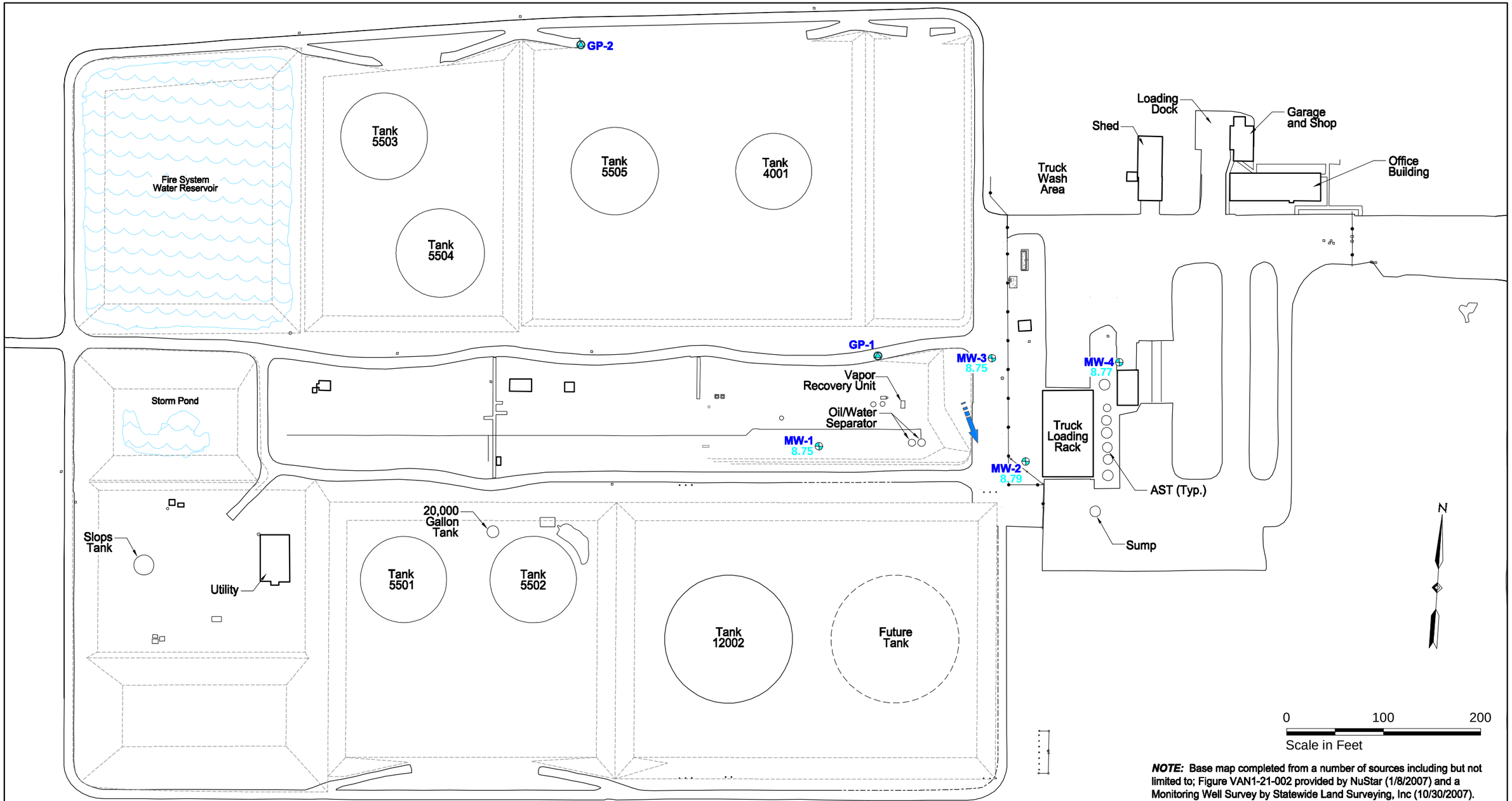
Estimated Groundwater Flow Direction

Relative Groundwater Elevations - August 2007

Quarterly Groundwater Monitoring Report
Support Terminal Operating Partnership, LP Vancouver Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1126-02	Figure
January 2008		4



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

Legend:

MW-1 8.75 — Groundwater Monitoring Well Location and Groundwater Elevation in Feet Above Mean Sea Limit (MSL)

November 2007 Groundwater Elevation in Feet

GP-1 — Direct-Push Geoprobe Location

Estimated Groundwater Flow Direction

Relative Groundwater Elevations - November 2007

Quarterly Groundwater Monitoring Report
Support Terminal Operating Partnership, LP Vancouver Terminal
Vancouver, Washington

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1126-02	Figure
January 2008		5

Appendix C

Laboratory Data from Firestone and February 2008 Groundwater Monitoring Events

TestAmerica
ANALYTICAL TESTING CORPORATION

PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
ph: (503) 906.9200 fax: (503) 906.9210

October 23, 2006

Amanda Spencer
Ash Creek Associates, Inc.
9615 SW Allen Blvd. Suite 106
Beaverton, OR 97005

RE: Valero-Cenex

Enclosed are the results of analyses for samples received by the laboratory on 09/27/06 13:45. The following list is a summary of the Work Orders contained in this report, generated on 10/23/06 09:39.

If you have any questions concerning this report, please feel free to contact me.

Work Order	Project	ProjectNumber
PPI1139	Valero-Cenex	1126-02

Darrell W. Auvil

Darrell Auvil, Project Manager

TestAmerica
ANALYTICAL TESTING CORPORATION

PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
ph: (503) 906.9200 fax: (503) 906.9210

Ash Creek Associates, Inc.	Project Name:	**Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-02	Report Created:
Beaverton, OR 97005	Project Manager:	Amanda Spencer	10/23/06 09:39

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
IRIG-Firestone	PPI1139-01	Water	09/26/06 17:00	09/27/06 13:45
House-Firestone	PPI1139-02	Water	09/26/06 17:00	09/27/06 13:45

Darrell W. Auvil

Darrell Auvil, Project Manager

TestAmerica
ANALYTICAL TESTING CORPORATION

PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
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Ash Creek Associates, Inc.	Project Name: **Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number: 1126-02	Report Created:
Beaverton, OR 97005	Project Manager: Amanda Spencer	10/23/06 09:39

Gasoline Hydrocarbons per NW TPH-Gx Method and BTEX per EPA Method 8021B

TestAmerica - Portland, OR

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PPI1139-01 (IRIG-Firestone)		**Water**					**Sampled: 09/26/06 17:00**			
Benzene	NW-G, 8021B	ND	-----	0.500	ug/l	1x	6091194	09/28/06 11:53	09/28/06 19:06	
Toluene	"	ND	-----	0.500	"	"	"	"	"	
Ethylbenzene	"	ND	-----	0.500	"	"	"	"	"	
Xylenes (total)	"	ND	-----	1.00	"	"	"	"	"	
Gasoline Range Hydrocarbons	"	ND	-----	80.0	"	"	"	"	"	
Surrogate(s): 4-BFB (FID)			*90.4%*		*50 - 150 %*	"			"	
4-BFB (PID)			*91.4%*		*70 - 130 %*	"			"	
PPI1139-02 (House-Firestone)		**Water**					**Sampled: 09/26/06 17:00**			
Benzene	NW-G, 8021B	ND	-----	0.500	ug/l	1x	6091194	09/28/06 11:53	09/28/06 19:32	
Toluene	"	ND	-----	0.500	"	"	"	"	"	
Ethylbenzene	"	ND	-----	0.500	"	"	"	"	"	
Xylenes (total)	"	ND	-----	1.00	"	"	"	"	"	
Gasoline Range Hydrocarbons	"	ND	-----	80.0	"	"	"	"	"	
Surrogate(s): 4-BFB (FID)			*94.6%*		*50 - 150 %*	"			"	
4-BFB (PID)			*95.4%*		*70 - 130 %*	"			"	

Darrell Auvil, Project Manager

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PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
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Ash Creek Associates, Inc.	Project Name:	**Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-02	Report Created:
Beaverton, OR 97005	Project Manager:	Amanda Spencer	10/23/06 09:39

Diesel and Heavy Range Hydrocarbons per NWTPH-Dx Method with Acid/Silica Gel Cleanup

TestAmerica - Portland, OR

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PPI1139-01 (IRIG-Firestone)		**Water**				**Sampled: 09/26/06 17:00**				
Diesel Range Organics	NWTPH-Dx	ND	-----	0.238	mg/l	1x	6100041	10/03/06 11:15	10/04/06 10:56	
Heavy Oil Range Hydrocarbons	"	ND	-----	0.476	"	"	"	"	"	
Surrogate(s): 1-Chlorooctadecane			*72.0%*		*50 - 150 %*	*"*			*"*	
PPI1139-02 (House-Firestone)		**Water**				**Sampled: 09/26/06 17:00**				
Diesel Range Organics	NWTPH-Dx	ND	-----	0.238	mg/l	1x	6100041	10/03/06 11:15	10/04/06 10:24	
Heavy Oil Range Hydrocarbons	"	ND	-----	0.476	"	"	"	"	"	
Surrogate(s): 1-Chlorooctadecane			*82.3%*		*50 - 150 %*	*"*			*"*	

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Darrell W. Auvil

Darrell Auvil, Project Manager

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PORTLAND, OR 9405 S.W. NIMBUS AVENUE
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Ash Creek Associates, Inc.	Project Name: **Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number: 1126-02	Report Created:
Beaverton, OR 97005	Project Manager: Amanda Spencer	10/23/06 09:39

Volatile Organic Compounds per EPA Method 8260B

TestAmerica - Portland, OR

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PPI1139-01 (IRIG-Firestone)		**Water**			**Sampled: 09/26/06 17:00**					**R-10**
Acetone	EPA 8260B	ND	-----	25.0	ug/l	1x	6100470	10/10/06 08:59	10/10/06 19:30	
Benzene	"	ND	-----	1.00	"	"	"	"	"	
Bromobenzene	"	ND	-----	1.00	"	"	"	"	"	
Bromochloromethane	"	ND	-----	1.00	"	"	"	"	"	
Bromodichloromethane	"	ND	-----	1.00	"	"	"	"	"	
Bromoform	"	ND	-----	1.00	"	"	"	"	"	
Bromomethane	"	ND	-----	5.00	"	"	"	"	"	
2-Butanone (MEK)	"	ND	-----	10.0	"	"	"	"	"	
n-Butylbenzene	"	ND	-----	5.00	"	"	"	"	"	
sec-Butylbenzene	"	ND	-----	1.00	"	"	"	"	"	
tert-Butylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Carbon disulfide	"	ND	-----	10.0	"	"	"	"	"	
Carbon tetrachloride	"	ND	-----	1.00	"	"	"	"	"	
Chlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
Chloroethane	"	ND	-----	1.00	"	"	"	"	"	
Chloroform	"	ND	-----	1.00	"	"	"	"	"	
Chloromethane	"	ND	-----	5.00	"	"	"	"	"	
2-Chlorotoluene	"	ND	-----	1.00	"	"	"	"	"	
4-Chlorotoluene	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	"	ND	-----	5.00	"	"	"	"	"	
Dibromochloromethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dibromoethane	"	ND	-----	1.00	"	"	"	"	"	
Dibromomethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
Dichlorodifluoromethane	"	ND	-----	5.00	"	"	"	"	"	
1,1-Dichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
cis-1,2-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
trans-1,2-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,3-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
2,2-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,1-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
cis-1,3-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
trans-1,3-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
Ethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Hexachlorobutadiene	"	ND	-----	4.00	"	"	"	"	"	
2-Hexanone	"	ND	-----	10.0	"	"	"	"	"	
Isopropylbenzene	"	ND	-----	2.00	"	"	"	"	"	
p-Isopropyltoluene	"	ND	-----	2.00	"	"	"	"	"	

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Darrell W. Auvil

Darrell Auvil, Project Manager

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PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
ph: (503) 906.9200 fax: (503) 906.9210

Ash Creek Associates, Inc.	Project Name: **Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number: 1126-02	Report Created:
Beaverton, OR 97005	Project Manager: Amanda Spencer	10/23/06 09:39

Volatile Organic Compounds per EPA Method 8260B

TestAmerica - Portland, OR

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PPI1139-01 (IRIG-Firestone)		**Water**			**Sampled: 09/26/06 17:00**					**R-10**
4-Methyl-2-pentanone	EPA 8260B	ND	-----	5.00	ug/l	1x	6100470	10/10/06 08:59	10/10/06 19:30	
Methyl tert-butyl ether	"	ND	-----	1.00	"	"	"	"	"	
Methylene chloride	"	ND	-----	5.00	"	"	"	"	"	
Naphthalene	"	ND	-----	2.00	"	"	"	"	"	
n-Propylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Styrene	"	ND	-----	1.00	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	"	ND	-----	1.00	"	"	"	"	"	
Tetrachloroethene	"	ND	-----	1.00	"	"	"	"	"	
Toluene	"	ND	-----	1.00	"	"	"	"	"	
1,2,3-Trichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,1,1-Trichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1,2-Trichloroethane	"	ND	-----	1.00	"	"	"	"	"	
Trichloroethene	"	ND	-----	1.00	"	"	"	"	"	
Trichlorofluoromethane	"	ND	-----	1.00	"	"	"	"	"	
1,2,3-Trichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Vinyl chloride	"	ND	-----	1.00	"	"	"	"	"	
o-Xylene	"	ND	-----	1.00	"	"	"	"	"	
m,p-Xylene	"	ND	-----	2.00	"	"	"	"	"	
Surrogate(s): 4-BFB			*86.0%*		*80 - 120 %*	"			"	
1,2-DCA-d4			*104%*		*80 - 120 %*	"			"	
Dibromofluoromethane			*97.5%*		*80 - 120 %*	"			"	
Toluene-d8			*95.0%*		*80 - 120 %*	"			"	
PPI1139-02 (House-Firestone)		**Water**			**Sampled: 09/26/06 17:00**					**R-10**
Acetone	EPA 8260B	ND	-----	25.0	ug/l	1x	6100470	10/10/06 08:59	10/10/06 19:58	
Benzene	"	ND	-----	1.00	"	"	"	"	"	
Bromobenzene	"	ND	-----	1.00	"	"	"	"	"	
Bromochloromethane	"	ND	-----	1.00	"	"	"	"	"	
Bromodichloromethane	"	ND	-----	1.00	"	"	"	"	"	
Bromoform	"	ND	-----	1.00	"	"	"	"	"	
Bromomethane	"	ND	-----	5.00	"	"	"	"	"	
2-Butanone (MEK)	"	ND	-----	10.0	"	"	"	"	"	
n-Butylbenzene	"	ND	-----	5.00	"	"	"	"	"	
sec-Butylbenzene	"	ND	-----	1.00	"	"	"	"	"	
tert-Butylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Carbon disulfide	"	ND	-----	10.0	"	"	"	"	"	
Carbon tetrachloride	"	ND	-----	1.00	"	"	"	"	"	
Chlorobenzene	"	ND	-----	1.00	"	"	"	"	"	

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Darrell W. Auvil

Darrell Auvil, Project Manager

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PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
ph: (503) 906.9200 fax: (503) 906.9210

Ash Creek Associates, Inc.	Project Name: **Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number: 1126-02	Report Created:
Beaverton, OR 97005	Project Manager: Amanda Spencer	10/23/06 09:39

Volatile Organic Compounds per EPA Method 8260B

TestAmerica - Portland, OR

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PPI1139-02 (House-Firestone)		**Water**			**Sampled: 09/26/06 17:00**					**R-10**
Chloroethane	EPA 8260B	ND	-----	1.00	ug/l	1x	6100470	10/10/06 08:59	10/10/06 19:58	
Chloroform	"	ND	-----	1.00	"	"	"	"	"	
Chloromethane	"	ND	-----	5.00	"	"	"	"	"	
2-Chlorotoluene	"	ND	-----	1.00	"	"	"	"	"	
4-Chlorotoluene	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	"	ND	-----	5.00	"	"	"	"	"	
Dibromochloromethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dibromoethane	"	ND	-----	1.00	"	"	"	"	"	
Dibromomethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,3-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,4-Dichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
Dichlorodifluoromethane	"	ND	-----	5.00	"	"	"	"	"	
1,1-Dichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
cis-1,2-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
trans-1,2-Dichloroethene	"	ND	-----	1.00	"	"	"	"	"	
1,2-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,3-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
2,2-Dichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,1-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
cis-1,3-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
trans-1,3-Dichloropropene	"	ND	-----	1.00	"	"	"	"	"	
Ethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Hexachlorobutadiene	"	ND	-----	4.00	"	"	"	"	"	
2-Hexanone	"	ND	-----	10.0	"	"	"	"	"	
Isopropylbenzene	"	ND	-----	2.00	"	"	"	"	"	
p-Isopropyltoluene	"	ND	-----	2.00	"	"	"	"	"	
4-Methyl-2-pentanone	"	ND	-----	5.00	"	"	"	"	"	
Methyl tert-butyl ether	"	ND	-----	1.00	"	"	"	"	"	
Methylene chloride	"	ND	-----	5.00	"	"	"	"	"	
Naphthalene	"	ND	-----	2.00	"	"	"	"	"	
n-Propylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Styrene	"	ND	-----	1.00	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	"	ND	-----	1.00	"	"	"	"	"	
Tetrachloroethene	"	ND	-----	1.00	"	"	"	"	"	
Toluene	"	ND	-----	1.00	"	"	"	"	"	
1,2,3-Trichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,2,4-Trichlorobenzene	"	ND	-----	1.00	"	"	"	"	"	
1,1,1-Trichloroethane	"	ND	-----	1.00	"	"	"	"	"	
1,1,2-Trichloroethane	"	ND	-----	1.00	"	"	"	"	"	

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Darrell W. Auvil

Darrell Auvil, Project Manager

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PORTLAND, OR 9405 S.W. NIMBUS AVENUE
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Ash Creek Associates, Inc.	Project Name: **Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number: 1126-02	Report Created:
Beaverton, OR 97005	Project Manager: Amanda Spencer	10/23/06 09:39

Volatile Organic Compounds per EPA Method 8260B

TestAmerica - Portland, OR

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PPI1139-02 (House-Firestone)		**Water**			**Sampled: 09/26/06 17:00**					**R-10**
Trichloroethene	EPA 8260B	ND	-----	1.00	ug/l	1x	6100470	10/10/06 08:59	10/10/06 19:58	
Trichlorofluoromethane	"	ND	-----	1.00	"	"	"	"	"	
1,2,3-Trichloropropane	"	ND	-----	1.00	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	ND	-----	1.00	"	"	"	"	"	
Vinyl chloride	"	ND	-----	1.00	"	"	"	"	"	
o-Xylene	"	ND	-----	1.00	"	"	"	"	"	
m,p-Xylene	"	ND	-----	2.00	"	"	"	"	"	
Surrogate(s): 4-BFB			*85.0%*		*80 - 120 %*	"			"	
1,2-DCA-d4			*100%*		*80 - 120 %*	"			"	
Dibromofluoromethane			*96.0%*		*80 - 120 %*	"			"	
Toluene-d8			*93.5%*		*80 - 120 %*	"			"	

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Darrell Auvil, Project Manager

TestAmerica
ANALYTICAL TESTING CORPORATION

PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
ph: (503) 906.9200 fax: (503) 906.9210

Ash Creek Associates, Inc.	Project Name: **Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number: 1126-02	Report Created:
Beaverton, OR 97005	Project Manager: Amanda Spencer	10/23/06 09:39

Polynuclear Aromatic Compounds per EPA 8270M-SIM

TestAmerica - Portland, OR

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PPI1139-01 (IRIG-Firestone)		**Water**			**Sampled: 09/26/06 17:00**					**I-08**
Acenaphthene	EPA 8270m	ND	-----	0.0943	ug/l	1x	6100554	10/11/06 13:55	10/17/06 18:48	
Acenaphthylene	"	ND	-----	0.0943	"	"	"	"	"	
Anthracene	"	ND	-----	0.0943	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	0.0943	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	0.0943	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	0.0943	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	0.0943	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	0.0943	"	"	"	"	"	
Chrysene	"	ND	-----	0.0943	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	0.189	"	"	"	"	"	
Fluoranthene	"	ND	-----	0.0943	"	"	"	"	"	
Fluorene	"	ND	-----	0.0943	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	0.0943	"	"	"	"	"	
Naphthalene	"	ND	-----	0.0943	"	"	"	"	"	
Phenanthrene	"	ND	-----	0.0943	"	"	"	"	"	
Pyrene	"	ND	-----	0.0943	"	"	"	"	"	
Surrogate(s): Fluorene-d10			*73.3%*		*25 - 125 %*	"			"	
Pyrene-d10			*91.5%*		*23 - 150 %*	"			"	
Benzo (a) pyrene-d12			*78.4%*		*10 - 125 %*	"			"	
PPI1139-02 (House-Firestone)		**Water**			**Sampled: 09/26/06 17:00**					**I-08**
Acenaphthene	EPA 8270m	ND	-----	0.0943	ug/l	1x	6100554	10/11/06 13:55	10/17/06 19:16	
Acenaphthylene	"	ND	-----	0.0943	"	"	"	"	"	
Anthracene	"	ND	-----	0.0943	"	"	"	"	"	
Benzo (a) anthracene	"	ND	-----	0.0943	"	"	"	"	"	
Benzo (a) pyrene	"	ND	-----	0.0943	"	"	"	"	"	
Benzo (b) fluoranthene	"	ND	-----	0.0943	"	"	"	"	"	
Benzo (ghi) perylene	"	ND	-----	0.0943	"	"	"	"	"	
Benzo (k) fluoranthene	"	ND	-----	0.0943	"	"	"	"	"	
Chrysene	"	ND	-----	0.0943	"	"	"	"	"	
Dibenzo (a,h) anthracene	"	ND	-----	0.189	"	"	"	"	"	
Fluoranthene	"	ND	-----	0.0943	"	"	"	"	"	
Fluorene	"	ND	-----	0.0943	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	"	ND	-----	0.0943	"	"	"	"	"	
Naphthalene	"	ND	-----	0.0943	"	"	"	"	"	
Phenanthrene	"	ND	-----	0.0943	"	"	"	"	"	
Pyrene	"	ND	-----	0.0943	"	"	"	"	"	
Surrogate(s): Fluorene-d10			*68.6%*		*25 - 125 %*	"			"	
Pyrene-d10			*95.3%*		*23 - 150 %*	"			"	
Benzo (a) pyrene-d12			*72.9%*		*10 - 125 %*	"			"	

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Darrell W. Auvil

Darrell Auvil, Project Manager

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PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
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Ash Creek Associates, Inc.	Project Name: **Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number: 1126-02	Report Created:
Beaverton, OR 97005	Project Manager: Amanda Spencer	10/23/06 09:39

Gasoline Hydrocarbons per NW TPH-Gx Method and BTEX per EPA Method 8021B - Laboratory Quality Control Results

TestAmerica - Portland, OR

QC Batch: 6091194 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (6091194-BLK1)									**Extracted: 09/28/06 11:01**					
Benzene	NW-G, 8021B	ND	---	0.500	ug/l	1x	--	--	--	--	--	--	09/28/06 12:41	
Toluene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Xylenes (total)	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Gasoline Range Hydrocarbons	"	ND	---	80.0	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB (FID)		*Recovery:*	*103%*		*Limits:*	*50-150%*	*"*						*09/28/06 12:41*	
4-BFB (PID)			*102%*			*70-130%*	*"*						*"*	
LCS (6091194-BS1)									**Extracted: 09/28/06 11:01**					
Benzene	NW-G, 8021B	19.3	---	0.500	ug/l	1x	--	20.0	96.5%	(70-130)	--	--	09/28/06 12:15	
Toluene	"	20.6	---	0.500	"	"	--	"	103%	(76-129)	--	--	"	
Ethylbenzene	"	19.7	---	0.500	"	"	--	"	98.5%	(82-130)	--	--	"	
Xylenes (total)	"	60.7	---	1.00	"	"	--	60.0	101%	(76-130)	--	--	"	
Surrogate(s): 4-BFB (PID)		*Recovery:*	*105%*		*Limits:*	*70-130%*	*"*						*09/28/06 12:15*	
LCS (6091194-BS2)									**Extracted: 09/28/06 11:01**					
Gasoline Range Hydrocarbons	NW-G, 8021B	442	---	80.0	ug/l	1x	--	500	88.4%	(70-130)	--	--	09/28/06 11:22	
Surrogate(s): 4-BFB (FID)		*Recovery:*	*102%*		*Limits:*	*50-150%*	*"*						*09/28/06 11:22*	
LCS Dup (6091194-BSD2)									**Extracted: 09/28/06 11:01**					
Gasoline Range Hydrocarbons	NW-G, 8021B	447	---	80.0	ug/l	1x	--	500	89.4%	(70-130)	1.12%	(40)	09/28/06 11:48	
Surrogate(s): 4-BFB (FID)		*Recovery:*	*104%*		*Limits:*	*50-150%*	*"*						*09/28/06 11:48*	
Duplicate (6091194-DUP1)					**QC Source: PPI1168-02**				**Extracted: 09/28/06 11:01**					
Gasoline Range Hydrocarbons	NW-G, 8021B	2020	---	400	ug/l	5x	1680	--	--	--	18.4%	(40)	09/28/06 23:00	
Surrogate(s): 4-BFB (FID)		*Recovery:*	*110%*		*Limits:*	*50-150%*	*1x*						*09/28/06 23:00*	
Duplicate (6091194-DUP2)					**QC Source: PPI1168-03**				**Extracted: 09/28/06 11:01**					
Gasoline Range Hydrocarbons	NW-G, 8021B	11100	---	800	ug/l	10x	11300	--	--	--	1.79%	(40)	09/28/06 23:52	
Surrogate(s): 4-BFB (FID)		*Recovery:*	*104%*		*Limits:*	*50-150%*	*1x*						*09/28/06 23:52*	
Matrix Spike (6091194-MS1)					**QC Source: PPI1153-01**				**Extracted: 09/28/06 11:01**					
Benzene	NW-G, 8021B	25.7	---	0.500	ug/l	1x	5.75	20.0	99.8%	(65-144)	--	--	09/28/06 15:21	
Toluene	"	20.6	---	0.500	"	"	0.445	"	101%	(68-139)	--	--	"	
Ethylbenzene	"	19.5	---	0.500	"	"	0.584	"	94.6%	(69-144)	--	--	"	
Xylenes (total)	"	58.3	---	1.00	"	"	0.690	60.0	96.0%	(60-144)	--	--	"	

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Ash Creek Associates, Inc.	Project Name:	**Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-02	Report Created:
Beaverton, OR 97005	Project Manager:	Amanda Spencer	10/23/06 09:39

Gasoline Hydrocarbons per NW TPH-Gx Method and BTEX per EPA Method 8021B - Laboratory Quality Control Results

TestAmerica - Portland, OR

QC Batch: 6091194 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike (6091194-MS1)					**QC Source: PPI1153-01**								**Extracted: 09/28/06 11:01**	
Surrogate(s): 4-BFB (PID)		*Recovery: 89.8%*			*Limits: 70-130%*	*1x*							*09/28/06 15:21*	
Matrix Spike Dup (6091194-MSD1)					**QC Source: PPI1153-01**								**Extracted: 09/28/06 11:01**	
Benzene	NW-G, 8021B	25.7	---	0.500	ug/l	1x	5.75	20.0	99.8%	(65-144)	0.00%	(20)	09/28/06 15:49	
Toluene	"	20.4	---	0.500	"	"	0.445	"	99.8%	(68-139)	0.976%	"	"	
Ethylbenzene	"	19.4	---	0.500	"	"	0.584	"	94.1%	(69-144)	0.514%	"	"	
Xylenes (total)	"	58.7	---	1.00	"	"	0.690	60.0	96.7%	(60-144)	0.684%	"	"	
Surrogate(s): 4-BFB (PID)		*Recovery: 90.0%*			*Limits: 70-130%*	*"*							*09/28/06 15:49*	

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Ash Creek Associates, Inc.	Project Name: **Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number: 1126-02	Report Created:
Beaverton, OR 97005	Project Manager: Amanda Spencer	10/23/06 09:39

Diesel and Heavy Range Hydrocarbons per NWTPH-Dx Method with Acid/Silica Gel Cleanup - Laboratory Quality Control Results

TestAmerica - Portland, OR

QC Batch: 6100041 **Water Preparation Method: EPA 3520/600 Series**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (6100041-BLK1)								**Extracted: 10/03/06 11:15**						
Diesel Range Organics	NWTPH-Dx	ND	---	0.250	mg/l	1x	--	--	--	--	--	--	10/04/06 10:56	
Heavy Oil Range Hydrocarbons	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 101%*			*Limits: 50-150%*	"							*10/04/06 10:56*	
LCS (6100041-BS1)								**Extracted: 10/03/06 11:15**						
Diesel Range Organics	NWTPH-Dx	2.30	---	0.250	mg/l	1x	--	2.55	90.2%	(50-150)	--	--	10/04/06 10:24	
Heavy Oil Range Hydrocarbons	"	1.56	---	0.500	"	"	--	1.60	97.5%	"	--	--	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 91.0%*			*Limits: 50-150%*	"							*10/04/06 10:24*	
LCS Dup (6100041-BSD1)								**Extracted: 10/03/06 11:15**						
Diesel Range Organics	NWTPH-Dx	2.42	---	0.250	mg/l	1x	--	2.55	94.9%	(50-150)	5.08%	(50)	10/04/06 09:52	
Heavy Oil Range Hydrocarbons	"	1.58	---	0.500	"	"	--	1.60	98.8%	"	1.27%	"	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 98.2%*			*Limits: 50-150%*	"							*10/04/06 09:52*	

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Ash Creek Associates, Inc.	Project Name:	**Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-02	Report Created:
Beaverton, OR 97005	Project Manager:	Amanda Spencer	10/23/06 09:39

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

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QC Batch: 6100470 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (6100470-BLK1)									**Extracted: 10/10/06 08:59**					
Acetone	EPA 8260B	ND	---	25.0	ug/l	1x	--	--	--	--	--	--	10/10/06 13:30	
Benzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromochloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromodichloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromoform	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Bromomethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Butanone (MEK)	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
n-Butylbenzene	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
sec-Butylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
tert-Butylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Carbon disulfide	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Carbon tetrachloride	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloroform	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Chloromethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
2-Chlorotoluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
4-Chlorotoluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dibromo-3-chloropropane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Dibromochloromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dibromoethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Dibromomethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,4-Dichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Dichlorodifluoromethane	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
cis-1,2-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
trans-1,2-Dichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
2,2-Dichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
cis-1,3-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
trans-1,3-Dichloropropene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	

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9615 SW Allen Blvd. Suite 106	Project Number: 1126-02	Report Created:
Beaverton, OR 97005	Project Manager: Amanda Spencer	10/23/06 09:39

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

TestAmerica - Portland, OR

QC Batch: 6100470 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (6100470-BLK1)									**Extracted: 10/10/06 08:59**					
Hexachlorobutadiene	EPA 8260B	ND	---	4.00	ug/l	1x	--	--	--	--	--	--	10/10/06 13:30	
2-Hexanone	"	ND	---	10.0	"	"	--	--	--	--	--	--	"	
Isopropylbenzene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
p-Isopropyltoluene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
4-Methyl-2-pentanone	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Methyl tert-butyl ether	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Methylene chloride	"	ND	---	5.00	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
n-Propylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Styrene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,1,2-Tetrachloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,2,2-Tetrachloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Tetrachloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Toluene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,3-Trichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trichlorobenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,1-Trichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,1,2-Trichloroethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Trichloroethene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Trichlorofluoromethane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,3-Trichloropropane	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,2,4-Trimethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
1,3,5-Trimethylbenzene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
Vinyl chloride	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
o-Xylene	"	ND	---	1.00	"	"	--	--	--	--	--	--	"	
m,p-Xylene	"	ND	---	2.00	"	"	--	--	--	--	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 91.5%*			*Limits: 80-120%*	"							*10/10/06 13:30*	
1,2-DCA-d4		*102%*			*80-120%*	"							"	
Dibromofluoromethane		*104%*			*80-120%*	"							"	
Toluene-d8		*94.0%*			*80-120%*	"							"	

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Ash Creek Associates, Inc.	Project Name: **Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number: 1126-02	Report Created:
Beaverton, OR 97005	Project Manager: Amanda Spencer	10/23/06 09:39

Volatile Organic Compounds per EPA Method 8260B - Laboratory Quality Control Results

TestAmerica - Portland, OR

QC Batch: 6100470 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
LCS (6100470-BS1)									**Extracted: 10/10/06 08:59**					
Benzene	EPA 8260B	21.4	---	1.00	ug/l	1x	--	20.0	107%	(80-120)	--	--	10/10/06 11:05	
Chlorobenzene	"	20.0	---	1.00	"	"	--	"	100%	(80-124)	--	--	"	
1,1-Dichloroethene	"	20.7	---	1.00	"	"	--	"	104%	(78-120)	--	--	"	
Toluene	"	20.9	---	1.00	"	"	--	"	104%	(80-124)	--	--	"	
Trichloroethene	"	21.3	---	1.00	"	"	--	"	106%	(80-132)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 110%*			*Limits: 80-120%*	"							*10/10/06 11:05*	
1,2-DCA-d4		*109%*			*80-120%*	"							"	
Dibromofluoromethane		*112%*			*80-120%*	"							"	
Toluene-d8		*108%*			*80-120%*	"							"	
Matrix Spike (6100470-MS1)					**QC Source: PPJ0299-01**				**Extracted: 10/10/06 08:59**					
Benzene	EPA 8260B	19.6	---	1.00	ug/l	1x	ND	20.0	98.0%	(80-124)	--	--	10/10/06 11:39	
Chlorobenzene	"	17.8	---	1.00	"	"	ND	"	89.0%	(72.9-134)	--	--	"	
1,1-Dichloroethene	"	18.5	---	1.00	"	"	ND	"	92.5%	(79.3-127)	--	--	"	
Toluene	"	18.7	---	1.00	"	"	0.110	"	93.0%	(79.7-131)	--	--	"	
Trichloroethene	"	18.0	---	1.00	"	"	ND	"	90.0%	(68.4-130)	--	--	"	
Surrogate(s): 4-BFB		*Recovery: 101%*			*Limits: 80-120%*	"							*10/10/06 11:39*	
1,2-DCA-d4		*103%*			*80-120%*	"							"	
Dibromofluoromethane		*106%*			*80-120%*	"							"	
Toluene-d8		*99.5%*			*80-120%*	"							"	
Matrix Spike Dup (6100470-MSD1)					**QC Source: PPJ0299-01**				**Extracted: 10/10/06 08:59**					
Benzene	EPA 8260B	19.2	---	1.00	ug/l	1x	ND	20.0	96.0%	(80-124)	2.06%	(25)	10/10/06 12:07	
Chlorobenzene	"	17.6	---	1.00	"	"	ND	"	88.0%	(72.9-134)	1.13%	"	"	
1,1-Dichloroethene	"	18.5	---	1.00	"	"	ND	"	92.5%	(79.3-127)	0.00%	"	"	
Toluene	"	18.9	---	1.00	"	"	0.110	"	94.0%	(79.7-131)	1.06%	"	"	
Trichloroethene	"	18.2	---	1.00	"	"	ND	"	91.0%	(68.4-130)	1.10%	"	"	
Surrogate(s): 4-BFB		*Recovery: 102%*			*Limits: 80-120%*	"							*10/10/06 12:07*	
1,2-DCA-d4		*107%*			*80-120%*	"							"	
Dibromofluoromethane		*110%*			*80-120%*	"							"	
Toluene-d8		*105%*			*80-120%*	"							"	

Darrell Auvil, Project Manager

TestAmerica
ANALYTICAL TESTING CORPORATION

PORTLAND, OR 9405 S.W. NIMBUS AVENUE
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Ash Creek Associates, Inc.	Project Name: **Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number: 1126-02	Report Created:
Beaverton, OR 97005	Project Manager: Amanda Spencer	10/23/06 09:39

Polynuclear Aromatic Compounds per EPA 8270M-SIM - Laboratory Quality Control Results

TestAmerica - Portland, OR

QC Batch: 6100554 **Water Preparation Method: 3520B Liq-Liq**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (6100554-BLK1)								**Extracted: 10/11/06 13:55**						
Acenaphthene	EPA 8270m	ND	---	0.100	ug/l	1x	--	--	--	--	--	--	10/17/06 15:05	
Acenaphthylene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Anthracene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) anthracene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (a) pyrene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (b) fluoranthene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (ghi) perylene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Benzo (k) fluoranthene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Chrysene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Dibenzo (a,h) anthracene	"	ND	---	0.200	"	"	--	--	--	--	--	--	"	
Fluoranthene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Fluorene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Indeno (1,2,3-cd) pyrene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Phenanthrene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Pyrene	"	ND	---	0.100	"	"	--	--	--	--	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery: 58.4%*			*Limits: 25-125%*	"							*10/17/06 15:05*	
Pyrene-d10		*86.8%*			*23-150%*	"							"	
Benzo (a) pyrene-d12		*78.0%*			*10-125%*	"							"	
LCS (6100554-BS1)								**Extracted: 10/11/06 13:55**						
Acenaphthene	EPA 8270m	2.47	---	0.100	ug/l	1x	--	2.50	98.8%	(26-135)	--	--	10/17/06 16:01	
Benzo (a) pyrene	"	2.32	---	0.100	"	"	--	"	92.8%	(38-137)	--	--	"	
Pyrene	"	2.64	---	0.100	"	"	--	"	106%	(33-133)	--	--	"	
Surrogate(s): Fluorene-d10		*Recovery: 71.6%*			*Limits: 25-125%*	"							*10/17/06 16:01*	
Pyrene-d10		*90.8%*			*23-150%*	"							"	
Benzo (a) pyrene-d12		*88.8%*			*10-125%*	"							"	
LCS Dup (6100554-BSD1)								**Extracted: 10/11/06 13:55**						
Acenaphthene	EPA 8270m	2.79	---	0.100	ug/l	1x	--	2.50	112%	(26-135)	12.2%	(60)	10/17/06 16:29	
Benzo (a) pyrene	"	1.94	---	0.100	"	"	--	"	77.6%	(38-137)	17.8%	"	"	
Pyrene	"	2.74	---	0.100	"	"	--	"	110%	(33-133)	3.72%	"	"	
Surrogate(s): Fluorene-d10		*Recovery: 76.4%*			*Limits: 25-125%*	"							*10/17/06 16:29*	
Pyrene-d10		*94.8%*			*23-150%*	"							"	
Benzo (a) pyrene-d12		*70.0%*			*10-125%*	"							"	

Darrell W. Auvil

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Ash Creek Associates, Inc.	Project Name:	**Valero-Cenex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-02	Report Created:
Beaverton, OR 97005	Project Manager:	Amanda Spencer	10/23/06 09:39

Notes and Definitions

Report Specific Notes:

I-08 - Analysis requested and performed after recommend hold time had expired

R-10 - Sample pH greater than 2. Sample analyzed outside of 7 day hold time for non-preserved samples.

Laboratory Reporting Conventions:

DET - Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.

ND - Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).

NR/NA - Not Reported / Not Available

dry - Sample results reported on a Dry Weight Basis. Results and Reporting Limits have been corrected for Percent Dry Weight.

wet - Sample results and reporting limits reported on a Wet Weight Basis (as received). Results with neither 'wet' nor 'dry' are reported on a Wet Weight Basis.

RPD - RELATIVE PERCENT DIFFERENCE (RPDs calculated using Results, not Percent Recoveries).

MRL - METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.

MDL* - METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated Results.

Dil - Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.

Reporting Limits - Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.

Electronic Signature - Electronic Signature added in accordance with TestAmerica's *Electronic Reporting and Electronic Signatures Policy*. Application of electronic signature indicates that the report has been reviewed and approved for release by the laboratory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Darrell W. Auvil

Darrell Auvil, Project Manager

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March 13, 2008

John Foxwell
Ash Creek Associates, Inc.
9615 SW Allen Blvd. Suite 106
Beaverton, OR 97005

RE: NuStar Vancouver Annex

Enclosed are the results of analyses for samples received by the laboratory on 02/28/08 16:10. The following list is a summary of the Work Orders contained in this report, generated on 03/13/08 16:33.

If you have any questions concerning this report, please feel free to contact me.

Work Order	Project	ProjectNumber
PRB0818	NuStar Vancouver Annex	1126-06

TestAmerica Portland

Darrell Auvil, Project Manager

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Ash Creek Associates, Inc.	Project Name:	**NuStar Vancouver Annex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-06	Report Created:
Beaverton, OR 97005	Project Manager:	John Foxwell	03/13/08 16:33

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1	PRB0818-01	Water	02/27/08 17:30	02/28/08 16:10
MW-2	PRB0818-02	Water	02/27/08 17:00	02/28/08 16:10
MW-3	PRB0818-03	Water	02/27/08 16:30	02/28/08 16:10
MW-3 DUP	PRB0818-04	Water	02/27/08 16:30	02/28/08 16:10
MW-4	PRB0818-05	Water	02/27/08 16:00	02/28/08 16:10

TestAmerica Portland

Darrell Auvil, Project Manager

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Ash Creek Associates, Inc.	Project Name:	**NuStar Vancouver Annex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-06	Report Created:
Beaverton, OR 97005	Project Manager:	John Foxwell	03/13/08 16:33

Gasoline Hydrocarbons per NW TPH-Gx Method

TestAmerica Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PRB0818-01 (MW-1)		**Water**			**Sampled: 02/27/08 17:30**					
Gasoline Range Hydrocarbons	NW TPH-Gx	ND	-----	80.0	ug/l	1x	8030078	03/04/08 12:18	03/05/08 19:34	
Surrogate(s): 4-BFB			*87.6%*		*50 - 150 %*	"			"	
PRB0818-02 (MW-2)		**Water**			**Sampled: 02/27/08 17:00**					
Gasoline Range Hydrocarbons	NW TPH-Gx	**81.7**	-----	80.0	ug/l	1x	8030078	03/04/08 12:18	03/05/08 20:02	
Surrogate(s): 4-BFB			*89.2%*		*50 - 150 %*	"			"	
PRB0818-03 (MW-3)		**Water**			**Sampled: 02/27/08 16:30**					
Gasoline Range Hydrocarbons	NW TPH-Gx	**2140**	-----	80.0	ug/l	1x	8030078	03/04/08 12:18	03/05/08 20:29	
Surrogate(s): 4-BFB			*159%*		*50 - 150 %*	"			"	***ZX***
PRB0818-04 (MW-3 DUP)		**Water**			**Sampled: 02/27/08 16:30**					
Gasoline Range Hydrocarbons	NW TPH-Gx	**1850**	-----	80.0	ug/l	1x	8030078	03/04/08 12:18	03/06/08 01:01	
Surrogate(s): 4-BFB			*149%*		*50 - 150 %*	"			"	
PRB0818-05 (MW-4)		**Water**			**Sampled: 02/27/08 16:00**					
Gasoline Range Hydrocarbons	NW TPH-Gx	ND	-----	80.0	ug/l	1x	8030078	03/04/08 12:18	03/06/08 01:28	
Surrogate(s): 4-BFB			*85.9%*		*50 - 150 %*	"			"	

TestAmerica Portland

Darrell Auvil, Project Manager

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Ash Creek Associates, Inc.	Project Name:	**NuStar Vancouver Annex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-06	Report Created:
Beaverton, OR 97005	Project Manager:	John Foxwell	03/13/08 16:33

Diesel and Heavy Range Hydrocarbons per NWTPH-Dx Method with Acid/Silica Gel Cleanup

TestAmerica Portland

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PRB0818-01 (MW-1)		**Water**			**Sampled: 02/27/08 17:30**					
Diesel Range Organics	NWTPH-Dx	ND	-----	0.294	mg/l	1x	8030004	03/03/08 11:15	03/04/08 13:22	**RL4**
Heavy Oil Range Hydrocarbons	"	ND	-----	0.588	"	"	"	"	"	**RL4**
Surrogate(s): 1-Chlorooctadecane			*81.8%*		*50 - 150 %*	"			"	***RL4***
PRB0818-02 (MW-2)		**Water**			**Sampled: 02/27/08 17:00**					
Diesel Range Organics	NWTPH-Dx	ND	-----	0.294	mg/l	1x	8030004	03/03/08 11:15	03/04/08 13:40	**RL4**
Heavy Oil Range Hydrocarbons	"	ND	-----	0.588	"	"	"	"	"	**RL4**
Surrogate(s): 1-Chlorooctadecane			*81.2%*		*50 - 150 %*	"			"	***RL4***
PRB0818-03 (MW-3)		**Water**			**Sampled: 02/27/08 16:30**					
Diesel Range Organics	NWTPH-Dx	**0.387**	-----	0.250	mg/l	1x	8030004	03/03/08 11:15	03/04/08 13:57	**Q10**
Heavy Oil Range Hydrocarbons	"	ND	-----	0.500	"	"	"	"	"	
Surrogate(s): 1-Chlorooctadecane			*85.7%*		*50 - 150 %*	"			"	
PRB0818-04 (MW-3 DUP)		**Water**			**Sampled: 02/27/08 16:30**					
Diesel Range Organics	NWTPH-Dx	**0.342**	-----	0.243	mg/l	1x	8030004	03/03/08 11:15	03/04/08 14:15	**Q10**
Heavy Oil Range Hydrocarbons	"	ND	-----	0.485	"	"	"	"	"	
Surrogate(s): 1-Chlorooctadecane			*83.7%*		*50 - 150 %*	"			"	
PRB0818-05 (MW-4)		**Water**			**Sampled: 02/27/08 16:00**					
Diesel Range Organics	NWTPH-Dx	ND	-----	0.248	mg/l	1x	8030004	03/03/08 11:15	03/04/08 14:32	
Heavy Oil Range Hydrocarbons	"	ND	-----	0.495	"	"	"	"	"	
Surrogate(s): 1-Chlorooctadecane			*73.4%*		*50 - 150 %*	"			"	

TestAmerica Portland

Darrell Auvil, Project Manager

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Ash Creek Associates, Inc.	Project Name:	**NuStar Vancouver Annex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-06	Report Created:
Beaverton, OR 97005	Project Manager:	John Foxwell	03/13/08 16:33

VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

TestAmerica Irvine

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PRB0818-01 (MW-1)		**Water**			**Sampled: 02/27/08 17:30**					
1,2-Dibromoethane (EDB)	EPA 8260B	ND	*0.40*	0.50	ug/l	1x	8C06023	03/06/08 00:00	03/07/08 00:38	
1,2-Dichloroethane	"	ND	*0.28*	0.50	"	"	"	"	"	
Ethanol	"	ND	*100*	100	"	"	"	"	"	
tert-Butanol (TBA)	"	ND	*6.5*	10	"	"	"	"	"	
Ethyl tert-Butyl Ether (ETBE)	"	ND	*0.28*	0.50	"	"	"	"	"	
Di-isopropyl Ether (DIPE)	"	ND	*0.25*	0.50	"	"	"	"	"	
Methyl-tert-butyl Ether (MTBE)	"	ND	*0.32*	0.50	"	"	"	"	"	
tert-Amyl Methyl Ether (TAME)	"	ND	*0.33*	0.50	"	"	"	"	"	
Benzene	"	ND	*0.28*	0.50	"	"	"	"	"	
Toluene	"	ND	*0.36*	0.50	"	"	"	"	"	
Ethylbenzene	"	ND	*0.25*	0.50	"	"	"	"	"	
Xylenes, Total	"	ND	*0.90*	1.0	"	"	"	"	"	
Naphthalene	"	ND	*0.41*	0.50	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	ND	*0.23*	0.50	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	ND	*0.26*	0.50	"	"	"	"	"	
Isopropylbenzene	"	ND	*0.25*	0.50	"	"	"	"	"	
n-Propylbenzene	"	ND	*0.27*	0.50	"	"	"	"	"	
Surrogate(s): *Dibromofluoromethane*			*95%*		*80 - 120 %*	"			"	
Toluene-d8			*102%*		*80 - 120 %*	"			"	
4-Bromofluorobenzene			*89%*		*80 - 120 %*	"			"	
PRB0818-02 (MW-2)		**Water**			**Sampled: 02/27/08 17:00**					
1,2-Dibromoethane (EDB)	EPA 8260B	ND	*0.40*	0.50	ug/l	1x	8C06023	03/06/08 00:00	03/07/08 01:10	
1,2-Dichloroethane	"	ND	*0.28*	0.50	"	"	"	"	"	
Ethanol	"	ND	*100*	100	"	"	"	"	"	
tert-Butanol (TBA)	"	ND	*6.5*	10	"	"	"	"	"	
Ethyl tert-Butyl Ether (ETBE)	"	ND	*0.28*	0.50	"	"	"	"	"	
Di-isopropyl Ether (DIPE)	"	ND	*0.25*	0.50	"	"	"	"	"	
Methyl-tert-butyl Ether (MTBE)	"	**15**	*0.32*	0.50	"	"	"	"	"	
tert-Amyl Methyl Ether (TAME)	"	ND	*0.33*	0.50	"	"	"	"	"	
Benzene	"	**5.0**	*0.28*	0.50	"	"	"	"	"	
Toluene	"	ND	*0.36*	0.50	"	"	"	"	"	
Ethylbenzene	"	ND	*0.25*	0.50	"	"	"	"	"	
Xylenes, Total	"	ND	*0.90*	1.0	"	"	"	"	"	
Naphthalene	"	ND	*0.41*	0.50	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	ND	*0.23*	0.50	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	ND	*0.26*	0.50	"	"	"	"	"	
Isopropylbenzene	"	**0.34**	*0.25*	0.50	"	"	"	"	"	**J**
n-Propylbenzene	"	ND	*0.27*	0.50	"	"	"	"	"	
Surrogate(s): *Dibromofluoromethane*			*95%*		*80 - 120 %*	"			"	
Toluene-d8			*104%*		*80 - 120 %*	"			"	

TestAmerica Portland

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Ash Creek Associates, Inc.	Project Name: **NuStar Vancouver Annex**	
9615 SW Allen Blvd. Suite 106	Project Number: 1126-06	Report Created:
Beaverton, OR 97005	Project Manager: John Foxwell	03/13/08 16:33

VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

TestAmerica Irvine

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PRB0818-02 (MW-2)		**Water**			**Sampled: 02/27/08 17:00**					
4-Bromofluorobenzene		*91%*			*80 - 120 %*	*1x*			*03/07/08 01:10*	
PRB0818-03 (MW-3)		**Water**			**Sampled: 02/27/08 16:30**					
1,2-Dibromoethane (EDB)	EPA 8260B	ND	*0.40*	0.50	ug/l	1x	8C06023	03/06/08 00:00	03/07/08 01:41	
1,2-Dichloroethane	"	ND	*0.28*	0.50	"	"	"	"	"	
Ethanol	"	ND	*100*	100	"	"	"	"	"	
tert-Butanol (TBA)	"	ND	*6.5*	10	"	"	"	"	"	
Ethyl tert-Butyl Ether (ETBE)	"	ND	*0.28*	0.50	"	"	"	"	"	
Di-isopropyl Ether (DIPE)	"	ND	*0.25*	0.50	"	"	"	"	"	
Methyl-tert-butyl Ether (MTBE)	"	ND	*0.32*	0.50	"	"	"	"	"	
tert-Amyl Methyl Ether (TAME)	"	ND	*0.33*	0.50	"	"	"	"	"	
Benzene	"	ND	*0.28*	0.50	"	"	"	"	"	
Toluene	"	ND	*0.36*	0.50	"	"	"	"	"	
Ethylbenzene	"	**170**	*0.25*	0.50	"	"	"	"	"	
Xylenes, Total	"	**170**	*0.90*	1.0	"	"	"	"	"	
Naphthalene	"	**6.4**	*0.41*	0.50	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	**210**	*0.23*	0.50	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	**51**	*0.26*	0.50	"	"	"	"	"	
Isopropylbenzene	"	**22**	*0.25*	0.50	"	"	"	"	"	
n-Propylbenzene	"	**56**	*0.27*	0.50	"	"	"	"	"	
Surrogate(s): *Dibromofluoromethane*		*95%*			*80 - 120 %*	"			"	
Toluene-d8		*105%*			*80 - 120 %*	"			"	
4-Bromofluorobenzene		*101%*			*80 - 120 %*	"			"	
PRB0818-04 (MW-3 DUP)		**Water**			**Sampled: 02/27/08 16:30**					
1,2-Dibromoethane (EDB)	EPA 8260B	ND	*0.40*	0.50	ug/l	1x	8C06023	03/06/08 00:00	03/07/08 02:13	
1,2-Dichloroethane	"	ND	*0.28*	0.50	"	"	"	"	"	
Ethanol	"	ND	*100*	100	"	"	"	"	"	
tert-Butanol (TBA)	"	ND	*6.5*	10	"	"	"	"	"	
Ethyl tert-Butyl Ether (ETBE)	"	ND	*0.28*	0.50	"	"	"	"	"	
Di-isopropyl Ether (DIPE)	"	ND	*0.25*	0.50	"	"	"	"	"	
Methyl-tert-butyl Ether (MTBE)	"	ND	*0.32*	0.50	"	"	"	"	"	
tert-Amyl Methyl Ether (TAME)	"	ND	*0.33*	0.50	"	"	"	"	"	
Benzene	"	**1.1**	*0.28*	0.50	"	"	"	"	"	
Toluene	"	ND	*0.36*	0.50	"	"	"	"	"	
Ethylbenzene	"	**190**	*0.25*	0.50	"	"	"	"	"	
Xylenes, Total	"	**200**	*0.90*	1.0	"	"	"	"	"	
Naphthalene	"	**7.6**	*0.41*	0.50	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	**230**	*0.23*	0.50	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	**58**	*0.26*	0.50	"	"	"	"	"	

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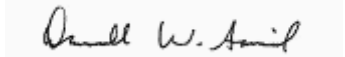

Darrell Auvil, Project Manager

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Ash Creek Associates, Inc.	Project Name:	**NuStar Vancouver Annex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-06	Report Created:
Beaverton, OR 97005	Project Manager:	John Foxwell	03/13/08 16:33

VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

TestAmerica Irvine

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PRB0818-04 (MW-3 DUP)		**Water**			**Sampled: 02/27/08 16:30**					
Isopropylbenzene	EPA 8260B	**26**	*0.25*	0.50	ug/l	1x	8C06023	03/06/08 00:00	03/07/08 02:13	
n-Propylbenzene	"	**66**	*0.27*	0.50	"	"	"	"	"	
Surrogate(s): Dibromofluoromethane			*97%*		*80 - 120 %*	"			"	
Toluene-d8			*106%*		*80 - 120 %*	"			"	
4-Bromofluorobenzene			*99%*		*80 - 120 %*	"			"	
PRB0818-05 (MW-4)		**Water**			**Sampled: 02/27/08 16:00**					
1,2-Dibromoethane (EDB)	EPA 8260B	ND	*0.40*	0.50	ug/l	1x	8C06023	03/06/08 00:00	03/07/08 02:45	
1,2-Dichloroethane	"	ND	*0.28*	0.50	"	"	"	"	"	
Ethanol	"	ND	*100*	100	"	"	"	"	"	
tert-Butanol (TBA)	"	ND	*6.5*	10	"	"	"	"	"	
Ethyl tert-Butyl Ether (ETBE)	"	ND	*0.28*	0.50	"	"	"	"	"	
Di-isopropyl Ether (DIPE)	"	ND	*0.25*	0.50	"	"	"	"	"	
Methyl-tert-butyl Ether (MTBE)	"	ND	*0.32*	0.50	"	"	"	"	"	
tert-Amyl Methyl Ether (TAME)	"	ND	*0.33*	0.50	"	"	"	"	"	
Benzene	"	ND	*0.28*	0.50	"	"	"	"	"	
Toluene	"	ND	*0.36*	0.50	"	"	"	"	"	
Ethylbenzene	"	ND	*0.25*	0.50	"	"	"	"	"	
Xylenes, Total	"	ND	*0.90*	1.0	"	"	"	"	"	
Naphthalene	"	ND	*0.41*	0.50	"	"	"	"	"	
1,2,4-Trimethylbenzene	"	ND	*0.23*	0.50	"	"	"	"	"	
1,3,5-Trimethylbenzene	"	ND	*0.26*	0.50	"	"	"	"	"	
Isopropylbenzene	"	ND	*0.25*	0.50	"	"	"	"	"	
n-Propylbenzene	"	ND	*0.27*	0.50	"	"	"	"	"	
Surrogate(s): Dibromofluoromethane			*96%*		*80 - 120 %*	"			"	
Toluene-d8			*102%*		*80 - 120 %*	"			"	
4-Bromofluorobenzene			*92%*		*80 - 120 %*	"			"	

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Ash Creek Associates, Inc.	Project Name:	**NuStar Vancouver Annex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-06	Report Created:
Beaverton, OR 97005	Project Manager:	John Foxwell	03/13/08 16:33

Gasoline Hydrocarbons per NW TPH-Gx Method - Laboratory Quality Control Results

TestAmerica Portland

QC Batch: 8030078 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (8030078-BLK1)								**Extracted: 03/04/08 12:18**						
Gasoline Range Hydrocarbons	NW TPH-Gx	ND	---	80.0	ug/l	1x	--	--	--	--	--	--	03/05/08 09:33	
Surrogate(s): 4-BFB		*Recovery: 86.8%*			*Limits: 50-150%*	"							*03/05/08 09:33*	
LCS (8030078-BS1)								**Extracted: 03/04/08 12:18**						
Gasoline Range Hydrocarbons	NW TPH-Gx	444	---	80.0	ug/l	1x	--	500	88.8%	(70-130)	--	--	03/05/08 08:38	
Surrogate(s): 4-BFB		*Recovery: 90.4%*			*Limits: 50-150%*	"							*03/05/08 08:38*	
LCS Dup (8030078-BSD1)								**Extracted: 03/04/08 12:18**						
Gasoline Range Hydrocarbons	NW TPH-Gx	441	---	80.0	ug/l	1x	--	500	88.1%	(70-130)	0.806%	(35)	03/05/08 09:05	
Surrogate(s): 4-BFB		*Recovery: 89.1%*			*Limits: 50-150%*	"							*03/05/08 09:05*	
Duplicate (8030078-DUP1)							**QC Source: PRB0801-01**			**Extracted: 03/04/08 12:18**				
Gasoline Range Hydrocarbons	NW TPH-Gx	3280	---	800	ug/l	10x	3190	--	--	--	2.66%	(35)	03/05/08 12:41	
Surrogate(s): 4-BFB		*Recovery: 126%*			*Limits: 50-150%*	*1x*							*03/05/08 12:41*	
Duplicate (8030078-DUP2)							**QC Source: PRB0801-02**			**Extracted: 03/04/08 12:18**				
Gasoline Range Hydrocarbons	NW TPH-Gx	ND	---	80.0	ug/l	1x	ND	--	--	--	NR	(35)	03/05/08 23:12	
Surrogate(s): 4-BFB		*Recovery: 85.1%*			*Limits: 50-150%*	"							*03/05/08 23:12*	

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Ash Creek Associates, Inc.	Project Name:	**NuStar Vancouver Annex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-06	Report Created:
Beaverton, OR 97005	Project Manager:	John Foxwell	03/13/08 16:33

Diesel and Heavy Range Hydrocarbons per NWTPH-Dx Method with Acid/Silica Gel Cleanup - Laboratory Quality Control Results

TestAmerica Portland

QC Batch: 8030004 **Water Preparation Method: EPA 3510 Fuels**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (8030004-BLK1)								**Extracted: 03/03/08 10:30**						
Diesel Range Organics	NWTPH-Dx	ND	---	0.250	mg/l	1x	--	--	--	--	--	--	03/04/08 11:59	
Heavy Oil Range Hydrocarbons	"	ND	---	0.500	"	"	--	--	--	--	--	--	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 78.6%*			*Limits: 50-150%*	"							*03/04/08 11:59*	
LCS (8030004-BS1)								**Extracted: 03/03/08 10:30**						
Diesel Range Organics	NWTPH-Dx	2.47	---	0.250	mg/l	1x	--	2.50	98.5%	(50-150)	--	--	03/04/08 12:13	
Heavy Oil Range Hydrocarbons	"	1.70	---	0.500	"	"	--	1.50	113%	"	--	--	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 59.6%*			*Limits: 50-150%*	"							*03/04/08 12:13*	
LCS Dup (8030004-BSD1)								**Extracted: 03/03/08 10:30**						
Diesel Range Organics	NWTPH-Dx	2.52	---	0.250	mg/l	1x	--	2.50	101%	(50-150)	2.15%	(50)	03/04/08 12:31	
Heavy Oil Range Hydrocarbons	"	1.71	---	0.500	"	"	--	1.50	113%	"	0.433%	"	"	
Surrogate(s): 1-Chlorooctadecane		*Recovery: 61.8%*			*Limits: 50-150%*	"							*03/04/08 12:31*	

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Ash Creek Associates, Inc.	Project Name:	**NuStar Vancouver Annex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-06	Report Created:
Beaverton, OR 97005	Project Manager:	John Foxwell	03/13/08 16:33

VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B) - Laboratory Quality Control Results

TestAmerica Irvine

QC Batch: 8C06023 **Water Preparation Method: EPA 5030B GCMS**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (8C06023-BLK1)								**Extracted: 03/06/08 00:00**						
1,2-Dibromoethane (EDB)	EPA 8260B	ND	0.40	0.50	ug/l	1x	--	--	--	--	--	--	03/06/08 19:54	
1,2-Dichloroethane	"	ND	0.28	0.50	"	"	--	--	--	--	--	--	"	
Ethanol	"	ND	100	100	"	"	--	--	--	--	--	--	"	
tert-Butanol (TBA)	"	ND	6.5	10	"	"	--	--	--	--	--	--	"	
Ethyl tert-Butyl Ether (ETBE)	"	ND	0.28	0.50	"	"	--	--	--	--	--	--	"	
Di-isopropyl Ether (DIPE)	"	ND	0.25	0.50	"	"	--	--	--	--	--	--	"	
Methyl-tert-butyl Ether (MTBE)	"	ND	0.32	0.50	"	"	--	--	--	--	--	--	"	
tert-Amyl Methyl Ether (TAME)	"	ND	0.33	0.50	"	"	--	--	--	--	--	--	"	
Benzene	"	ND	0.28	0.50	"	"	--	--	--	--	--	--	"	
Toluene	"	ND	0.36	0.50	"	"	--	--	--	--	--	--	"	
Ethylbenzene	"	ND	0.25	0.50	"	"	--	--	--	--	--	--	"	
Xylenes, Total	"	ND	0.90	1.0	"	"	--	--	--	--	--	--	"	
Naphthalene	"	ND	0.41	0.50	"	"	--	--	--	--	--	--	"	
1,2,4-Trimethylbenzene	"	ND	0.23	0.50	"	"	--	--	--	--	--	--	"	
1,3,5-Trimethylbenzene	"	ND	0.26	0.50	"	"	--	--	--	--	--	--	"	
Isopropylbenzene	"	ND	0.25	0.50	"	"	--	--	--	--	--	--	"	
n-Propylbenzene	"	ND	0.27	0.50	"	"	--	--	--	--	--	--	"	
Surrogate(s): Dibromofluoromethane		*Recovery: 94%*			*Limits: 80-120%*	"							*03/06/08 19:54*	
Toluene-d8		*102%*			*80-120%*	"							*"*	
4-Bromofluorobenzene		*89%*			*80-120%*	"							*"*	
LCS (8C06023-BS1)								**Extracted: 03/06/08 00:00**						
1,2-Dibromoethane (EDB)	EPA 8260B	24.8	0.40	0.50	ug/l	1x	--	25.0	99%	(75-125)	--	--	03/06/08 20:26	
1,2-Dichloroethane	"	26.7	0.28	0.50	"	"	--	"	107%	(60-140)	--	--	"	
Ethanol	"	270	100	100	"	"	--	250	108%	(40-155)	--	--	"	
tert-Butanol (TBA)	"	151	6.5	10	"	"	--	125	120%	(70-135)	--	--	"	
Ethyl tert-Butyl Ether (ETBE)	"	24.4	0.28	0.50	"	"	--	25.0	98%	(65-135)	--	--	"	
Di-isopropyl Ether (DIPE)	"	27.1	0.25	0.50	"	"	--	"	108%	(60-135)	--	--	"	
Methyl-tert-butyl Ether (MTBE)	"	23.8	0.32	0.50	"	"	--	"	95%	"	--	--	"	
tert-Amyl Methyl Ether (TAME)	"	25.0	0.33	0.50	"	"	--	"	100%	"	--	--	"	
Benzene	"	25.3	0.28	0.50	"	"	--	"	101%	(70-120)	--	--	"	
Toluene	"	27.1	0.36	0.50	"	"	--	"	108%	"	--	--	"	
Ethylbenzene	"	27.2	0.25	0.50	"	"	--	"	109%	(75-125)	--	--	"	
Naphthalene	"	23.4	0.41	0.50	"	"	--	"	93%	(55-135)	--	--	"	
1,2,4-Trimethylbenzene	"	25.6	0.23	0.50	"	"	--	"	102%	(75-125)	--	--	"	
1,3,5-Trimethylbenzene	"	25.7	0.26	0.50	"	"	--	"	103%	"	--	--	"	
Isopropylbenzene	"	28.6	0.25	0.50	"	"	--	"	114%	(75-130)	--	--	"	
n-Propylbenzene	"	27.1	0.27	0.50	"	"	--	"	108%	"	--	--	"	
Surrogate(s): Dibromofluoromethane		*Recovery: 97%*			*Limits: 80-120%*	"							*03/06/08 20:26*	

TestAmerica Portland

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Ash Creek Associates, Inc.	Project Name:	**NuStar Vancouver Annex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-06	Report Created:
Beaverton, OR 97005	Project Manager:	John Foxwell	03/13/08 16:33

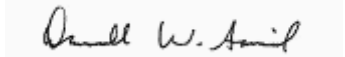
VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B) - Laboratory Quality Control Results

TestAmerica Irvine

QC Batch: 8C06023 **Water Preparation Method: EPA 5030B GCMS**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
LCS (8C06023-BS1)							**Extracted: 03/06/08 00:00**							
Surrogate(s): Toluene-d8		*Recovery: 102%*			*Limits: 80-120%*	*1x*							*03/06/08 20:26*	
4-Bromofluorobenzene		*98%*			*80-120%*	*"*							*"*	
Matrix Spike (8C06023-MS1)					**QC Source: IRC0158-02**		**Extracted: 03/06/08 00:00**							
1,2-Dibromoethane (EDB)	EPA 8260B	26.0	0.40	0.50	ug/l	1x	ND	25.0	104%	(70-130)	--	--	03/06/08 22:32	
1,2-Dichloroethane	"	27.7	0.28	0.50	"	"	0.600	"	108%	(60-140)	--	--	"	
Ethanol	"	380	100	100	"	"	ND	250	152%	(40-155)	--	--	"	
tert-Butanol (TBA)	"	164	6.5	10	"	"	ND	125	131%	(65-140)	--	--	"	
Ethyl tert-Butyl Ether (ETBE)	"	24.5	0.28	0.50	"	"	ND	25.0	98%	(60-135)	--	--	"	
Di-isopropyl Ether (DIPE)	"	27.5	0.25	0.50	"	"	ND	"	110%	(60-140)	--	--	"	
Methyl-tert-butyl Ether (MTBE)	"	24.1	0.32	0.50	"	"	ND	"	96%	(55-145)	--	--	"	
tert-Amyl Methyl Ether (TAME)	"	25.1	0.33	0.50	"	"	ND	"	100%	(60-140)	--	--	"	
Benzene	"	27.0	0.28	0.50	"	"	0.630	"	106%	(65-125)	--	--	"	
Toluene	"	28.2	0.36	0.50	"	"	ND	"	113%	(70-125)	--	--	"	
Ethylbenzene	"	28.5	0.25	0.50	"	"	ND	"	114%	(65-130)	--	--	"	
Naphthalene	"	24.3	0.41	0.50	"	"	ND	"	97%	(50-140)	--	--	"	
1,2,4-Trimethylbenzene	"	26.2	0.23	0.50	"	"	ND	"	105%	(55-135)	--	--	"	
1,3,5-Trimethylbenzene	"	26.3	0.26	0.50	"	"	ND	"	105%	(70-130)	--	--	"	
Isopropylbenzene	"	29.8	0.25	0.50	"	"	ND	"	119%	(70-135)	--	--	"	
n-Propylbenzene	"	28.3	0.27	0.50	"	"	ND	"	113%	"	--	--	"	
Surrogate(s): Dibromofluoromethane		*Recovery: 96%*			*Limits: 80-120%*	*"*							*03/06/08 22:32*	
Toluene-d8		*103%*			*80-120%*	*"*							*"*	
4-Bromofluorobenzene		*97%*			*80-120%*	*"*							*"*	
Matrix Spike Dup (8C06023-MSD1)					**QC Source: IRC0158-02**		**Extracted: 03/06/08 00:00**							
1,2-Dibromoethane (EDB)	EPA 8260B	26.0	0.40	0.50	ug/l	1x	ND	25.0	104%	(70-130)	0.04%	(25)	03/06/08 23:03	
1,2-Dichloroethane	"	27.6	0.28	0.50	"	"	0.600	"	108%	(60-140)	0.4%	(20)	"	
Ethanol	"	406	100	100	"	"	ND	250	162%	(40-155)	7%	(30)	"	M1
tert-Butanol (TBA)	"	161	6.5	10	"	"	ND	125	129%	(65-140)	2%	(25)	"	
Ethyl tert-Butyl Ether (ETBE)	"	24.4	0.28	0.50	"	"	ND	25.0	98%	(60-135)	0.3%	"	"	
Di-isopropyl Ether (DIPE)	"	27.2	0.25	0.50	"	"	ND	"	109%	(60-140)	1%	"	"	
Methyl-tert-butyl Ether (MTBE)	"	24.0	0.32	0.50	"	"	ND	"	96%	(55-145)	0.5%	"	"	
tert-Amyl Methyl Ether (TAME)	"	24.9	0.33	0.50	"	"	ND	"	100%	(60-140)	0.9%	(30)	"	
Benzene	"	26.8	0.28	0.50	"	"	0.630	"	105%	(65-125)	0.6%	(20)	"	
Toluene	"	28.2	0.36	0.50	"	"	ND	"	113%	(70-125)	0%	"	"	
Ethylbenzene	"	28.2	0.25	0.50	"	"	ND	"	113%	(65-130)	1%	"	"	
Naphthalene	"	23.8	0.41	0.50	"	"	ND	"	95%	(50-140)	2%	(30)	"	
1,2,4-Trimethylbenzene	"	25.5	0.23	0.50	"	"	ND	"	102%	(55-135)	3%	(25)	"	
1,3,5-Trimethylbenzene	"	26.4	0.26	0.50	"	"	ND	"	106%	(70-130)	0.7%	(20)	"	
Isopropylbenzene	"	30.2	0.25	0.50	"	"	ND	"	121%	(70-135)	2%	"	"	

TestAmerica Portland



Darrell Auvil, Project Manager

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
ph: (503) 906.9200 fax: (503) 906.9210

Ash Creek Associates, Inc.	Project Name:	**NuStar Vancouver Annex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-06	Report Created:
Beaverton, OR 97005	Project Manager:	John Foxwell	03/13/08 16:33

VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B) - Laboratory Quality Control Results

TestAmerica Irvine

QC Batch: 8C06023 **Water Preparation Method: EPA 5030B GCMS**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Matrix Spike Dup (8C06023-MSD1)					**QC Source: IRC0158-02**			**Extracted: 03/06/08 00:00**						
n-Propylbenzene	EPA 8260B	28.6	0.27	0.50	ug/l	1x	ND	25.0	115%	(70-135)	1%	(20)	03/06/08 23:03	
Surrogate(s): Dibromofluoromethane		*Recovery: 96%*			*Limits: 80-120%*	"							*03/06/08 23:03*	
Toluene-d8		*102%*			*80-120%*	"							"	
4-Bromofluorobenzene		*97%*			*80-120%*	"							"	

TestAmerica Portland

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Ash Creek Associates, Inc.	Project Name:	**NuStar Vancouver Annex**	
9615 SW Allen Blvd. Suite 106	Project Number:	1126-06	Report Created:
Beaverton, OR 97005	Project Manager:	John Foxwell	03/13/08 16:33

Notes and Definitions

Report Specific Notes:

J	-	Estimated value. Analyte detected at a level less than the Reporting Limit (RL) and greater than or equal to the Method Detection Limit (MDL). The user of this data should be aware that this data is of limited reliability.
M1	-	The MS and/or MSD were above the acceptance limits due to sample matrix interference. See Blank Spike (LCS).
Q10	-	Hydrocarbon pattern most closely resembles a blend of heavy gas/light diesel range components.
RL4	-	Reporting limit raised due to insufficient sample volume.
ZX	-	Due to sample matrix effects, the surrogate recovery was outside the acceptance limits.

Laboratory Reporting Conventions:

DET	-	Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.
ND	-	Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate).
NR/NA	-	Not Reported / Not Available
dry	-	Sample results reported on a Dry Weight Basis. Results and Reporting Limits have been corrected for Percent Dry Weight.
wet	-	Sample results and reporting limits reported on a Wet Weight Basis (as received). Results with neither 'wet' nor 'dry' are reported on a Wet Weight Basis.
RPD	-	RELATIVE PERCENT DIFFERENCE (RPDs calculated using Results, not Percent Recoveries).
MRL	-	METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table.
MDL*	-	METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B. *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated Results.
Dil	-	Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.
Reporting Limits	-	Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.
Electronic Signature	-	Electronic Signature added in accordance with TestAmerica's *Electronic Reporting and Electronic Signatures Policy.* Application of electronic signature indicates that the report has been reviewed and approved for release by the laboratory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

TestAmerica Portland

Darrell Auvil, Project Manager

FRB0818

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

CHAIN OF CUSTODY RECORD

Client Name: Ash Creek Associates
Address: 9615 SW Allen Blvd #106
City/State/Zip: Beaverton, OR 97005

Telephone Number: 503.924.4704
Fax No.: 503.924.4707

Project Manager: John Foxwell
Project Name: NuStar Vancouver Annex
Project Number: 1126-02
Sampler Name: Adam Reese

Analytical Lab: Test America
Report To: John Foxwell
Page: 1 of 1

Sample ID / Description	Date Sampled	Time Sampled	No. of Containers Shipped	Grab	Composite	Field Filtered	Preservative: Ice	Preservative: HNO_3 (Red Label)	Preservative: HCl (Blue Label)	Preservative: NaOH (Orange Label)	Preservative: H_2SO_4 Plastic (Yellow Label)	Preservative: H_2SO_4 Glass(Yellow Label)	Preservative: None (Black Label)	Preservative: Other (Specify)	Analyze For: Groundwater	Wastewater	Drinking Water	Sludge	Soil	Other (specify):		Analyze For: NW TPH-Gx	NW TPHdx w/ Silica gel clean-up	8260 Oxygenates & RBCA									RUSH TAT (Pre-Schedule)	Standard TAT	Fax Results	Send QC with report
MW-1	2/27/08	1730	7	X					X						X							X	X	X										X		
MW-2	2/27/08	1700	7	X					X						X							X	X	X										X		
MW-3	2/27/08	1630	7	X					X						X							X	X	X										X		
MW-3 DUP	2/27/08	1630	7	X					X						X							X	X	X										X		
MW-4	2/27/08	1600	7	X					X						X							X	X	X										X		

Special Instructions:

Laboratory Comments:
Temperature Upon Receipt: 4.3°C
VOCs Free of Headspace? Y N

Method of Shipment:

Relinquished by: Name/Company	Date	Time	Received by: Name/Company	Date	Time
Ashleigh Fines, Ash Creek Assoc.	2/28/08	1610		2/28/08	16:10
Relinquished by: Name/Company	Date	Time	Received by: Name/Company	Date	Time
Relinquished by: Name/Company	Date	Time	Received by: Name/Company	Date	Time
Relinquished by: Name/Company	Date	Time	Received by: Name/Company	Date	Time

TestAmerica Sample Receipt Checklist

Received by: *(section A)* Date: 2/23 Time: 1[illegible] Initials: JT

Unpacked by: *(section B)* Date: 2/2[illegible] Initials: JT

Logged-in by: Date: 2/20 Initials: JT

Work Order No. PRB0818
Client: Ash Creek Assoc
Project: ~~John Foxwell~~ NuStar Vancouver Annex JT

Temperature out of range:

___Not enough Ice
___*No Ice*
___*Ice Melted*
___*W/in 4 Hours*
___*Other*___

***ESI Clients *(see Section C)*

Cooler Temperature (IR): 4.3 °C plastic (glass) NA *(oil/air samples, ESI client)* Temperature Blank: ______ °C

A

Custody Seals: (#____)

Signature: Y N Dated:______
X None

Received from:
___TA Courier
___Senvoy
___UPS
___Fed Ex
X Client
___TDP
___DHL
___SDS
___Mid-Valley
___GS/TA
___GS/Senvoy
___Other:

Container Type:
1 #Cooler(s)
___#Box(s)
___None (___#Other:______)

Coolant Type:
X Gel Ice
___Loose Ice
___None

Packing Material:
___Bubble Bags
___Styrofoam Cubbies
Y None (___Other:______)

B

Sample Status:
(If N circled, see NOD)

General:			
Intact?	(Y)	N	
# Containers Match COC?	(Y)	N	none given
IDs Match COC?	(Y)	N	
For Analyses Requested:			
Correct Type & Preservation?	(Y)	N	
Adequate Volume?	(Y)	N	
Within Hold Time?	(Y)	N	
Volatiles/ Oil Quality:			
VOAs/ Syringes free of Headspace?	(Y)	N	NA
TB on COC? (not provided)	Y	N	NA
Metals:			
HNO3 Preserved?	Y	N	(NA)
Dissolved Metals Filtered?	Y	N	(NA)

C

***ESI Clients Only:

Temperature Blank: ______ °C not provided

All preserved bottles checked Y N NA *(voas/soils/all unp.)*
All preserved accordingly? Y N *(see NOD)* NA *(voas/soils/all unp.)*

FED EX/ UPS Was the tracking paper keepable? YES NO

If circled NO, what is the Tracking number? ______

FED EX Goldstreak UPS DHL Other: ______

Project Managers:

Comments ______

PM Reviewed ______ *(Initial/Date)*

Appendix D

Sampling and Analysis Plan

1.0 Introduction

This appendix presents the field and sampling procedures and the analytical testing program that will be used to complete the field and analytical work for this project. The Quality Assurance Project Plan (QAPP) is also included in this appendix.

1.1 Facility Description and Physical Setting

The Facility is the NuStar Terminals Operations Partnership, L.P. (NuStar) Annex Terminal tank farm located at 5420 NW Fruit Valley Road in Vancouver, Washington (the Facility; as shown on Figure 1). The property is roughly rectangular with nominal dimensions of 800 by 1,800 feet. The total area of the Facility is approximately 31 acres. The Facility is located in a mixed industrial-agricultural area and includes five 55,000-gallon and one 10,000-gallon aboveground fuel storage tanks (ASTs); a covered truck refueling rack; and several buildings used for equipment storage and offices.

2.0 Field and Sampling Procedures

The scope of work for the site investigation includes collection of groundwater samples from groundwater monitoring wells. Data from these activities will be used to complete the Remedial Investigation (RI) of the Facility. The field and sampling procedures include the following:

- Groundwater monitoring;
- Advancement of boring and collection of depth-discrete groundwater samples and a no-threat confirmation soil sample;
- Sample management (e.g., containers, storage, and shipment);
- Decontamination procedures; and
- Handling of investigation-derived waste (IDW).

2.1 Groundwater Monitoring

Groundwater monitoring will consist of measuring water levels, purging and sampling groundwater, and measuring groundwater field parameters. Field observations and measurements made during groundwater monitoring will be recorded in the field notes. Two quarters of groundwater samples will be collected from the four on-site monitoring wells (MW-1 through MW-4).

Groundwater Levels. Water levels in the wells will be measured and recorded. The wells will be opened and the water level allowed to equilibrate before the measurements are taken. Measurements of the depth to water will be made to the nearest 0.01 foot using an electronic probe.

Purging. After the groundwater levels are measured, each well will be purged prior to sampling. Each monitoring well will be purged using a disposable bailer. To assess the effectiveness of purging, groundwater field parameters (pH, electrical conductivity, temperature, oxidation-reduction potential [ORP], and dissolved oxygen [DO] concentration) will be measured using a handheld multi-parameter flow cell. Field parameters will be measured and recorded every casing volume purged. Purging will be considered complete when three casing volumes have been removed from the well or the well purges dry.

Purge water will be drummed and handled in accordance with Section 2.5 of this Sampling and Analysis Plan (SAP).

Sampling. After the purging of each well is complete, groundwater samples will be collected for chemical analyses using the same bailer used for the well purging.

Duplicate Sample. For quality assurance/quality control (QA/QC) purposes, a duplicate sample will be collected from one well (MW-3) for chemical analysis. We will alternately fill sample containers for the primary and duplicate samples with water from the well.

Field Parameter Measurements. Groundwater pH, temperature, electrical conductivity, DO, and ORP will be measured in the field after sampling has been completed. Results of these measurements will be included in the field notes.

2.2 Collection of Push-Probe Boring Samples

Figure 11 of the Final RI Work Plan shows the locations of the proposed exploration. Site investigation activities will be conducted in accordance with Ash Creek Associates (Ash Creek) standard operating procedures (SOPs) for direct-push explorations, included in this appendix.

Groundwater Sampling. Depth-discrete groundwater samples will be collected at the exploration, at the depths identified in the Final RI Work Plan. The groundwater sampling procedure consists of collecting a grab groundwater sample from the boring at the desired depth once the core barrel has been removed. After driving the core barrel to the desired depth, the barrel is withdrawn as described above to remove the soil core. The groundwater at the desired sampling depth is then able to flow inside the drilling outer casing. Prior to sample collection, groundwater is purged from the casing using a low-flow sampling pump (an inertial or pneumatic pump lowered to the middle of the screen interval to obtain a representative sample) for several minutes to limit the turbidity of the sample. Once the clarity of the groundwater has improved, a groundwater sample is collected using the same pump. The extraction rate on the pump will be slowed—if necessary—to avoid agitation of the water.

Soil Sampling. At the push-probe location, the exploration will be driven to a predetermined depth below ground surface. The field representative will remove the soil core from the sampler for field screening, description, and collection for chemical analysis. Soil samples will be field-screened using a photoionization detector (PID). The investigation will be conducted in accordance with Ash Creek standard operating procedures (SOPs) for field screening, included in this appendix.

Exploration Abandonment. Explorations will be abandoned by filling with hydrated bentonite pellets or grout. Asphalt concrete surfaces will be patched with a cold patch mix (e.g., EZ Street) to closely match the surrounding surface.

2.3 Sample Management

Containers. Clean sample containers will be provided by the analytical laboratory ready for sample collection, including preservative if required (the container requirements are listed in Table D-1). Specific container requirements for samples that will undergo multiple analyses will be discussed with the analytical laboratory prior to sample collection. Each container will be fully filled, leaving no headspace. Lids will be equipped with Teflon® liners to reduce the loss of volatile compounds.

Labeling Requirements. A sample label will be affixed to each sample container before sample collection. All containers will be marked with the project number, a sample number, date of collection, and the sampler's initials.

Sample Storage and Shipment. All samples will be stored in a cooler chilled with ice or blue ice to 4 degrees Celsius (°C). The cooler lid will be sealed with chain-of-custody seals. If necessary, the samples will be sent via overnight courier to the analytical laboratory for chemical analysis. Otherwise, we will transport the containers to the laboratory. Chain-of-custody will be maintained and documented at all times.

2.4 Decontamination Procedures

Personnel Decontamination. Personnel decontamination procedures depend on the level of protection specified for a given activity. The updated Health and Safety Plan (HASP; Appendix E) for the Facility identifies the appropriate level of protection for the type of work and expected field conditions involved in this project. In general, clothing and other protective equipment can be removed from the investigation area. Field personnel should thoroughly wash their hands and faces at the end of each day and before taking any work breaks.

Sampling Equipment Decontamination. To prevent cross-contamination between sampling events, clean, dedicated sampling equipment (e.g., groundwater sampling tubing) will be used when possible for

each sampling event and will be discarded after use. Cleaning of non-disposable items will consist of washing in a detergent (Alconox®) solution, rinsing with tap water, followed with a de-ionized water rinse.

To reduce the chance for cross-contamination between explorations, the drilling equipment will be cleaned with a high-pressure washer after each exploration. Decontamination water will be collected and handled in accordance with Section 2.5 of this SAP.

2.5 Handling of Investigation-Derived Waste

IDW will consist of decontamination water, purge water, soil cuttings, and personal protection equipment (PPE). IDW will be placed in Department of Transportation (DOT)-approved drums. Wastes from each exploration area will be drummed separately and stored at an approved location at the Facility pending proper disposal. Each drum will be labeled with the project name, general contents, and date.

The laboratory results will be compared against Washington State Department of Ecology (Ecology) dangerous waste criteria (WAC 173-303-100(5)) for classification. Based on previous work at the Facility and the anticipated environmental conditions in the exploration locations, it is anticipated that the water will be determined to be non-hazardous.

Disposable items, such as sample tubing, disposable bailers, bailer line, gloves, protective overalls (e.g., Tyvek®), paper towels, etc., will be placed in plastic bags after use and deposited in trash receptacles for disposal. Arrangement with a waste disposal subcontractor will be made to dispose of the IDW after chemical analytical results have been received.

3.0 Analytical Testing Program

An analytical testing program will be performed to assess the chemical quality of soil and groundwater samples collected as part of this project. Analytical laboratory QA/QC procedures are discussed in Section 4.

Specific container and storage requirements for samples will be discussed with the analytical laboratory prior to sample collection and will be in accordance with the container requirements presented in Table D-1. Table D-2 lists the proposed analytical methods and detection limit goals.

Groundwater monitoring well samples will be analyzed for total petroleum hydrocarbons (TPH) as gasoline (TPHg) by Method NWTPH-Gx; TPH as diesel (TPHd) and heavy oil (TPHho) by Method NWTPH-Dx with silica gel cleanup; BTEX (benzene, toluene, ethylbenzene, and xylenes), MTBE (methyl tertiary-butyl ether), and fuel oxygenates by U.S. Environmental Protection Agency (EPA) Method 8260B;

and dissolved lead by EPA Method 200.8. In addition, during the first groundwater monitoring event, each monitoring well will be sampled for total lead using EPA Method Series 200.8.

The collected grab groundwater sample from the boring installation will be analyzed for BTEX, MTBE, and fuel oxygenates by EPA Method 8260B; and dissolved lead by EPA Method 200.8. Soil samples collected will be analyzed for total lead using EPA Method 6020.

4.0 Quality Assurance Program

4.1 Quality Assurance Objectives For Data Management

The general QA objectives for this project are to develop and implement procedures for obtaining and evaluating data of a specified quality that can be used to assess the nature and lateral extent of contamination. Data collected in this study may be used in a Risk Assessment. To collect such information, analytical data must have an appropriate degree of accuracy and reproducibility, samples collected must be representative of actual field conditions, and samples must be collected and analyzed using unbroken chain-of-custody procedures (see Section 4.3).

Method detection limits and analytical results will be compared to action levels for each parameter in media of concern. The detection limits listed in Table D-2 are the expected detection limits, based upon laboratory calculations and experience.

Specific QA objectives are as follows:

1) Establish sampling techniques that will produce analytical data representative of the media (e.g., soil or groundwater) being measured.
2) Collect and analyze a sufficient number of duplicate field samples to establish sampling precision. Field duplicate samples will be used to establish precision among replicate samples collected from the same sample location. Laboratory duplicates of the same sample will provide a measure of precision within that sample (sample homogeneity).
3) Analyze a sufficient number of analytical duplicate samples to assess the performance of the analytical laboratory.
4) Collect and analyze a sufficient number of duplicate samples, field blanks, and trip blanks to evaluate the potential for contamination from sampling equipment and techniques and/or transportation.
5) Analyze a sufficient number of blank, standard, duplicate, spiked, and check samples within the laboratory to evaluate results against numerical QA goals established for precision and accuracy.

Precision, accuracy, representativeness, completeness, and comparability parameters used to indicate data quality are defined below.

4.1.1 Precision

Precision is a measure of the reproducibility of data under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. For duplicate measurements, precision can be expressed as the relative percent difference (RPD). Analysis of field duplicate samples will serve to measure the precision of sampling. Field and laboratory duplicate measurements will be carried out with approximately a 10-percent frequency for each sample matrix and a 5-percent frequency for laboratory samples.

4.1.2 Accuracy

Accuracy is the measure of error between the reported test results and the true sample concentration. True sample concentration is never known due to analytical limitations and error. Consequently, accuracy is inferred from the recovery data from spiked samples.

Because of the difficulty of spiking samples in the field, the laboratory will spike samples. The laboratory shall perform sufficient spike samples of a similar matrix (water or soil) to allow the computation of the accuracy. For analyses of less than five samples, surrogate spikes may be performed on a batch basis. Perfect accuracy is 100 percent recovery.

4.1.3 Representativeness

Representativeness is a measure of how closely the results reflect the actual concentration of the chemical parameters in the medium sampled. Sampling procedures as well as sample handling protocols for storage, preservation, and transportation are designed to preserve the representativeness of the samples collected. Proper documentation will confirm that protocols are followed. This helps to ensure sample identification and integrity.

Laboratory method blanks will be run in accordance with established laboratory protocols to ensure samples are not contaminated during sample preparation in the laboratory. A field blank will be used to assess the quality of the sampling methods (and the potential for cross-contamination by volatile organic compounds [VOCs] during transportation). The field blank will be analyzed for VOCs. A temperature blank will be included in each batch of samples submitted to the laboratory.

4.1.4 Completeness

Completeness is defined as the percentage of measurements made which are judged to be valid. The completeness goal is essentially that a sufficient amount of valid data be generated to allow for the assessment of the nature and lateral extent of VOC contamination.

4.1.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The objective of this QA Program is to assure that all data developed during the investigation are comparable. Comparability of the data will be assured by using EPA-defined procedures which specify sample collection, handling, and analytical methods. The comparability of past data will be evaluated during the investigation (if possible) by assessing the techniques used for sample collection and analysis.

4.1.6 Documentation

Essentially, EPA Level III documentation will be generated during this investigation. This level of documentation is generally considered legally defensible and consists of the following:

- Holding times;
- Field blank data;
- Field duplicate data;
- Laboratory method blank data;
- Sample data;
- Matrix/surrogate spike data; and
- Duplicate sample data.

4.2 Sampling Procedures

Sampling procedures are presented above in Section 2. These procedures are designed to ensure:

- All samples collected are consistent with project objectives; and
- Samples are identified, handled, and transported in a manner that does not alter the representativeness of the data from the actual site conditions.

QA objectives for sample collection will be accomplished by a combination of the following items:

- Duplicate Samples: Duplicates will be submitted to evaluate the precision. The number of field duplicates required for this project will be one (MW-3). The duplicate sample will be analyzed for TPH and VOCs by the same methods as the primary samples.
- Laboratory QA: Laboratory duplicate measurements will be carried out on at least 5 percent of all laboratory samples. Analytical procedures will be evaluated using the protocols of the analytical laboratory. These protocols can be submitted upon request.
- Chain-of-Custody: Described in Section 4.3.

4.3 Sample and Document Custody Procedures

The various methods used to document field sample collection and laboratory operation are presented below.

4.3.1 Field Chain-of-Custody Procedures

Sample chain-of-custody refers to the process of tracking the possession of a sample from the time it is collected in the field through the laboratory analysis. A sample is considered to be under a person's custody if it is:

- In a person's physical possession;
- In view of the person after possession has been taken; or
- Secured by that person so no one can tamper with the sample, or secured by that person in an area restricted to authorized personnel.

A chain-of-custody form is used to record possession of a sample and to document analyses requested. Each time the sample bottles or samples are transferred between individuals, both the sender and receiver sign and date the chain-of-custody form. When a sample shipment is transported to the laboratory, a copy of the chain-of-custody form is included in the transport container (i.e., ice chest). The chain-of-custody forms are used to record the following information:

- Sample identification number;
- Sample collector's signature;
- Date and time of collection;
- Description of sample;
- Analyses requested;
- Shipper's name and address;

- Receiver's name and address; and
- Signatures of persons involved in chain-of-custody.

4.3.2 Laboratory Operations

The analytical laboratory has a system in place for documenting the following laboratory information:

- Calibration procedures;
- Analytical procedures;
- Computational procedures;
- QC procedures;
- Bench data;
- Operating procedures or any changes to these procedures; and
- Laboratory notebook policy.

Laboratory chain-of-custody procedures provide the following:

- Identification of the responsible party (sample custodian) authorized to sign for incoming field samples and a log consisting of sequential lab tracking numbers; and
- Specification of laboratory sample custody procedures for sample handling, storage, and internal distribution for analysis.

4.3.3 Corrections to Documentation

All original data are recorded in field notes and on chain-of-custody forms using indelible ink. Documents will be retained even if they are illegible or contain inaccuracies that require correction.

If an error is made on a document, the individual making the entry will correct the document by crossing a line through the error, entering the correct information, and initialing and dating the correction. Any subsequent error discovered on a document is corrected, initialed, and dated by the person who made the entry.

4.4 Equipment Calibration Procedures and Frequency

All instruments and equipment used during this project will be operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations. Operation, calibration, and maintenance will be performed by laboratory personnel fully trained in these procedures.

4.5 Analytical Procedures

All samples will be analyzed using essentially SW 846 analytical protocols for the parameters identified above in Section 3. Table D-2 lists analytical parameters and test methods.

4.6 Data Reduction, Validation, and Reporting

Reports generated in the field and laboratory will be included as an appendix to the draft and final RI Reports.

The Task Manager will assure validation of the analytical data. The laboratory generating analytical data for this project will be required to submit results that are supported by sufficient backup and QA/QC data to enable the reviewer to determine the quality of the data. Validity of the laboratory data will be determined based on the objectives outlined in Section 4.1—Quality Assurance Objectives for Data Management. Data validity will also be determined based upon the sampling procedures and documentation outlined in Sections 4.2 and 4.3 of this SAP. Upon completion of the review, the Task Manager will be responsible for assuring development of a QA/QC report on the analytical data. All data will be stored and maintained according to the standard procedures of the laboratory. The method of data reduction will be described in the final report.

4.7 Performance Audits

Performance audits are an integral part of an analytical laboratory's SOPs and are available upon request.

4.8 Corrective Actions

If the QC audit detects unacceptable conditions or data, the Project Manager will be responsible for developing and initiating corrective action. The Task Manager will be notified if the nonconformance is significant or requires special expertise. Corrective action may include the following:

- Reanalyzing the samples, if holding time criteria permit;
- Re-sampling and analyzing;
- Evaluating and amending sampling and analytical procedures; and
- Accepting data and acknowledging level of uncertainty or inaccuracy by flagging the data.

4.9 Quality Assurance Reports

The Task Manager will prepare a QA/QC evaluation of the data collected during the site investigation field activities for inclusion in the final report. In addition to an opinion regarding the validity of the data, the QA/QC evaluation will address the following:

- Any adverse conditions or deviations from the SAP;
- Assessment of analytical data for precision, accuracy, and completeness;
- Significant QA problems and recommended solutions; and
- Corrective actions taken for any problems previously identified.

Table D-1
Analytical Methods - Sample Container Requirements
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Analysis	Method	Container	Preservative	Storage Temperature	Holding Time
Groundwater Samples					
Gasoline-Range TPH Benzene Toluene Ethylbenzene Xylenes	NWTPH-G EPA 8260B	40 ml VOA (3)	HCl, pH<2	4°C	14 Days
Diesel-Range TPH Heavy Oil-Range TPH	NWTPH-Dx	1 L Amber (1)	HCl, pH<2	4°C	14 Days
1,2-Dibromoethane (EDB) 1,2-Dichloroethane (EDC) Diisopropyl Ether (DIPE) Ethyl tert-Butyl Ether (ETBE) Methyl tert-Butyl Ether (MTBE) tert-Amyl Methyl Ether (TAME) tert-Butyl Alcohol (TBA) Ethanol	EPA 8260B	40 ml VOA (2)	HCl, pH<2	4°C	14 Days
Total Lead Dissolved Lead (Field Filtered)	EPA 200 EPA 200	250 mL 250 mL	HNO_3 HNO_3	4°C 4°C	180 Days 180 Days

Acronyms:

EPA: Environmental Protection Agency
HCl: Hydrochloric Acid
VOA: Volatile Organic Analysis
TPH: Total Petroleum Hydrocarbons

Table D-2
Analytical Methods - Reporting Limit Goals
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

Method	Analyte	Reporting Limit Goal Groundwater [µg/L]
NWTPH-G	Gasoline-Range TPH	80
NWTPH-Dx	Diesel-Range TPH	250
	Heavy Oil-Range TPH	500
EPA 8260B	Benzene	0.50
	Toluene	0.50
	Ethylbenzene	0.50
	Xylenes	1.00
EPA 8260B	Methyl tertiary-Butyl Ether (MTBE)	5.00
	tert-Butyl Alcohol (TBA)	50.0

Note:
1. µg/L = Micrograms per liter.
2. TPH = Total petroleum hydrocarbons.

Ash Creek Standard Operating Procedures

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) provides instructions for standard field screening. Field screening results are used to aid in the selection of soil samples for chemical analysis. This procedure is applicable during all Ash Creek Associates (ACA) soil sampling operations.

Standard field screening techniques include the use of a photoionization detector (PID) to assess for volatile organic compounds (VOCs), for the presence of petroleum hydrocarbons using a sheen test, and for non-aqueous phase liquids (NAPLs) using dyes and UV light. These methods will not detect all potential contaminants, so selection of screening techniques shall be based on an understanding of the site history. The PID is not compound or concentration-specific, but it can provide a qualitative indication of the presence of VOCs. PID measurements are affected by other field parameters such as temperature and soil moisture.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- PID with calibration gas (record daily calibration/calibration check in field notes)
- Glass jars (with aluminum foil) or resealable bags
- NAPL Dye (such as OilScreen DNAPL-Lens) if needed for NAPL screening
- UV Light Box (if needed for NAPL screening)

3. METHODOLOGY

Each soil sample will be field screened for VOCs using a PID (with a 10.2 eV probe) and for the presence of petroleum hydrocarbons using a sheen test. If the presence of NAPLs is suspected, then screening using dye and UV light is also to be completed. The PID used on site will be calibrated on a daily basis according to the manufacturer's specifications. The PID is also used as a safety tool. The PID can be used to monitor air during activities where vapors may be present in the breathing space. Document all calibration activities and field observations. The field screening procedures are summarized below.

PID Calibration Procedure:

- Zero the PID using ambient air from the general area where the work will be done.
- A standard gas of 100 ppm isobutylene gas is then used to calibrate the PID. If questionable readings are encountered, the PID will be recalibrated using new 100 ppm isobutylene gas.

PID Screening Procedure:

- Place a representative portion (approximately one ounce) of freshly exposed, uncompacted soil into a clean resealable plastic bag or glass jar.
- Seal the bag or jar (with aluminum foil) and shake to expose vapors from the soil matrix.
- Allow the bag to sit to reach ambient temperature.
- Carefully insert the intake port of the PID into the plastic bag or jar.
- Record the sample concentration in the field notes.

Sheen Test Procedure:

- Following the PID screen, add enough water to the bag/jar to cover the sample.
- Observe the water surface for signs of discoloration/sheen and characterize.

No Sheen (NS)	No visible sheen on the water surface
Slight Sheen (SS)	Light, colorless, dull sheen, irregular spread, not rapid. Biological content may produce a slight sheen (typically platy/blocky).
Moderate Sheen (MS)	Light to heavy coverage, may have some color/iridescence, spread is irregular to flowing, few remaining areas of no sheen on water surface.
Heavy Sheen (HS)	Heavy sheen coverage with color/iridescence, spread is rapid, entire water surface may be covered with sheen.

NAPL Dye Procedure:

- Dye can be either liquid form, dissolvable tablet, or spray applied.
- Follow manufacturers instructions for specific product used.
- NAPL testing is completed after other field screening and sample collection is complete.
- For OilScreen DNAPL-Lens dye, the remaining soil sample is sprayed along its length so the soil surface is visibly wetted. A royal blue color of the dye about one minute after spraying would be considered a positive indication of NAPL.

UV Light Screening Procedure:

- UV Light Screening involves placement of a portion of the soil sample into a resealable plastic bag (which can be the same as used for PID screening, but before sheen test is performed).
- The sample is then examined in a dark space under UV light using a small, portable UV light box.
- The plastic bag is manipulated during examination to squeeze fluid against the bag beneath the lamp.
- Fluorescence (glowing color) indicates presence of NAPLs.

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) describes the methods for observing and sampling from push-probes (i.e., GeoProbe™). Subsurface soil cores may be obtained using this system for purposes of determining subsurface soil conditions and for obtaining soil samples for physical and/or chemical evaluation. Grab groundwater samples may be collected using temporary well screens. Soil vapor samples may be obtained using temporary well points. Shallow (less than 50 feet), small-diameter (2-inch max) pre-packed wells may also be installed using push-probe equipment. This procedure is applicable during all Ash Creek Associates (ACA) push-probe activities.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Traffic cones, measuring tape, spatula, and buckets/drums
- Sampling equipment (water level probe, pumps, tubing) and laboratory-supplied sample containers
- Field documentation materials
- Decontamination materials
- Personal protective equipment (as required by project Health and Safety Plan)

3. METHODOLOGY

Coring Procedure (Conducted by Drilling Subcontractor):

The sampling procedure includes driving a 2-inch outside-diameter, 5-foot-long, push-probe soil sampler to the desired depth using a combination of hydraulic pressure and mechanical hammer blows. When the sampling depth is reached, the pin attaching the sampler's tip is released (if a tip is used), which allows the tip to slide inside the sampler (Macro-Core Sampler with removable plastic liner). The sampler is driven the length of the sampler to collect a soil core, which is then withdrawn from the exploration. When the sampler is retrieved from the borehole the drive head/cutting shoe is detached and the liner is removed. Soil cores are collected continuously to the full depth of the exploration unless otherwise specified in a project-specific sampling and analysis plan (SAP). Verify that the subcontractor decontaminates the sampling device (per SOP 1.2) prior to its initial use and following collection of each soil sample.

Logging and Soil Sample Collection:

Remove the soil core from the sampler for field screening, description, and placement into sample jars. Soil samples will be collected for field screening and possible chemical analysis on two foot intervals unless otherwise specified in a project-specific SAP. The sampling interval will be determined in the field based on recovery, soil variability, and evidence of contamination. Complete field screening as specified in SOP-2.1. Soil samples should be collected using different procedures for volatile on non-volatile analyses, as follows.

- Volatile Analyses. Sampling for volatile organics analysis (VOA) is different than other routine physical or chemical testing because of the potential loss of volatiles during sampling. To limit volatile loss, the soil sample must be obtained as quickly and as directly as possible. If a VOA sample is to collected as part of a multiple analyte sample, the VOA sample portion will be obtained first. The VOA sample should be obtained from a discrete portion of the entire collected sample and should not be composited or homogenized. Sample bottles should be filled to capacity, with no headspace. Specific procedures for collecting VOA samples using the EPA Method 5035 are discussed in SOP 2.7.
- Other Analyses. Soil samples for non-volatile analyses will be thoroughly homogenized in a stainless steel bowl prior to bottling. Sample homogenizing is accomplished by manually mixing the entire soil

sample in the stainless steel bowl with a clean sampling tool until a uniform mixture is achieved. The sample jar should be filled completely.

Any extra soil generated during probing activities will be placed in Department of Transportation (DOT) approved drums.

Grab Groundwater Sample Collection:

Collect grab groundwater samples using a sampling attachment with a 4 to 5-foot-long temporary screen (specify to drillers whether to use decontaminated stainless steel or disposable PVC. Also, specify whether a filter pack is necessary based on field observations). Obtain samples using a peristaltic pump unless otherwise specified in the SAP with new tubing for each boring. Record field parameters (e.g., temperature, conductivity, and pH) prior to sampling.

Backfilling the Excavation (Conducted by Drilling Subcontractor):

After sampling activities are completed, abandon each exploration in accordance with Oregon Water Resources Department (OWRD) regulations and procedures. The abandonment procedure typically consists of filling the exploration with granular bentonite and hydrating the bentonite with water. Match the surface completion to the surrounding materials.