August 12, 2015

Andy Smith
Department of Ecology
Southwest Regional Office
Toxics Cleanup Program
PO Box 47775
Olympia, WA 98504-7775

Re: June 2015 Groundwater Monitoring Results
NuStar Vancouver Annex Terminal
Vancouver, Washington
1569-05

Dear Mr. Smith

Apex Companies LLC. (Apex) has prepared this June 2015 Groundwater Monitoring Results letter for the NuStar Terminals Operations Partnership, L.P. (NuStar) Annex Terminal located at 5420 NW Fruit Valley Road, Vancouver, Washington (the Site; Figure 1). On July 29, 2014, the Washington State Department of Ecology (Ecology) submitted the Project Coordinator's Decision (the Decision) to NuStar, documenting steps for additional investigation and monitoring to support the Feasibility Study (FS) of the Site. One of the provisions of the Decision was that Site groundwater monitoring wells would be sampled for four quarters, with results being submitted to Ecology in quarterly letter reports. This third quarterly letter summarizes the results of the June 2015 groundwater monitoring event.

GROUNDWATER MONITORING

On June 24, 2015, Apex conducted groundwater monitoring of Site monitoring wells MW-1 through MW-6, including gauging depth to groundwater, and groundwater sampling and analysis; locations of the wells are shown on Figure 2. Measurements of the depth to groundwater were collected from the wells prior to groundwater sampling and were measured to the nearest 0.01 foot using an electronic probe. Prior to groundwater sampling, wells were purged with a peristaltic pump while water quality parameters (pH, temperature, and specific conductance) were recorded. Purging was considered complete when the field parameters stabilized. Following purging, groundwater samples were collected using a peristaltic pump and dedicated tubing. Field notes are included in Attachment A.

The groundwater samples were analyzed for gasoline-range total petroleum hydrocarbons (TPHg) and diesel-range total petroleum hydrocarbons (TPHd) with silica gel cleanup; benzene, toluene, ethylbenzene, and total xylenes (BTEX); and methyl tert-butyl ether (MTBE) by Pace Analytical of Davis, California. Laboratory reports and a quality assurance/quality control (QA/QC) review are included in Attachment B.

Groundwater Elevations

Depth to groundwater ranged from between 18.43 and 31.92 feet, corresponding to groundwater elevations ranging from 8.16 to 8.23 feet above mean sea level (MSL). Groundwater elevations were within historical levels that have ranged from approximately 7.5 feet to 12 feet above MSL (Table 1). Monitoring wells MW-5 and MW-6 have not been surveyed, so well elevation, and therefore groundwater elevation information, for these wells is not available. The groundwater gradient measured during the June 2015 monitoring event was consistent with historical results and indicates a flat to slight gradient to the south (AMEC, 2002; SECOR, 2003; and Ash Creek, 2009, 2010). Groundwater isocontours are shown on Figure 3.

Analytical Results

Analytical results from the June 2015 groundwater monitoring event are summarized in Table 2 and on Figures 4 and 5. MTBE was not detected in groundwater samples from wells MW-1 and MW-3 through MW-6. MTBE was observed in well MW-2 at a concentration of 0.0428 milligrams per liter (mg/L), which exceeds the Model Toxics Control Act (MTCA) Method A cleanup level of 0.02 mg/L.

TPHd and oil-range total petroleum hydrocarbons (TPHo) were at or below detection limits in the groundwater samples from wells MW-1 through MW-4. The laboratory identified a few discreet peaks in the diesel hydrocarbon range in samples from wells MW-5 and MW-6; however, the laboratory confirmed that the peaks were not typical of a diesel hydrocarbon fingerprint. The laboratory chemist stated that the peaks were indicative of non-petroleum organic material, which is typically (but not always) filtered out during silica gel cleanup. While silica gel cleanup was performed on the TPHd analysis, it was not affective in removing all organic material from the sample. TPHg was not detected in the groundwater samples from wells MW-1 through MW-4. TPHg in wells MW-5 and MW-6 were detected at concentrations of 15.0 and 17.7 mg/L, respectively, which exceeds the MTCA Method A cleanup level for TPHg of 0.800 mg/L.

BTEX results were non-detect in the groundwater samples from wells MW-1 through MW-4. Benzene was detected at a concentration of 0.423 mg/L in the groundwater sample from MW-6, which exceeds the MTCA Method A cleanup level of 0.005 mg/L. Total xylenes in wells MW-5 and MW-6 were detected at concentrations of 1.51 and 1.92 mg/L, respectively, exceeding the MTCA Method A cleanup level of 1 mg/L; ethylbenzene, in well MW-6, exceeded the cleanup level of 0.7 mg/L with a concentration of 1.6 mg/L.

FUTURE WORK

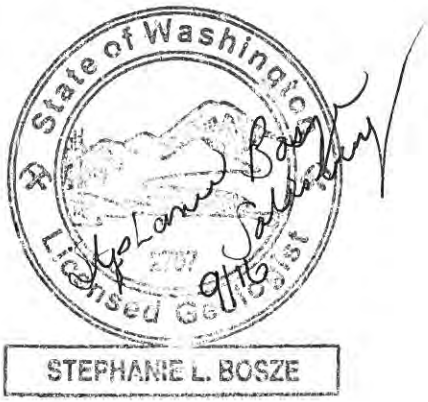
Monitoring wells MW-1 through MW-6 will be gauged and sampled in September 2015 using the same procedures summarized in the "Scope and Procedures" section, and the analytical results will be provided to Ecology in a quarterly results report within 45 days of receipt of analytical data from the laboratory.

On May 28, 2015, the *March 2015 Groundwater Monitoring Results and Groundwater Investigation Work Plan* was submitted to Ecology, documenting the results of the March 2015 groundwater monitoring event and proposing an additional investigation to evaluate the extent of hydrocarbon impacts in the vicinity of monitoring wells MW-5 and MW-6 (Apex, 2015). The investigation will be conducted during the third quarter of 2015 and the results will be submitted to Ecology along with the results of the September 2015 groundwater monitoring event. It is our understanding that NuStar will be required to install additional wells at the Site after the investigation data have been reviewed, and new wells will be surveyed along with existing wells MW-5 and MW-6 at that time.

The September 2015 monitoring event will conclude the four consecutive groundwater monitoring events required by the Decision. The monitoring well data from the four groundwater monitoring events and grab groundwater data from the additional site investigations, including the forthcoming investigation in the vicinity of wells MW-5 and MW-6, will be used to support the preparation of a Revised FS. NuStar/Apex will work with Ecology to establish a schedule for submittal of a Revised FS to Ecology.

If you have any questions regarding the contents of this letter, please do not hesitate to call either of the undersigned at (503) 924-4704.

Sincerely,



Stephanie Bosze Salisbury, L.G.
Project Geologist

Amanda Spencer
Principal Hydrogeologist

cc: Mr. Aaron Flett, NuStar Terminals Operations Partnership, L.P. (electronic deliverable)
Ms. Renee Robinson, NuStar Energy, L.P. (electronic deliverable)
Mr. Stephan Rosen, NuStar Energy, L.P. (electronic deliverable)

ATTACHMENTS

Table 1 – Groundwater Elevation Data
Table 2 – Analytical Results from Groundwater Monitoring Wells

Figure 1 – Site Location Map
Figure 2 – Site Plan
Figure 3 – Groundwater Elevations – June 2015
Figure 4 – June 2015, TPH Concentrations in Groundwater
Figure 5 – June 2015 BTEX and MTBE Concentrations in Groundwater
Figure 6 – Proposed Borehole Locations

Attachment A – Field Notes
Attachment B – Laboratory Analytical Results and Quality Assurance/Quality Control Review
Attachment C – Apex Standard Operating Procedure for Direct-Push Exploration

REFERENCES

AMEC, 2002a. *Phase II Environmental Site Assessment*, Cenex Harvest State Cooperatives. May 2002.

Apex Companies, LLC. (Apex), 2015. March 2015 Groundwater Monitoring Results and Groundwater Investigation Work Plan. Vancouver Annex Terminal, Vancouver, Washington, May 28, 2015.

Ash Creek Associates (Ash Creek), 2009. *Remedial Investigation Work Plan*. October 2009.

Ash Creek, 2010. *Remedial Investigation/Risk Assessment Report*. December 29, 2010.

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

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

Well Number	Date of Measurement	Top of Casing Elevation (feet above MSL)[1]	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
MW-1	05/14/02	NS	16.00	NS
	05/25/07	26.66	14.92	11.74
	08/24/07	26.66	18.67	7.99
	11/26/07	26.66	17.91	8.75
	02/27/08	26.66	16.92	9.74
	03/30/10	26.66	17.09	9.57
	09/01/10	26.66	19.19	7.47
	12/16/14	26.66	16.19	10.47
	03/25/15	26.66	15.25	11.41
	06/24/15	26.66	18.43	8.23
MW-2	05/14/02	NS	27.46	NS
	05/25/07	38.21	26.46	11.75
	08/24/07	38.21	30.17	8.04
	11/26/07	38.21	29.42	8.79
	02/27/08	38.21	28.50	9.71
	03/30/10	38.21	28.66	9.55
	09/01/10	38.21	30.74	7.47
	12/16/14	38.21	27.77	10.44
	03/25/15	38.21	26.79	11.42
	06/24/15	38.21	30.05	8.16
MW-3	05/14/02	NS	28.15	NS
	05/25/07	39.11	27.17	11.94
	08/24/07	39.11	31.04	8.07
	11/06/07	39.11	30.36	8.75
	02/27/08	39.11	28.71	10.40
	03/30/10	39.11	29.55	9.56
	09/01/10	39.11	31.65	7.46
	12/16/14	39.11	28.54	10.57
	03/25/15	39.11	27.72	11.39
	06/24/15	39.11	30.85	8.26
MW-4	05/14/02	NS	29.40	NS
	05/25/07	40.17	28.35	11.82
	08/24/07	40.17	32.12	8.05
	11/06/07	40.17	31.40	8.77
	02/27/08	40.17	30.40	9.77
	03/30/10	40.17	30.77	9.40
	09/01/10	40.17	32.62	7.55
	12/16/14	40.17	29.63	10.54
	03/25/15	40.17	28.76	11.41
	06/24/15	40.17	31.92	8.25
MW-5	12/16/14	NS	16.60	NS
	03/25/15	NS	15.37	NS
	06/24/15	NS	18.89	NS
MW-6	12/16/14	NS	16.93	NS
	03/25/15	NS	15.73	NS
	06/24/15	NS	19.34	NS

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
Analytical Results from Groundwater Monitoring Wells
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Sample Date	Screened Interval (feet bgs)	Concentrations in mg/L (ppm)																					
			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	Methanol
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	--
	12/16/14		<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0005	--	--	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	--	<0.050
	03/25/15		<0.250	<0.046	<0.093	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	<0.0005	--	--	--	--	--	--	--	--	--	--
	06/24/15		<0.250	<0.100	<0.250	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	<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	--
	12/16/14		<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0005	--	--	<0.005	<0.005	<0.0005	<0.0005	0.008	<0.0005	--	--	--	--	--	--	--	--	<0.050
	03/25/15		<0.250	<0.046	<0.091	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	<0.0005	--	--	--	--	--	--	--	--	--	--
	06/24/15		<0.250	<0.100	<0.250	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	0.0428	--	--	--	--	--	--	--	--	--	--
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	--
	12/16/14		<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0005	--	--	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	--	<0.050
	03/25/15		<0.418	<0.046	<0.092	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	<0.0005	--	--	--	--	--	--	--	--	--	--
	06/24/15		<0.250	0.120	<0.026	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	<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	--
	12/16/14		<0.250	<0.250	<0.500	<0.0005	<0.0005	<0.0005	<0.0005	--	--	<0.005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	--	--	--	--	--	--	--	--	<0.050
	03/25/15		<0.250	0.074	<0.091	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	<0.0005	--	--	--	--	--	--	--	--	--	--
	06/24/15		<0.250	<0.099	<0.250	<0.0005	<0.0005	<0.0005	<0.001	--	--	--	--	--	--	<0.0005	--	--	--	--	--	--	--	--	--	--
MW-5	12/16/14	10-25	15	0.350	<0.500	0.00070	0.00066	0.12	1.2	--	--	--	--	--	--	<0.0005	--	--	--	--	--	--	--	--	--	--
	03/25/15		18.1	<0.045	<0.091	<0.00050	0.00061	0.218	1.45	--	--	--	--	--	--	<0.0005	--	--	--	--	--	--	--	--	--	--
	06/24/15		15	0.33 D (see note)	<0.250	<0.0012	<0.0012	0.228	1.51	--	--	--	--	--	--	<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	NA

Please refer to notes at end of table.

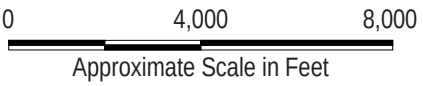
Table 2
Analytical Results from Groundwater Monitoring Wells
NuStar Terminals Operations Partnership, L.P. – Annex Terminal
Vancouver, Washington

Well Number	Sample Date	Screened Interval (feet bgs)	Concentrations in mg/L (ppm)																					
			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	Methanol
MW-5 DUP	12/16/14	10-25	15	<0.250	<0.500	0.00088	0.00081	0.18	1.3	--	--	--	--	--	--	<0.0005	--	--	--	--	--	--	--	--	--	--
	03/25/15		17.2	<0.046	<0.092	0.0005	0.00065	0.236	1.22	--	--	--	--	--	--	<0.0005	--	--	--	--	--	--	--	--	--	--
	06/24/15		16.8	0.560 D (see note)	<0.250	<0.0012	<0.0012	0.232	1.49	--	--	--	--	--	--	<0.0005	--	--	--	--	--	--	--	--	--	--
MW-6	12/16/14	10-25	15	<0.250	<0.500	0.47	0.065	1.3	2.6	--	--	--	--	--	--	<0.0005	--	--	--	--	--	--	--	--	--	--
	03/25/15		13.7	0.047	<0.092	0.516	0.0756	1.4	2.26	--	--	--	--	--	--	<0.0005	--	--	--	--	--	--	--	--	--	--
	06/24/15		17.7	1.2 D (see note)	<0.250	0.423	0.0582	1.6	1.92	--	--	--	--	--	--	<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	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).
11. bgs = below ground surface
12. The relative percent difference between TPHD concentrations in samples MW-5 and MW-5 DUP exceed the control limit of +/- 30%
13. D = Laboratory report noted discreet peaks that are not indicative of diesel. The laboratory chemist confirmed the peaks were from non-petroleum organic material.

Note: Base map prepared from USGS 7.5-minute quadrangle of Vancouver, WA, dated 2014 as provided by USGS.gov.



Site Location Map

June 2015 Groundwater Results Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

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

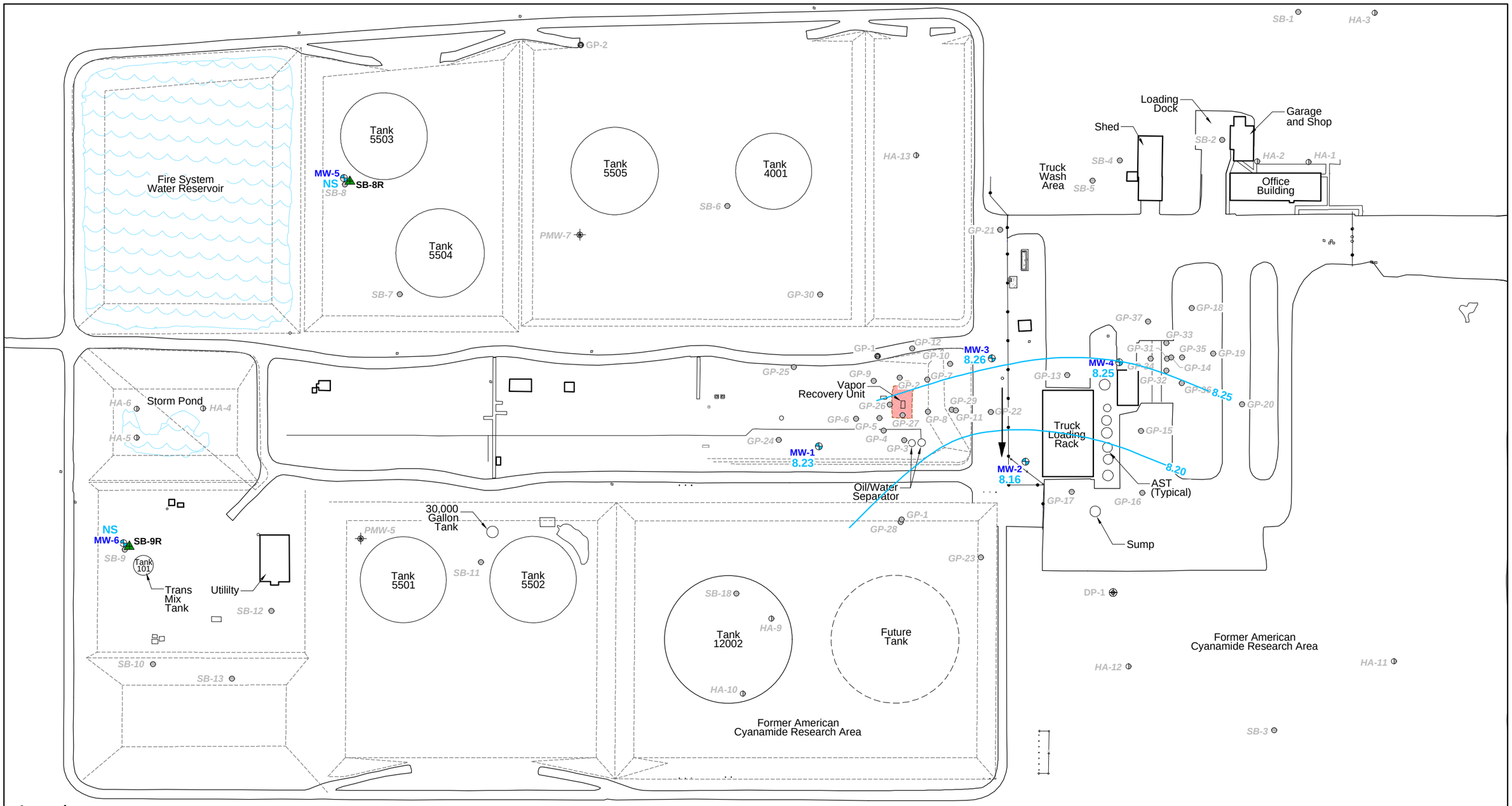
Project Number	1569-05	Figure
August 2015		1

Site Plan

June 2015 Groundwater Results Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

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

Project Number	1569-05	Figure
August 2015		2



Legend:

- MW-1 / 8.23 — Groundwater Monitoring Well Location and Groundwater Elevation in Feet Above Mean Sea Limit (MSL)
- 8.1 — Groundwater Elevation Contour
- NS — Not Surveyed
- Inferred Groundwater Flow Direction
- SB-8R — Direct-Push Geoprobe Location
- GP-1 — Soil Boring Location (September 2014)
- DP-1 — Grab Groundwater Sample 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

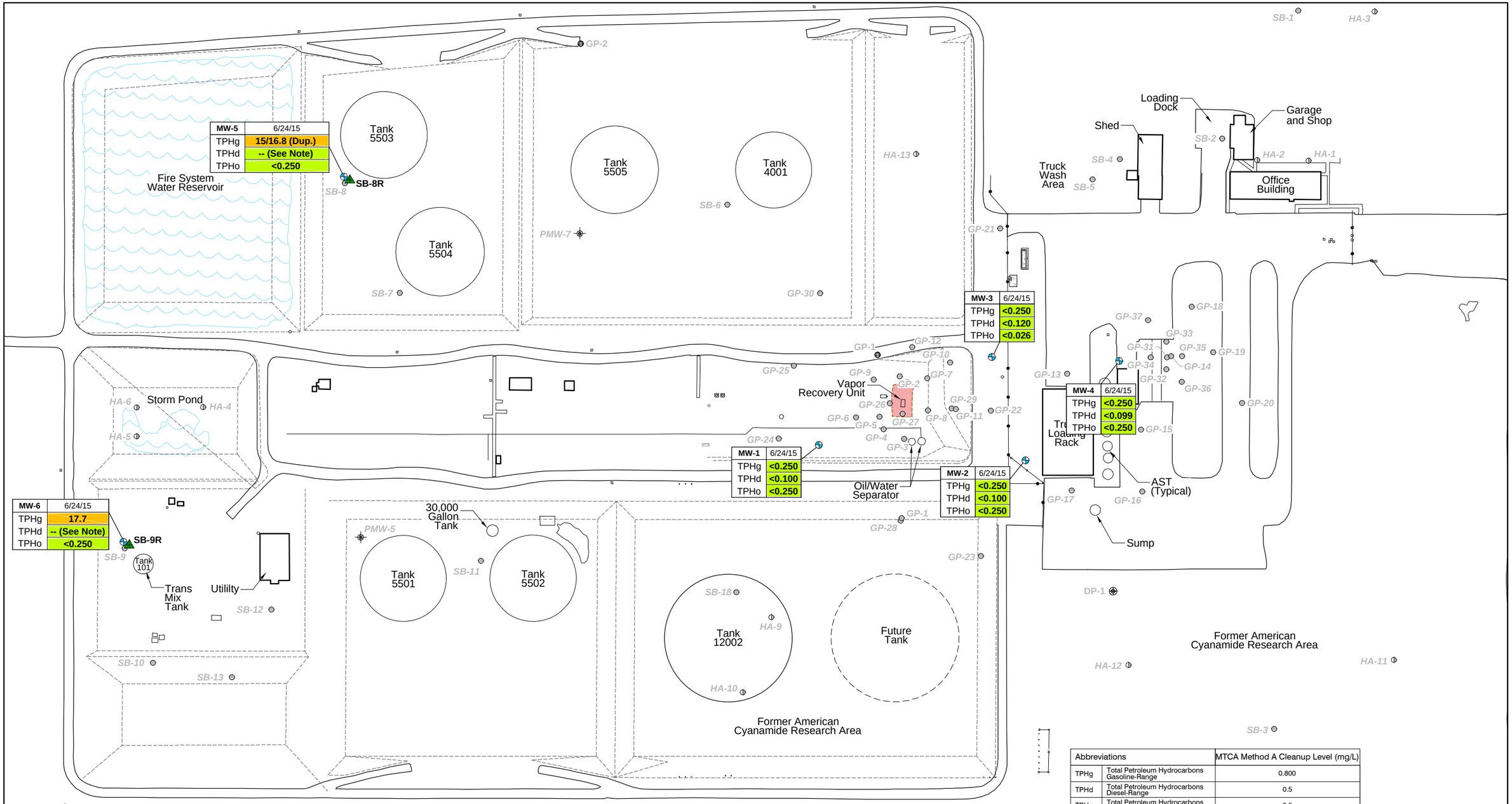
NOTE: Base map completed from a number of sources including but not limited to; Figure VAN1-21-002 provided by NuStar (1/8/2007) and a Monitoring Well Survey by Statewide Land Surveying, Inc (10/30/2007). Locations of roads and containments are approximate.

Groundwater Elevations - June 2015

June 2015 Groundwater Results Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

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

Project Number	1569-05	Figure
August 2015		3



Abbreviations		MTCA Method A Cleanup Level (mg/L)
TPHg	Total Petroleum Hydrocarbons Gasoline-Range	0.800
TPHd	Total Petroleum Hydrocarbons Diesel-Range	0.5
TPHo	Total Petroleum Hydrocarbons Heavy Oil-Range	0.5

Legend:

- **SB-8R** Soil Boring Location (September 2014)
- **MW-1** Groundwater Monitoring Well Location
- DP-1 Grab Groundwater Sample 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

MW-1	6/24/15
TPHg	<0.250
TPHd	<0.100
TPHo	<0.250

Sample Identification
Date Sampled
Concentration in mg/L
Analyte Sampled

-- A few discreet peaks were identified in the diesel range; however, the laboratory confirmed it was not indicative of diesel. The peak was more indicative of a non-petroleum organic material.

Concentration is Below MTCA Method A Cleanup Level

Concentration is Above MTCA Method A Cleanup Level

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.

TPH Concentrations in Groundwater - June 2015

June 2015 Groundwater Results Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

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

Project Number	1569-05	Figure
August 2015		4

Abbreviations	MTCA Method A Cleanup Level (mg/L)
BEN Benzene	0.005
TOL Toluene	1
ETH Ethylbenzene	0.7
XYL Xylenes	1
MTBE Methyl Tert-Butyl Ether	0.02

Legend:

- SB-8R ▲ Soil Boring Location (September 2014)
- MW-1 ⊕ Groundwater Monitoring Well Location
- DP-1 ⊕ Grab Groundwater Sample 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

MW-1	6/24/15
BEN	<0.0005
TOL	<0.0005
ETH	<0.0005
XYL	<0.001
MTBE	<0.0005

Sample Identification
Date Sampled
Concentration in mg/L
Analyte Sampled

Concentration is Below MTCA Method A Cleanup Level

Concentration is Above TCA Method A Cleanup Level

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.

BTEX and MTBE Concentrations in Groundwater - June 2015

June 2015 Groundwater Results Report
NuStar Terminals Operations Partnership, L.P. - Annex Terminal
Vancouver, Washington

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

Project Number	1569-05	Figure
August 2015		5

Attachment A

Field Notes

APEX
3015 SW First Avenue
Portland, Oregon 97201-4707
(503) 924-4704 Phone
(503) 943-6357 Fax

PROJECT NUMBER 1529-04
FIELD REPORT NUMBER —
PAGE 1 OF 1
DATE 6/24/05

PROJECT	Vancouver Annex	ARRIVAL TIME	0805
LOCATION	Vancouver, WA	DEPARTURE TIME	1335
CLIENT	NWStar	WEATHER	70°, cloudy
PURPOSE OF OBSERVATIONS	GWM		
APEX REPRESENTATIVE	CB	APEX PROJECT MANAGER	S. Boroe
CONTRACTOR	—	PERMIT NO.	190502
CONTRACTOR REP.	—	H&S REVIEW	✓

Our firm's professionals are represented on site solely to observe operations of the contractor identified, to form opinions about the adequacy of those operations, and to report those opinions to our client. The presence and activities of our field representative do not relieve any contractor from its obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods, operations, send sequence of construction. Unless signed by the Ash Creek Associates Project Manager, this report is preliminary. A preliminary report is provided solely as evidence that field observation was performed. Observations and/or conclusions and/or recommendations conveyed in the final report may vary from and shall take precedence over those included in a preliminary report.

0700 Apex, loading up
0805 on-site, call Andy @ gate
0830 permit obtained, begin gauging
0905 gauging complete, set up to sample on MW-5
0933 sample MW-5, MW-5 DUP
1000 Sample MW-6
1030 Sample MW-1
1117 Sample MW-3
1210 Sample MW-2 → peri not powerful enough to fill flow cell
- sample w/ no parameter readings
1245 Sample MW-4 → Same situation as MW-2
1310 done sampling, dump purge water in drum and pack up
1325 return to work permit
1375 off-site

BY
APEX REPRESENTATIVE

REVIEWED BY
APEX PROJECT MANAGER

WELL GAGING DATA SHEET

APEX

		Job Number:	1569-04
Client:	Astar	Date:	6/24/15
Project:	Va. Annex	Sampler:	CB
Weather:	70°, cloudy	Time In/Out:	

WATER LEVEL DATA

Well I.D.	Time	Depth to Free Product (feet)	Depth to Water (feet)	Depth to Well Bottom (feet)	Product Thickness (feet)	Water Column Height (feet)	Notes/Other Remarks
MW-3	0833	—	30.85				
MW-5	0838	—	18.89				
MW-6	0847	—	19.34				
MW-1	0852	—	18.43				
MW-2	0858	—	30.05				
MW-4	0903	—	31.92				

WELL MONITORING DATA SHEET

APEX

Well I.D.	MW-1	Job Number:	15769-04
Client:	NWStr	Date:	6/24/15
Project:	Vancouver Annex	Sampler:	CB
Weather:		Time In/Out:	

WELL DATA

Well Depth:		Well Diameter:	2"	Water Height	
Depth to Water:	18.43	Screened Interval:		x Multiplier	
Water Column Length:		Depth to Free Product:		x Casing Volumes	
Purge Volume:		Free Product Thickness:		= Purge Volume	
Water Height Multipliers (gal)	1-inch = 0.041	2-inch = 0.162	4-inch = 0.653	1 gallon = 3.785 liters	

PURGING DATA

Purge Method:	Peri	Pump Intake Depth:	23' off bottom	Comments
Sampling Method:	LF	Tubing Type:	LDPE	

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Turbidity (NTUs)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5° C	+/-5%	+/- 0.5 ppm	+/-20mV	+/-10%	<-- Stabilization Criteria
1017			18.43		6.64	17.58	75	3.20	42.6	—	Clear
1020			18.43		6.45	18.25	77	2.91	47.2	—	
1023			18.43		6.43	18.82	79	2.80	47.7	—	
1026			18.43		6.43	18.91	80	2.69	47.5	—	
1029		1 gal	18.43		6.43	18.85	80	2.58	46.8	—	

Clarity: VC = very cloudy, Cl = Cloudy, SC = slightly cloudy, AC = almost clear, C = clear

SAMPLING DATA

Sample ID:	MW-1	Sampling Flow Rate		Analytical Laboratory:	Pace
Sample Time:	1030	Final Depth to Water:	18.43	Did Well Dewater?	NO

# Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
6x VOA	HCl	VOC/6x10Y	yes (no)	—		—
			yes no			
			yes no			
			yes no			
			yes no			
			yes no			

COMMENTS

WELL MONITORING DATA SHEET

APEX

Well I.D.	MW-2	Job Number:	1565-04
Client:	Nustar	Date:	10/24/15
Project:	Uncon Assess	Sampler:	CS
Weather:		Time In/Out:	

WELL DATA

Well Depth:		Well Diameter:	2"	Water Height	
Depth to Water:	30.05	Screened Interval:		x Multiplier	
Water Column Length:		Depth to Free Product:		x Casing Volumes	
Purge Volume:		Free Product Thickness:		= Purge Volume	

Water Height Multipliers (gal)	1-inch = 0.041	2-inch = 0.162	4-inch = 0.653	1 gallon = 3.785 liters	

PURGING DATA

Purge Method:	Peri	Pump Intake Depth:	~3' off bottom	Comments
Sampling Method:	LF	Tubing Type:	LDPE	

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Turbidity (NTUs)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5° C	+/-5%	+/- 0.5 ppm	+/-20mV	+/-10%	<-- Stabilization Criteria
NO READINGS											

Clarity: VC = very cloudy, Cl = Cloudy, SC = slightly cloudy, AC = almost clear, C = clear

SAMPLING DATA

Sample ID:	MW-2	Sampling Flow Rate		Analytical Laboratory:	Pace	
Sample Time:		Final Depth to Water:	30.05	Did Well Dewater?	No	

# Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
6xVOA	HCl	VOC/6x/Bx	yes no			
			yes no			
			yes no			
			yes no			
			yes no			
			yes no			

COMMENTS

** Peri pump barely powerful enough to pull water - can't fill flow cell; sample @ 12:10 // no parameters taken

WELL MONITORING DATA SHEET

APEX

Well I.D.	MW-3	Job Number:	1569-04
Client:	NSTR	Date:	6/24/15
Project:	Vancouver Annex	Sampler:	CB
Weather:		Time In/Out:	

WELL DATA

Well Depth:	~~30.85~~	Well Diameter:	2"	Water Height	
Depth to Water:	30.85	Screened Interval:		x Multiplier	
Water Column Length:		Depth to Free Product:		x Casing Volumes	
Purge Volume:		Free Product Thickness:		= Purge Volume	
Water Height Multipliers (gal)	1-inch = 0.041	2-inch = 0.162	4-inch = 0.653	1 gallon = 3.785 liters	

PURGING DATA

Purge Method:	Peri	Pump Intake Depth:	~2' off bottom	Comments
Sampling Method:	LF	Tubing Type:	LDPE	

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Turbidity (NTUs)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5° C	+/-5%	+/- 0.5 ppm	+/-20mV	+/-10%	<-- Stabilization Criteria
1107			31.12		7.16	17.22	64	4.20	21.2	—	clear
1110			31.13		6.84	16.52	61	3.47	24.5	—	↓
1113			31.13		6.79	16.36	61	3.73	27.0	—	
1116		1/2 gal	31.13		6.75	16.28	61	3.61	29.2	—	

Clarity: VC = very cloudy, Cl = Cloudy, SC = slightly cloudy, AC = almost clear, C = clear

SAMPLING DATA

Sample ID:	MW-3	Sampling Flow Rate		Analytical Laboratory:	Pace	
Sample Time:	1117	Final Depth to Water:	31.13	Did Well Dewater?	NO	
# Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
6x VOA	HCl	VX/6x/Mx	yes (no)			
			yes no			
			yes no			
			yes no			
			yes no			
			yes no			

COMMENTS

WELL MONITORING DATA SHEET

APEX

Well I.D.	MW-4	Job Number:	15689.04
Client:	Nustar	Date:	6/24/15
Project:	Vancouver Annex	Sampler:	CB
Weather:		Time In/Out:	

WELL DATA

Well Depth:	[redacted]	Well Diameter:	2"	Water Height	
Depth to Water:	31.92	Screened Interval:		x Multiplier	
Water Column Length:		Depth to Free Product:		x Casing Volumes	
Purge Volume:		Free Product Thickness:		= Purge Volume	
Water Height Multipliers (gal)	1-inch = 0.041	2-inch = 0.162	4-inch = 0.653	1 gallon = 3.785 liters	

PURGING DATA

Purge Method:	Peri	Pump Intake Depth:	~3' off S. bottom
Sampling Method:	LF	Tubing Type:	LDPE

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Turbidity (NTUs)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5° C	+/-5%	+/- 0.5 ppm	+/-20mV	+/-10%	<-- Stabilization Criteria
NO READINGS											

Clarity: VC = very cloudy, CI = Cloudy, SC = slightly cloudy, AC = almost clear, C = clear

SAMPLING DATA

Sample ID:	MW-4	Sampling Flow Rate		Analytical Laboratory:	Pace
Sample Time:		Final Depth to Water:	31.92	Did Well Dewater?	(No)

# Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
6x VOA	HCl	VOC/Dup/6x	yes (no)			
			yes no			
			yes no			
			yes no			
			yes no			
			yes no			

COMMENTS

* peri pump barely powerful enough to pull water - can't fill flow cell; Sample @ 12:45 w/ no parameter readings

WELL MONITORING DATA SHEET

APEX

Well I.D.	MW-5	Job Number:	15269-04
Client:	Nustar	Date:	10/29/15
Project:	Vancouver Area	Sampler:	CB
Weather:		Time In/Out:	

WELL DATA

Well Depth:		Well Diameter:	2"	Water Height	
Depth to Water:	18.89	Screened Interval:		x Multiplier	
Water Column Length:		Depth to Free Product:		x Casing Volumes	
Purge Volume:		Free Product Thickness:		= Purge Volume	
Water Height Multipliers (gal)	1-inch = 0.041	2-inch = 0.162	4-inch = 0.653	1 gallon = 3.785 liters	

PURGING DATA

Purge Method:	Peri	Pump Intake Depth:	~3' off bottom	Comments
Sampling Method:	LF	Tubing Type:	LDPE	

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Turbidity (NTUs)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5° C	+/-5%	+/- 0.5 ppm	+/-20mV	+/-10%	<-- Stabilization Criteria
0920			19.77		8.65	15.15	87	4.51	-45.4	—	Clear
0923			20.13		8.10	15.31	89	3.00	-46.7	—	↓
0926			20.32		8.05	15.22	90	2.23	-51.8	—	↓
0929			20.50		8.00	15.21	91	2.00	-45.3	—	↓
0932		1/2 gal	20.68		7.95	15.20	91	1.81	-42.1	—	↓

Clarity: VC = very cloudy, Cl = Cloudy, SC = slightly cloudy, AC = almost clear, C = clear

SAMPLING DATA

Sample ID:	MW-5	Sampling Flow Rate		Analytical Laboratory:	Pace
Sample Time:	0933	Final Depth to Water:	20.68	Did Well Dewater?	No

# Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
12x VOA	HCl	VOC/8260	yes no	—		MW-5 DUP
			yes no			
			yes no			
			yes no			
			yes no			
			yes no			

COMMENTS

WELL MONITORING DATA SHEET

APEX

Well I.D.	MW-6	Job Number:	15609-04
Client:	Nustar	Date:	6/27/15
Project:	Vancouver Area	Sampler:	CB
Weather:		Time In/Out:	-

WELL DATA

Well Depth:		Well Diameter:	2"	Water Height	
Depth to Water:	19.34	Screened Interval:		x Multiplier	
Water Column Length:		Depth to Free Product:		x Casing Volumes	
Purge Volume:		Free Product Thickness:		= Purge Volume	
Water Height Multipliers (gal)	1-inch = 0.041	2-inch = 0.162	4-inch = 0.653	1 gallon = 3.785 liters	

PURGING DATA

Purge Method:	Peri	Pump Intake Depth:	~3' off bottom	Comments	
Sampling Method:	LF	Tubing Type:	LDPE		

Time	Volume Purged (liters)	Cumulative Volume Purged (liters)	DTW (btc)	Purge Rate (L/min)	pH	Temp (°C)	Cond (µS/cm)	DO (ppm)	ORP (mV)	Turbidity (NTUs)	Clarity/Color Other Remarks
					+/-0.1	+/-0.5° C	+/-5%	+/- 0.5 ppm	+/-20mV	+/-10%	<-- Stabilization Criteria
0950			20.30		8.42	15.63	98	3.52	-70.1	—	clear
0953			20.56		8.05	15.83	103	2.99	-65.5	—	↓
0956			20.80		8.01	15.73	107	2.82	-66.5	—	↓
0959		1/2 gal	20.95		7.96	15.68	107	2.70	-67.1	—	↓

Clarity: VC = very cloudy, Cl = Cloudy, SC = slightly cloudy, AC = almost clear, C = clear

SAMPLING DATA

Sample ID:	MW-6	Sampling Flow Rate		Analytical Laboratory:	Pace
Sample Time:	1000	Final Depth to Water:	20.95	Did Well Dewater?	No

# Containers/Type	Preservative	Analysis/Method	Field Filtered	Filter Size	MS/MSD	Duplicate ID
6x VOA	HCl	VOC/GRO/DRO	yes (no)			
			yes no			
			yes no			
			yes no			
			yes no			
			yes no			

COMMENTS

Attachment B

Laboratory Analytical Results and Quality Assurance/Quality Control Review

Attachment B – Laboratory Analytical Reports and Data Quality Review

This appendix documents the results of a quality assurance/quality control (QA/QC) review of the analytical data for groundwater samples collected during the June 2015 groundwater sampling event for the NuStar Terminals Operations Partnership, L.P. (NuStar) Vancouver Annex Facility (Facility) in Vancouver, Washington. Pace Analytical in Davis, California performed the analyses. A copy of each analytical laboratory report is included in this appendix.

The QA review included examination and validation of the laboratory summary report, including:

- Analytical methods;
- Detection limits;
- Sample holding times;
- Custody records;
- Surrogates, spikes, and blanks; and
- Duplicates.

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

Analytical Methods

Chemical analyses on collected water samples consisted of select volatile organic compounds (VOCs) and fuel oxygenates by U.S. Environmental Protection Agency (EPA) Method 8260B and total petroleum hydrocarbons – gasoline and diesel range (TPHg and TPHd) by Method NWTPH-Gx and NWTPH-Dx (with silica gel cleanup), respectively.

Quality Assurance Objectives and Review

The general QA objectives for this project were to develop and implement procedures for obtaining, evaluating, and confirming the usability of data of a specified quality for monitoring groundwater quality trends and SVE monitoring data at the site. To collect such information, analytical data must have an appropriate degree of accuracy and reproducibility, samples collected must be representative of actual field conditions, and samples must be collected and analyzed using unbroken chain-of-custody procedures.

Reporting limits and analytical results were compared to action levels for each parameter in the media of concern. Precision, accuracy, representativeness, completeness, and comparability parameters used to indicate data quality are defined below.

Reporting Limits. Detection limits are set by the laboratory and are based on instrumentation abilities, sample matrix, and suggested detection limits by the EPA or the Washington State Department of Ecology (Ecology). In some cases, the detection limits may be raised due to high concentrations of analytes in the samples or matrix interferences. Detection limits were generally consistent with industry standards and below promulgated regulatory standards when possible (if not raised, as previously discussed). Reporting limits were reviewed and are generally acceptable for this project.

Holding Times. Samples were analyzed within the holding times specified for the VOC and analyses.

Method Blanks. A method, or laboratory, blank is a sample prepared in the laboratory along with the actual samples and analyzed for the same parameters at the same time. It is used to assess if detected contaminants may have been the result of contamination of the samples in the laboratory. No analytes were detected in the laboratory method blanks.

Laboratory Control Samples and Laboratory Control Sample Duplicate. Laboratory Control Samples (LCS) were also analyzed by the laboratory to assess the accuracy of the analytical equipment. LCS are prepared from an analyte-free matrix that is then spiked with known levels of the constituents of interest (COI; i.e., a standard). The concentrations are measured and the results compared to the known spiked levels. This comparison is expressed as percent recovery. The LCS percent recovery was within control limits for all analytes.

In addition, a second laboratory control sample (the Laboratory Control Sample Duplicate [LCSD]) is prepared as above and analyzed. This is compared to the initial laboratory control sample to assess the precision of the analytical method (relative percent difference [RPD]). No LCSD samples were analyzed with this sample batch.

Matrix Spike Analyses. Matrix Spike (MS) analyses are performed on samples submitted to the laboratory that are of the same matrix as the actual sample. The MS is spiked with known levels of the COI. These analyses are used to assess the potential for matrix interference with recovery or detection of the COI and the accuracy of the determination. The spiked sample results are compared to the expected result (i.e., sample concentration plus spike amount) and reported as percent recovery. The MS recovery exceeded control limits for TPHd. Since the associated LCS was within recovery limits, no data were flagged.

In addition, a second matrix spike sample (the Matrix Spike Duplicate [MSD]) is prepared as above and analyzed. This is compared to the initial matrix spike sample to assess the precision of the analytical method (RPD). The percent recovery and RPD were within acceptable control limits.

Laboratory Duplicate. A laboratory duplicate is a second analysis of the QA/QC sample, which serves as an internal check on laboratory quality, as well as potential variability of the sample matrix. The laboratory duplicate is analyzed and compared to the primary sample analysis to assess the precision of the analytical method. This comparison can be expressed by the RPD between the original and duplicate samples. No laboratory duplicate was analyzed.

Surrogate Recovery. Surrogates are organic compounds that are similar in chemical composition to the COI and spiked into environmental and batch quality control samples prior to sample preparation and analysis. Surrogate recoveries for environmental samples are used to evaluate matrix interference on a sample-specific basis. The surrogate recovery associated with the TPHg and TPHd analysis for sample MW-6, was above control limits likely due to a matrix interference. Since the associated LCS was within control limits, no data were flagged.

Field Duplicate. A field duplicate is a second field sample collected from a selected monitoring well. Field duplicate samples serve as a check on laboratory quality as well as potential variability of the sample matrix. The field duplicate is analyzed and compared with the first sample to assess the precision of the analytical method. This comparison can be expressed by the RPD between the original and duplicate samples. A field duplicate was analyzed for sample MW-5 (MW-5 DUP) and TPHd was above the RPD limit of +/-30 percent (RPD=51%). TPHd results for the sample and duplicate were flagged with a "D" qualifier. Because the other analytes were within the RPD limit of +/-30 percent, and the matrix spike duplicates for the sample batch were within control limits, no other data were flagged.

Field Blank. A field blank is a sample of analyte-free water poured into a clean sample container in the field, preserved, and shipped to the laboratory with field samples. Field blanks assess the potential for contamination from field conditions during sampling. No field blank was analyzed.

Trip Blank. A trip blank is a clean sample of a matrix that is taken from the laboratory to the sampling site and transported back to the laboratory without having been exposed to sampling procedures. Trip blanks assess contamination introduced during shipping and field-handling activities. No analytes were detected in the trip blank.

Conclusion. In conclusion, the overall QA objectives have been met and the data are of adequate quality for use in this project.

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July 08, 2015

Stephanie Bosze-Salisbury
Apex Companies, LLC
3015 SW First Avenue
Portland, OR 97201

RE: Project: NuStar Vacouver GWM
Pace Project No.: 1249204

Dear Stephanie Bosze-Salisbury:
Enclosed are the analytical results for sample(s) received by the laboratory on June 25, 2015. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

Scott Forbes

Scott M Forbes
scott.forbes@pacelabs.com
Project Manager

Enclosures

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(530) 297-4800

CERTIFICATIONS

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

Davis Cerification IDs
2795 Second Street Suite 300 Davis, CA 95618
North Dakota Certification #: R-214
Oregon Certification #: CA300002
Washington Certification #: C926-14a
California Certification #: 08263CA

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
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(530) 297-4800

SAMPLE SUMMARY

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

Lab ID	Sample ID	Matrix	Date Collected	Date Received
1249204001	**MW-1**	Water	06/24/15 10:30	06/25/15 10:31
1249204002	**MW-2**	Water	06/24/15 12:10	06/25/15 10:31
1249204003	**MW-3**	Water	06/24/15 11:17	06/25/15 10:31
1249204004	**MW-4**	Water	06/24/15 12:45	06/25/15 10:31
1249204005	**MW-5**	Water	06/24/15 09:33	06/25/15 10:31
1249204006	**MW-5 DUP**	Water	06/24/15 09:33	06/25/15 10:31
1249204007	**MW-6**	Water	06/24/15 10:00	06/25/15 10:31
1249204008	**Trip Blank**	Water	06/24/15 00:00	06/25/15 10:31

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SAMPLE ANALYTE COUNT

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

Lab ID	Sample ID	Method	Analysts	Analytes Reported
1249204001	**MW-1**	NWTPH-Dx	DRM	3
		EPA 8260B	JMB	8
		NWTPH-Gx	JCP	4
1249204002	**MW-2**	NWTPH-Dx	DRM	3
		EPA 8260B	JMB	8
		NWTPH-Gx	JCP	4
1249204003	**MW-3**	NWTPH-Dx	DRM	3
		EPA 8260B	JMB	8
		NWTPH-Gx	JCP	4
1249204004	**MW-4**	NWTPH-Dx	DRM	3
		EPA 8260B	JMB	8
		NWTPH-Gx	JCP	4
1249204005	**MW-5**	NWTPH-Dx	DRM	3
		EPA 8260B	JMB	8
		NWTPH-Gx	JCP	4
1249204006	**MW-5 DUP**	NWTPH-Dx	DRM	3
		EPA 8260B	JMB	8
		NWTPH-Gx	JCP	4
1249204007	**MW-6**	NWTPH-Dx	CCB	3
		EPA 8260B	JMB	8
		NWTPH-Gx	JCP	4

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ANALYTICAL RESULTS

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

Sample: MW-1 **Lab ID: 1249204001** Collected: 06/24/15 10:30 Received: 06/25/15 10:31 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS, Silica Gel	Analytical Method: NWTPH-Dx Preparation Method: EPA 3510							
Diesel Fuel Range	ND	mg/L	0.10	1	06/26/15 15:37	06/26/15 19:36		M1
Motor Oil Range	ND	mg/L	0.25	1	06/26/15 15:37	06/26/15 19:36		
Surrogates								
n-Octacosane (S)	110	%.	70-130	1	06/26/15 15:37	06/26/15 19:36	630-02-4	
8260 MSV UST	Analytical Method: EPA 8260B							
Benzene	ND	ug/L	0.50	1		06/26/15 12:23	71-43-2	
Ethylbenzene	ND	ug/L	0.50	1		06/26/15 12:23	100-41-4	
Methyl-tert-butyl ether	ND	ug/L	0.50	1		06/26/15 12:23	1634-04-4	
Toluene	ND	ug/L	0.50	1		06/26/15 12:23	108-88-3	
Xylene (Total)	ND	ug/L	1.0	1		06/26/15 12:23	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	104	%.	70-130	1		06/26/15 12:23	17060-07-0	
Toluene-d8 (S)	103	%.	70-130	1		06/26/15 12:23	2037-26-5	
4-Bromofluorobenzene (S)	99	%.	70-130	1		06/26/15 12:23	460-00-4	
NWTPH-Gx MSV	Analytical Method: NWTPH-Gx							
TPH as Gas	ND	ug/L	250	1		07/03/15 14:32		
Surrogates								
1,2-Dichloroethane-d4 (S)	122	%.	70-130	1		07/03/15 14:32	17060-07-0	
Toluene-d8 (S)	96	%.	70-130	1		07/03/15 14:32	2037-26-5	
4-Bromofluorobenzene (S)	94	%.	70-130	1		07/03/15 14:32	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

Sample: MW-2 **Lab ID: 1249204002** Collected: 06/24/15 12:10 Received: 06/25/15 10:31 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS, Silica Gel	Analytical Method: NWTPH-Dx Preparation Method: EPA 3510							
Diesel Fuel Range	ND	mg/L	0.10	1	06/26/15 15:37	06/26/15 20:05		M1
Motor Oil Range	ND	mg/L	0.25	1	06/26/15 15:37	06/26/15 20:05		
Surrogates								
n-Octacosane (S)	110	%.	70-130	1	06/26/15 15:37	06/26/15 20:05	630-02-4	
8260 MSV UST	Analytical Method: EPA 8260B							
Methyl-tert-butyl ether	**42.8**	ug/L	0.50	1		06/26/15 12:48	1634-04-4	
Benzene	ND	ug/L	0.50	1		06/26/15 12:48	71-43-2	
Toluene	ND	ug/L	0.50	1		06/26/15 12:48	108-88-3	
Ethylbenzene	ND	ug/L	0.50	1		06/26/15 12:48	100-41-4	
Xylene (Total)	ND	ug/L	1.0	1		06/26/15 12:48	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	107	%.	70-130	1		06/26/15 12:48	17060-07-0	
Toluene-d8 (S)	96	%.	70-130	1		06/26/15 12:48	2037-26-5	
4-Bromofluorobenzene (S)	100	%.	70-130	1		06/26/15 12:48	460-00-4	
NWTPH-Gx MSV	Analytical Method: NWTPH-Gx							
TPH as Gas	ND	ug/L	250	1		07/03/15 12:56		
Surrogates								
1,2-Dichloroethane-d4 (S)	109	%.	70-130	1		07/03/15 12:56	17060-07-0	
Toluene-d8 (S)	98	%.	70-130	1		07/03/15 12:56	2037-26-5	
4-Bromofluorobenzene (S)	96	%.	70-130	1		07/03/15 12:56	460-00-4	

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ANALYTICAL RESULTS

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

Sample: MW-3 **Lab ID: 1249204003** Collected: 06/24/15 11:17 Received: 06/25/15 10:31 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS, Silica Gel	Analytical Method: NWTPH-Dx Preparation Method: EPA 3510							
Diesel Fuel Range	**0.12**	mg/L	0.10	1	06/26/15 15:37	06/26/15 20:34		DE,M1
Motor Oil Range	ND	mg/L	0.26	1	06/26/15 15:37	06/26/15 20:34		
Surrogates								
n-Octacosane (S)	116	%.	70-130	1	06/26/15 15:37	06/26/15 20:34	630-02-4	
8260 MSV UST	Analytical Method: EPA 8260B							
Benzene	ND	ug/L	0.50	1		06/26/15 21:32	71-43-2	
Ethylbenzene	ND	ug/L	0.50	1		06/26/15 21:32	100-41-4	
Methyl-tert-butyl ether	ND	ug/L	0.50	1		06/26/15 21:32	1634-04-4	
Toluene	ND	ug/L	0.50	1		06/26/15 21:32	108-88-3	
Xylene (Total)	ND	ug/L	1.0	1		06/26/15 21:32	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	99	%.	70-130	1		06/26/15 21:32	17060-07-0	
Toluene-d8 (S)	94	%.	70-130	1		06/26/15 21:32	2037-26-5	
4-Bromofluorobenzene (S)	98	%.	70-130	1		06/26/15 21:32	460-00-4	
NWTPH-Gx MSV	Analytical Method: NWTPH-Gx							
TPH as Gas	ND	ug/L	250	1		07/03/15 14:56		
Surrogates								
1,2-Dichloroethane-d4 (S)	127	%.	70-130	1		07/03/15 14:56	17060-07-0	
Toluene-d8 (S)	98	%.	70-130	1		07/03/15 14:56	2037-26-5	
4-Bromofluorobenzene (S)	98	%.	70-130	1		07/03/15 14:56	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

Sample: MW-4 **Lab ID: 1249204004** Collected: 06/24/15 12:45 Received: 06/25/15 10:31 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS, Silica Gel	Analytical Method: NWTPH-Dx Preparation Method: EPA 3510							
Diesel Fuel Range	ND	mg/L	0.099	1	06/26/15 15:37	06/26/15 21:04		M1
Motor Oil Range	ND	mg/L	0.25	1	06/26/15 15:37	06/26/15 21:04		
Surrogates								
n-Octacosane (S)	103	%.	70-130	1	06/26/15 15:37	06/26/15 21:04	630-02-4	
8260 MSV UST	Analytical Method: EPA 8260B							
Benzene	ND	ug/L	0.50	1		06/26/15 13:13	71-43-2	
Ethylbenzene	ND	ug/L	0.50	1		06/26/15 13:13	100-41-4	
Methyl-tert-butyl ether	ND	ug/L	0.50	1		06/26/15 13:13	1634-04-4	
Toluene	ND	ug/L	0.50	1		06/26/15 13:13	108-88-3	
Xylene (Total)	ND	ug/L	1.0	1		06/26/15 13:13	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	110	%.	70-130	1		06/26/15 13:13	17060-07-0	
Toluene-d8 (S)	101	%.	70-130	1		06/26/15 13:13	2037-26-5	
4-Bromofluorobenzene (S)	102	%.	70-130	1		06/26/15 13:13	460-00-4	
NWTPH-Gx MSV	Analytical Method: NWTPH-Gx							
TPH as Gas	ND	ug/L	250	1		07/03/15 15:20		
Surrogates								
1,2-Dichloroethane-d4 (S)	110	%.	70-130	1		07/03/15 15:20	17060-07-0	
Toluene-d8 (S)	97	%.	70-130	1		07/03/15 15:20	2037-26-5	
4-Bromofluorobenzene (S)	91	%.	70-130	1		07/03/15 15:20	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

Sample: MW-5 **Lab ID: 1249204005** Collected: 06/24/15 09:33 Received: 06/25/15 10:31 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS, Silica Gel	Analytical Method: NWTPH-Dx Preparation Method: EPA 3510							
Diesel Fuel Range	**0.33**	mg/L	0.10	1	06/26/15 15:37	06/26/15 21:33		DG,M1
Motor Oil Range	ND	mg/L	0.25	1	06/26/15 15:37	06/26/15 21:33		
Surrogates								
n-Octacosane (S)	109	%.	70-130	1	06/26/15 15:37	06/26/15 21:33	630-02-4	
8260 MSV UST	Analytical Method: EPA 8260B							
Benzene	ND	ug/L	1.2	2.5		06/26/15 14:02	71-43-2	
Ethylbenzene	**228**	ug/L	1.2	2.5		06/26/15 14:02	100-41-4	
Methyl-tert-butyl ether	ND	ug/L	1.2	2.5		06/26/15 14:02	1634-04-4	
Toluene	ND	ug/L	1.2	2.5		06/26/15 14:02	108-88-3	
Xylene (Total)	**1510**	ug/L	10.0	10		06/26/15 22:28	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	97	%.	70-130	2.5		06/26/15 14:02	17060-07-0	
Toluene-d8 (S)	99	%.	70-130	2.5		06/26/15 14:02	2037-26-5	
4-Bromofluorobenzene (S)	105	%.	70-130	2.5		06/26/15 14:02	460-00-4	
NWTPH-Gx MSV	Analytical Method: NWTPH-Gx							
TPH as Gas	**15000**	ug/L	2500	10		07/03/15 15:44		
Surrogates								
1,2-Dichloroethane-d4 (S)	109	%.	70-130	10		07/03/15 15:44	17060-07-0	
Toluene-d8 (S)	99	%.	70-130	10		07/03/15 15:44	2037-26-5	
4-Bromofluorobenzene (S)	106	%.	70-130	10		07/03/15 15:44	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

Sample: MW-5 DUP **Lab ID: 1249204006** Collected: 06/24/15 09:33 Received: 06/25/15 10:31 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS, Silica Gel	Analytical Method: NWTPH-Dx Preparation Method: EPA 3510							
Diesel Fuel Range	**0.56**	mg/L	0.10	1	06/26/15 15:37	06/26/15 22:02		DG,M1
Motor Oil Range	ND	mg/L	0.25	1	06/26/15 15:37	06/26/15 22:02		
Surrogates								
n-Octacosane (S)	110	%.	70-130	1	06/26/15 15:37	06/26/15 22:02	630-02-4	
8260 MSV UST	Analytical Method: EPA 8260B							
Benzene	ND	ug/L	1.2	2.5		06/26/15 14:27	71-43-2	
Ethylbenzene	**232**	ug/L	1.2	2.5		06/26/15 14:27	100-41-4	
Methyl-tert-butyl ether	ND	ug/L	1.2	2.5		06/26/15 14:27	1634-04-4	
Toluene	ND	ug/L	1.2	2.5		06/26/15 14:27	108-88-3	
Xylene (Total)	**1490**	ug/L	10.0	10		06/26/15 22:52	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	96	%.	70-130	2.5		06/26/15 14:27	17060-07-0	
Toluene-d8 (S)	98	%.	70-130	2.5		06/26/15 14:27	2037-26-5	
4-Bromofluorobenzene (S)	103	%.	70-130	2.5		06/26/15 14:27	460-00-4	
NWTPH-Gx MSV	Analytical Method: NWTPH-Gx							
TPH as Gas	**16800**	ug/L	2500	10		07/03/15 16:08		
Surrogates								
1,2-Dichloroethane-d4 (S)	108	%.	70-130	10		07/03/15 16:08	17060-07-0	
Toluene-d8 (S)	99	%.	70-130	10		07/03/15 16:08	2037-26-5	
4-Bromofluorobenzene (S)	101	%.	70-130	10		07/03/15 16:08	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

Sample: MW-6 **Lab ID: 1249204007** Collected: 06/24/15 10:00 Received: 06/25/15 10:31 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS, Silica Gel	Analytical Method: NWTPH-Dx Preparation Method: EPA 3510							
Diesel Fuel Range	**1.2**	mg/L	0.10	1	06/26/15 15:37	07/03/15 02:16		DG,M1
Motor Oil Range	ND	mg/L	0.25	1	06/26/15 15:37	07/03/15 02:16		
Surrogates								
n-Octacosane (S)	140	%.	70-130	1	06/26/15 15:37	07/03/15 02:16	630-02-4	S5
8260 MSV UST	Analytical Method: EPA 8260B							
Benzene	**423**	ug/L	2.5	5		06/26/15 15:17	71-43-2	
Ethylbenzene	**1580**	ug/L	2.5	5		06/26/15 15:17	100-41-4	
Methyl-tert-butyl ether	ND	ug/L	2.5	5		06/26/15 15:17	1634-04-4	
Toluene	**58.2**	ug/L	2.5	5		06/26/15 15:17	108-88-3	
Xylene (Total)	**1920**	ug/L	10.0	10		06/26/15 23:17	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	101	%.	70-130	5		06/26/15 15:17	17060-07-0	
Toluene-d8 (S)	100	%.	70-130	5		06/26/15 15:17	2037-26-5	
4-Bromofluorobenzene (S)	106	%.	70-130	5		06/26/15 15:17	460-00-4	
NWTPH-Gx MSV	Analytical Method: NWTPH-Gx							
TPH as Gas	**17700**	ug/L	2500	10		07/03/15 16:32		
Surrogates								
1,2-Dichloroethane-d4 (S)	107	%.	70-130	10		07/03/15 16:32	17060-07-0	
Toluene-d8 (S)	97	%.	70-130	10		07/03/15 16:32	2037-26-5	
4-Bromofluorobenzene (S)	104	%.	70-130	10		07/03/15 16:32	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
2795 Second Street - Suite 300
Davis, CA 95618
(530) 297-4800

QUALITY CONTROL DATA

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

QC Batch: DAOP/1227 Analysis Method: NWTPH-Dx
QC Batch Method: EPA 3510 Analysis Description: NWTPH-Dx GCS, Silica Gel
Associated Lab Samples: 1249204001, 1249204002, 1249204003, 1249204004, 1249204005, 1249204006, 1249204007

METHOD BLANK: 223402 Matrix: Water
Associated Lab Samples: 1249204001, 1249204002, 1249204003, 1249204004, 1249204005, 1249204006, 1249204007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Diesel Fuel Range	mg/L	ND	0.10	07/07/15 12:24	
Motor Oil Range	mg/L	ND	0.25	07/07/15 12:24	
n-Octacosane (S)	%.	120	70-130	07/07/15 12:24	

LABORATORY CONTROL SAMPLE: 223403

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Diesel Fuel Range	mg/L	.88	0.70	79	70-130	
n-Octacosane (S)	%.			110	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 223404 223405

Parameter	Units	1249204001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Diesel Fuel Range	mg/L	ND	.87	.9	0.64	0.63	65	62	70-130	1	25	M1
n-Octacosane (S)	%.						112	119	70-130			

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

QC Batch: DAVM/1646 Analysis Method: EPA 8260B
QC Batch Method: EPA 8260B Analysis Description: 8260 MSV UST-WATER
Associated Lab Samples: 1249204001, 1249204002, 1249204003, 1249204004, 1249204005, 1249204006, 1249204007

METHOD BLANK: 223328 Matrix: Water
Associated Lab Samples: 1249204001, 1249204002, 1249204003, 1249204004, 1249204005, 1249204006, 1249204007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Benzene	ug/L	ND	0.50	06/26/15 08:14	
Ethylbenzene	ug/L	ND	0.50	06/26/15 08:14	
Methyl-tert-butyl ether	ug/L	ND	0.50	06/26/15 08:14	
Toluene	ug/L	ND	0.50	06/26/15 08:14	
Xylene (Total)	ug/L	ND	1.0	06/26/15 08:14	
1,2-Dichloroethane-d4 (S)	%.	99	70-130	06/26/15 08:14	
4-Bromofluorobenzene (S)	%.	98	70-130	06/26/15 08:14	
Toluene-d8 (S)	%.	99	70-130	06/26/15 08:14	

LABORATORY CONTROL SAMPLE: 223329

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Benzene	ug/L	40	44.5	111	70-130	
Ethylbenzene	ug/L	40	47.4	119	70-130	
Methyl-tert-butyl ether	ug/L	40	42.1	105	70-130	
Toluene	ug/L	40	43.5	109	70-130	
Xylene (Total)	ug/L	120	133	110	70-130	
1,2-Dichloroethane-d4 (S)	%.			100	70-130	
4-Bromofluorobenzene (S)	%.			98	70-130	
Toluene-d8 (S)	%.			98	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 223330 223331

Parameter	Units	1249200001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Benzene	ug/L	10.9	40	40	54.1	53.5	108	106	70-130	1	25	
Ethylbenzene	ug/L	ND	40	40	43.4	43.5	108	108	70-130	0	25	
Methyl-tert-butyl ether	ug/L	133	40	40	173	164	101	79	70-130	5	25	
Toluene	ug/L	ND	40	40	41.1	41.0	102	102	70-130	0	25	
Xylene (Total)	ug/L	ND	120	120	118	120	98	100	70-130	2	25	
1,2-Dichloroethane-d4 (S)	%.						97	98	70-130			
4-Bromofluorobenzene (S)	%.						99	103	70-130			
Toluene-d8 (S)	%.						98	97	70-130			

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
2795 Second Street - Suite 300
Davis, CA 95618
(530) 297-4800

QUALITY CONTROL DATA

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

QC Batch: DAVM/1688 Analysis Method: NWTPH-Gx
QC Batch Method: NWTPH-Gx Analysis Description: NWTPH-Gx Water MSV
Associated Lab Samples: 1249204001, 1249204002, 1249204003, 1249204004, 1249204005, 1249204006, 1249204007

METHOD BLANK: 225052 Matrix: Water
Associated Lab Samples: 1249204001, 1249204002, 1249204003, 1249204004, 1249204005, 1249204006, 1249204007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
TPH as Gas	ug/L	ND	250	07/03/15 12:32	
1,2-Dichloroethane-d4 (S)	%.	110	70-130	07/03/15 12:32	
4-Bromofluorobenzene (S)	%.	96	70-130	07/03/15 12:32	
Toluene-d8 (S)	%.	97	70-130	07/03/15 12:32	

LABORATORY CONTROL SAMPLE: 225053

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
TPH as Gas	ug/L	480	422	88	70-130	
1,2-Dichloroethane-d4 (S)	%.			108	70-130	
4-Bromofluorobenzene (S)	%.			105	70-130	
Toluene-d8 (S)	%.			98	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 225056 225057

Parameter	Units	1249204002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
TPH as Gas	ug/L	ND	480	480	440	461	88	92	70-130	5	25	
1,2-Dichloroethane-d4 (S)	%.						109	118	70-130			
4-Bromofluorobenzene (S)	%.						101	101	70-130			
Toluene-d8 (S)	%.						99	99	70-130			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
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(530) 297-4800

QUALIFIERS

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

DE	Discrete peaks present, atypical for Diesel Fuel.
DG	Lower boiling hydrocarbons present, atypical for Diesel Fuel.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
S5	Surrogate recovery outside control limits due to matrix interferences (not confirmed by re-analysis).

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: NuStar Vacouver GWM
Pace Project No.: 1249204

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
1249204001	**MW-1**	EPA 3510	DAOP/1227	NWTPH-Dx	DASG/1217
1249204002	**MW-2**	EPA 3510	DAOP/1227	NWTPH-Dx	DASG/1217
1249204003	**MW-3**	EPA 3510	DAOP/1227	NWTPH-Dx	DASG/1217
1249204004	**MW-4**	EPA 3510	DAOP/1227	NWTPH-Dx	DASG/1217
1249204005	**MW-5**	EPA 3510	DAOP/1227	NWTPH-Dx	DASG/1217
1249204006	**MW-5 DUP**	EPA 3510	DAOP/1227	NWTPH-Dx	DASG/1217
1249204007	**MW-6**	EPA 3510	DAOP/1227	NWTPH-Dx	DASG/1217
1249204001	**MW-1**	EPA 8260B	DAVM/1646		
1249204002	**MW-2**	EPA 8260B	DAVM/1646		
1249204003	**MW-3**	EPA 8260B	DAVM/1646		
1249204004	**MW-4**	EPA 8260B	DAVM/1646		
1249204005	**MW-5**	EPA 8260B	DAVM/1646		
1249204006	**MW-5 DUP**	EPA 8260B	DAVM/1646		
1249204007	**MW-6**	EPA 8260B	DAVM/1646		
1249204001	**MW-1**	NWTPH-Gx	DAVM/1688		
1249204002	**MW-2**	NWTPH-Gx	DAVM/1688		
1249204003	**MW-3**	NWTPH-Gx	DAVM/1688		
1249204004	**MW-4**	NWTPH-Gx	DAVM/1688		
1249204005	**MW-5**	NWTPH-Gx	DAVM/1688		
1249204006	**MW-5 DUP**	NWTPH-Gx	DAVM/1688		
1249204007	**MW-6**	NWTPH-Gx	DAVM/1688		

CHAIN OF CUSTODY RECORD

1249204

APEX

Client Name: Apex/Ash Creek
Address: 3015 SW First Ave
City/State/Zip: Portland, OR 97201

Telephone Number: 503.924.4704
Fax No.: 503.943.6357

Project Manager: Stephanie Bosze Salisbury 503-924-4704 x1925
Project Name: NuStar Vacouver GWM
Project Number: 1569-04 T2
Sampler Name: C. Brackett

Analytical Lab: Pace
Report To: sbosze@apexcos.com
Page: 1 of 1

Sample ID / Description	Date Sampled	Time Sampled	No. of Containers Shipped	Grab	Composite	Field Filtered	Preservative: Ice	HNO_3 (Red Label)	HCl (Blue Label)	NaOH (Orange Label)	H_2SO_4 Plastic (Yellow Label)	H_2SO_4 Glass(Yellow Label)	None (Black Label)	Other (Specify)	Matrix: Groundwater	Wastewater	Drinking Water	Sludge	Soil	Other (specify):	Analyze For: TPH-diesel and heavy oil -NWTPG-Dx with silica gel clea	NWTPH-Gx	BTEX, MTBE ONLY by 8260B	RUSH TAT (Pre-Schedule)	Standard TAT	Fax Results	Send QC with report	
MW-1	6/24/15	1030	6	X			X		X						X						X	X	X		X			001
MW-2	6/24/15	1210	6	X			X		X						X						X	X	X		X			002
MW-3	6/24/15	1117	6	X			X		X						X						X	X	X		X			003
MW-4	6/24/15	1245	6	X			X		X						X						X	X	X		X			004
MW-5	6/24/15	933	6	X			X		X						X						X	X	X		X			005
MW-5 DUP	6/24/15	933	6	X			X		X						X						X	X	X		X			006
MW-6	6/24/15	1000	6	X			X		X						X						X	X	X		X			007

Special Instructions:

Method of Shipment: FexEx

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

Relinquished by: Name/Company	Date	Time	Received by: Name/Company	Date	Time
Chris Brackett / Apex Companies	6/24/2015	1500	Pace Analytical	06/25/15	1031
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

Pace Analytical	Document Name: Sample Condition Upon Receipt Form	Document Revised: 25Feb2015 Page 1 of 1
	Document No.: F-DAV-C-002-rev.02	Issuing Authority: Pace Davis, CA Quality Office

Sample Condition Upon Receipt

Client Name: Apex LLC

Project #: WO# : 1249204

1249204

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ OnTrac ☐ Other:

Tracking Number: 7739 1088 1120

Custody Seal on Cooler/Box Present? ☐ Yes ☒ No **Seals Intact?** ☐ Yes ☒ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other: **Temp Blank?** ☐ Yes ☒ No

Thermom. Used: ☒ DA1434 ☐ DA2285 **Type of Ice:** ☒ Wet ☐ Blue ☐ Dry Ice ☐ None ☐ Samples on ice, cooling process has begun

Cooler Temp Read(°C): 3.4 **Cooler Temp Corrected(°C):** 3.4 **Biological Tissue Frozen?** ☐ Yes ☐ No ☒ N/A

Temp should be above freezing to 6°C **Correction Factor:** 0 **Date and Initials of Person Examining Contents:** EW 06/25/15

				Comments:
Chain of Custody Present?	☒ Yes	☐ No	☐ N/A	1. 2 40ml vials labeled as Trip
Chain of Custody Filled Out?	☒ Yes	☐ No	☐ N/A	2. Blank with a date 7
Chain of Custody Relinquished?	☒ Yes	☐ No	☐ N/A	3. 6/24/15 were received. SR will
Sampler Name and/or Signature on COC?	☒ Yes	☐ No	☐ N/A	4. log it in as Sample -008 and
Samples Arrived within Hold Time?	☒ Yes	☐ No	☐ N/A	5. on Hold.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☒ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☒ No	☐ N/A	7.
Sufficient Volume?	☒ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☒ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☒ Yes	☐ No	☐ N/A	
Containers Intact?	☒ Yes	☐ No	☐ N/A	10.
Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☒ N/A	11. Note if sediment is visible in the dissolved container.
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: WT	☒ Yes	☐ No	☐ N/A	12.
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☒ N/A	13. ☐ HNO_3 ☐ H_2SO_4 ☐ NaOH ☐ HCl
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes	☐ No	☒ N/A	Sample #
Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC	☒ Yes	☐ No		Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐ Yes	☒ No	☐ N/A	14.
Trip Blank Present?	☒ Yes	☐ No	☐ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☒ No	☐ N/A	
Pace Trip Blank Lot # (if purchased):				

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: Scott Kerr **Date:** 6/26/15

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Attachment C

Apex Standard Operating Procedure for Direct-Push Exploration

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 Apex Companies, LLC (Apex) 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.