November 2, 2018

Mr. Jacek Anuszewski
Washington Department of Ecology - Water Quality Program
PO Box 47775
Olympia, WA 98504-7775

Subject: **State Waste Discharge Permit Application - Revision**
NuStar Terminals Operations Partnership, L.P.
5420 NW Fruit Valley Road
Vancouver, WA 98660

Mr. Anuszewski,

Attached is the revised NuStar Terminals Operations Partnership, L.P. of the State Waste Discharge Permit application per Ecology's October 12, 2018 request.

Please note this permit application contains information relevant to current operating design. If you have any question, please do not hesitate to contact me.

Sincerely,

Chris Chan
Sr. HSE Manager – WR
(916) 296-3853
Chris.Chan@NuStarEnergy.com

Enclosures

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WA State Department
of Ecology (SWRO)

DEPARTMENT OF ECOLOGY
State of Washington

Application for a State Waste Discharge Permit to Discharge Industrial Wastewater to Ground Water by Land Treatment or Application

This application is for a state waste discharge permit as required by Chapter 90.48 RCW and Chapter 173-216 WAC. Permit applications provide Ecology with information on pollutants in the waste stream, materials that may enter the waste stream, the flow characteristics of the discharge, and the site characteristics at the point of discharge.

Ecology may request additional information to clarify the conditions of this discharge. The applicant should reference information previously submitted to Ecology that applies to this application in the appropriate section.

SECTION A. GENERAL INFORMATION

1. Applicant name: **NuStar Terminals Operations Partnership L.P.**

2. Facility name: **NuStar Terminals Operations Partnership L.P.**
(if different from applicant)

3. Applicant mail address: **5420 NW Fruit Valley Road**
Street

Vancouver, WA **98660**
City/State Zip

4. Facility location address: **5420 NW Fruit Valley Road**
(if different from above)
Street

Vancouver, WA **98660**
City/State Zip

5. UBI No. **602364562**
Sometimes called a registration, tax, "C," or resale number, the Unified Business Identifier (UBI) number is a nine-digit number used to identify persons engaging in business activities. The number is assigned when a person completes a Master Business Application to register with or obtain a license from state agencies. The Departments of Revenue, Licensing, Employment Security, Labor and Industries, and the Corporations Division of the Secretary of State are among the state agencies participating in the UBI program.

6. Latitude/longitude of the processing facility as decimal degrees (NAD83/WGS84):
45.6617° N / **122.6932° W**

FOR ECOLOGY USE ONLY	Check One	New/Renewal ☐	Modification ☐
Date application received		Application/Permit no.	
Date application accepted		Date fee paid	

7. Person to contact who is familiar with the information contained in this application:

Michael Stevens, P.E.	Principal Engineer
Name	Title
503-924-4704 x1919	
Telephone number	Fax number

8. Check One:

☐ **Permit renewal** (including renewal of temporary permits authorized by RCW 90.48.200)

Does this application request a greater amount of wastewater discharge, a greater amount of pollutant discharge, or a discharge of different pollutants than specified in the last permit application for this facility? ☐ YES ☐ NO

For permit renewals, the current permit is an attachment, by reference, to this application.

☐ **Permit modification** ☒ **Existing unpermitted discharge** ☐ **Proposed discharge**

Anticipated date of discharge: _____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and/or imprisonment for knowing violations.

Signature*	11/9/2018	General Manager
	Date	Title

Jerome Jackson
Printed name

*Applications must be signed as follows: Corporations, by a principal executive officer of at least the level of vice-president; partnership, by a general partner; sole proprietorship, by the proprietor. If these titles do not apply to your organization, the person who makes budget decisions for this facility must sign the application.

The application signatory may delegate signature authority for submittals required by the permit, such as monthly reports, to a suitable employee. You can delegate this authority to a qualified individual or to a position, which you expect to fill with a qualified individual. If you wish to delegate signature authority, please complete the following:

	11/2/2018	Sr. HSE Manager
Signature of delegated employee	Date	Title or function at the facility

Chris Chan
Printed name

SECTION B. PRODUCT INFORMATION

1. Briefly describe all manufacturing processes and products, and/or commercial activities at this facility. Provide the applicable Standard Industrial Category (SIC) and the North American Industry Classification System (NAICS) Code(s) for each activity (see *North American Industrial Classification System,* 2007 ed.). You can find the 1997 NAICS codes and the corresponding 1987 Standard Industry Category (SIC) codes at (http://www.census.gov/epcd/naics/frames3.htm).

Description: No manufacturing processes at this site. This facility serves only as terminal warehousing finished products owned by the customers. SIC 4226 and NAICS 493190

2. List raw materials and products:

Type	RAW MATERIALS	Quantity
Potatoes (Example)		*20 million tons per year*
This facility is a specialty warehouse for a variety of finished petroleum and other products owned by customers. Volumes and types of products may vary.		**Maximum Total Storage Capacity: 438,412 bbl**

Type	PRODUCTS	Quantity
French fries (Example)		*10 million pounds per year*
Not a process facility.		

SECTION C. PLANT OPERATIONAL CHARACTERISTICS

1. For each process listed in B.1that generates wastewater, list the process, assign the waste stream a name and ID #, and describe whether it is a batch or continuous flow.

Process	Waste Stream Name	Waste Stream ID#	Batch (B) or Continuous (C) Process
Receiving raw potatoes (Example)	*Mud Water*	*1*	*C*
Non-Contact Stormwater	**Non-Contact Stormwater**	1	**Batch**

2. On a separate sheet, produce a schematic drawing showing production processes and water flow through the facility and wastewater treatment devices *(label as attachment C2)*. The drawing should indicate the source of intake water and the operations contributing wastewater to the effluent and should label the treatment units. Construct the water balance by showing average flows between intakes, operations, treatment units, and points of discharge to land. If a water balance cannot be determined *(e.g., for certain mining activities)*, provide a description of the nature and amount of any sources of water and any collection or treatment measures.

3. What is the highest daily discharge flow from the processing facility:
(Specify the time period for the value given)

NA gallons per **day**

What is the highest daily discharge flow to the sprayfields/infiltration basin:
(Specify the time period for the value given)

inches/acre/month OR **650,900 (design storm)** gallons per day

What is the highest average monthly discharge flow (daily flows averaged over a month) from the processing facility:
(Specify the time period for the value given)

NA gallons/day?

What is the highest average monthly discharge flow to the ~~sprayfields~~: **(Infiltration Pond)**
(Specify the time period for the value given)

inches/acre/month OR **34,630 (annual average)** gallons per day

4. Describe any planned wastewater treatment or sprayfield/infiltration improvements and the schedule for the improvements or changes. *(Use additional sheets, if necessary and label as attachment C4.)*

There are no planned treatment or infiltration improvements.

Note: The highest daily discharge flow is calculated from the 24-hour, 6-month design storm event. The "average monthly discharge flow to the sprayfields" is not applicable, so have replaced this with the calculated discharge flow to the Infiltration Pond. Does not include volume of contact water from the truck rack area or tank bottoms which is collected and transported off site for disposal.

5. If ~~production processes~~ **(stormwater infiltration)** are subject to seasonal variations, provide the following information. List discharge for each wastestream in gallons or million gallons per month. The combined value for each month should equal the estimated total monthly flow. Please indicate the proper unit by checking one of the following boxes:

☐ gallons per day ☐ gallons per month ☒ million gallons per month

Waste Stream ID#	MONTHS											
	J	F	M	A	M	J	J	A	S	O	N	D
#1 (Example)	*1000*	*1000*	*1000*	*1000*	*6000*	*2000*	*2000*	*2000*	*1000*	*1000*	*5000*	*4000*
1	2.64	1.70	1.29	0.32	0	0	0	0	0	0.94	2.85	2.90
Estimated total gallons												

6. If this is a discharge from the processing facility to a storage or evaporative lagoon, what is the size of the lagoon (give square footage for the bottom of the lagoon and the total volume of the lagoon at full operating depth). *10,000 square feet; 10 million gallons (Example)*

Stormwater from the Lined Containment area is directed to the lined stormwater / fire system pond (which together have an area of about 182,000 square feet, or about 42 percent of the total containment area). The lined stormwater / fire system pond has an estimated capacity of about 5.1 million gallons and a monthly input flow of up to 0.7 million gallons (from just the Lined Containment and Stormwater Pond footprints). Facility history has shown the stormwater / fire system pond to only occasionally flow into the adjacent overflow pond (which is an additional infiltration area).

7. Check the applicable box. Is this is a discharge to a sprayfield ☐ or an infiltration bed ☒? Provide the average gallons per acre per day proposed for each month in the following table.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept.	Oct	Nov	Dec
Estimated gallons per acre per day	4,805	3,411	2,341	609	0	0	0	0	0	1,714	5,351	5,278

Notes: * Monthly flow totals calculated for #5 and #7 are based on published averages for precipitation in Vancouver, WA, less the pan evaporation rates published by US Bureau of Reclamation (Agrimet, Aurora Station). Several months result in higher evaporation rates than normal rainfall (i.e., a net loss, reflected as "0" infiltration).

*** Storage capacity of containment areas is in excess of 23,500,000 gallons, which is sufficient to contain annual stormwater volume (not accounting for infiltration/evaporation).**

8. How many hours a day does this facility typically operate? **24**
   How many days a week does this facility typically operate? **7**
   How many weeks per year does this facility typically operate? **52**

9. List all incidental materials such as oil, paint, grease, solvents, and cleaners that are used or stored on site (list only those with quantities greater than 10 gallons for liquids and 50 pound quantities for solids). For solvents and solvent-based cleaners, include a copy of the material safety data sheet for each material and estimate the quantity used. *Use additional sheets, if necessary and label as attachment C.7.)*

   Materials/Quantity Stored: This facility stores oil and paint for maintenance inside covered warehouse. Fire foam is also presence in this facility for emergency response.

10.	Some types of facilities are required to have spill or waste control plans. Does this facility have:	Yes	No
a.	A spill prevention, control, and countermeasure plan (40 CFR 112)?	☒	☐
b.	An Oil Spill Contingency Plan (chapter 173-182 WAC)?	☒	☐
c.	An emergency response plan (per WAC 173-303-350)?	☒	☐
d.	A runoff, spillage, or leak control plan (per WAC 173-216-110(f))?	☒	☐
e.	Any spill or pollution prevention plan required by local, state or federal authorities? If yes specify: **Washington Combined Plan (SPCC)**	☒	☐
f.	A solid waste control plan?	☐	☒

SECTION D. WATER CONSUMPTION AND WATER LOSS

1. Potable water source(s):

☒☐ Public system (Specify name) **Potable water does not contribute to waste water subject to this permit application.**

☐☐ Private well ☐ Surface water (Specify name of water body) _____

a. Water right permit number: _____

b. Legal description of water source:

_____ ¼S, _____ ¼S, _____, Section, _____ TWN, _____ R

2. Potable water use

a. Indicate total water use: Gallons per day (average) **De-Minimus (Domestic Only)**

Gallons per day (maximum) _____

b. Is water metered? ☐ YES ☐ NO

3. Supplemental Irrigation water source(s):

☐☐ Public system or Irrigation District (Specify name) _____

☐☐ Private well ☐ Surface water (Specify name of water body) _____

a. Water right permit number: _____

b. Legal description of water source:

_____ ¼S, _____ ¼S, _____, Section, _____ TWN, _____ R

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SECTION E. WASTEWATER INFORMATION

1. How are the water intake and effluent flows measured?

   Intake: **"Intake" or water generation is exclusively from precipitation and flow is not measured on-site (data from local climate/weather stations are used as needed for determining input flow rates).**

   Effluent **"Effluent" water is either evaporated or infiltrated across the site (excepting at the truck rack and tank bottom water, which are collected and transported off-site for disposal). Flow rates are not measurable, but are calculated from published precipitation and pan evaporation rates (as per note on Page 5).**

2. Describe the collection method for the samples analyzed below. (*i.e.*, grab, 24-hour composite). Applicants must collect grab samples (not composites) for analysis of pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, fecal coliform (including E. coli), and Enterococci (previously known as fecal streptococcus at § 122.26 (d)(2)(iii)(A)(3)), or volatile organics.

   The water accumulated in the stormwater / fire system pond would be representative of stormwater quality at the facility, and the previous sampling (summarized herein) includes the collection of grab samples from the stormwater / fire system pond.

3. Has the effluent been analyzed for any other parameters than those identified in question E.4.? ☒ YES ☐ NO
   If yes, attach results and label as attachment E.4. This data must clearly show the date, method and location of sampling. *(Note: Ecology may require additional testing.)* [Additional analyses include VOCs and SVOCs; all results have been non-detect]

4. Provide measurements or range of measurements for treated wastewater prior to discharge to the POTW for the parameters with an "X" in the left column. If you obtain the application from the internet, contact Ecology's regional office to see if testing for a subset of these parameters is permissible. All analyses (except pH) must be conducted by a laboratory registered or accredited by Ecology (WAC 173-216-125). If this is an application for permit renewal, provide data for the last year for those parameters that are routinely measured. For parameters measured only for this application, place the values under "Maximum." Report the values with units as specified in the parameter name or in the detection level.

   The Permittee must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table unless Ecology approves an alternate method or the method used produces measurable results in the sample and EPA has listed it as an EPA approved method in 40 CFR Part 136. If the Permittee uses an alternative method as allowed above, it must report the test method, DL, and QL on the discharge monitoring report or in the required report.

Note: The proposed sampling program would include the collection of samples from water being released from the Lined Containment area. The samples would be analyzed for TPH and VOCs. Other analytes (such as residual chlorine and fecal coliform) would not be applicable to the water source and site use. Consistent with other similar permits, the sampling program is proposed to be completed quarterly.

X	Parameter	Measurement Values			Number of Analyses	Analytical Method Std. Methods 19th,20th edition or EPA	Detection Limit/Quantitation Level
		Minimum	Maximum	Average			
	BOD (5 day)					SM 5210 B	/2 mg/l
	COD					SM 5220 D	/10 mg/l
	Total suspended solids					SM 2540 D	/5 mg/l
	Fixed Dissolved Solids					SM 2540 E	
	Total dissolved solids					SM 2540 C	
	Conductivity (micromhos/cm)					SM 2510 B	
	Ammonia-N as N					SM 4500-NH_3 C	/0.3 mg/L
	pH					SM 4500-H	0.1 standard units
	Fecal coliform (organisms/100 mL)					SM 9221 E or 9222 D	
	Total coliform (organisms/100 mL)					SM 9221 B or 9222 B	
	Dissolved oxygen					SM 4500-O C/G	
	Nitrate + nitrite-N as N					SM 4500-NO_3 E	100 µg/L
	Total kjeldahl N as N					SM 4500-N_{org} C/E/FG	300 µg/l
	Ortho-phosphate-P as P					SM 4500-P E/F	10 µg/l
	Total-phosphorous-P as P					SM 4500-P E/P/F	10 µg/l
	Total Oil & grease					EPA 1664A	1.4/5 mg/l
X	NWTPH - Dx	ND (<250)	ND (<250)	<250 µg/L	2	Ecology NWTPH Dx	250/250 µg/l
X	NWTPH - Gx	ND (<250)	ND (<250)	<250 µg/L	2	Ecology NWTPH Gx	250/250 µg/l
	Calcium					EPA 200.7	10 µg/l

X	Parameter	Measurement Values			Number of Analyses	Analytical Method Std. Methods 19th,20th edition or EPA	Detection Limit/Quantitation Level
		Minimum	Maximum	Average			
	Chloride					SM 4500-Cl C	0.15 µg/l
	Fluoride					SM 4500-F E	.025/0.1 mg/l
	Magnesium					EPA 200.7	10/50 µg/l
	Potassium					EPA 200.7	700/ µg/l
	Sodium					EPA 200.7	29/ µg/l
	Sulfate					SM 4500-SO_4 C/D	/200 µg/l
	Alkalinity as $CaCO_3$					SM 2320 B	/5 mg/L as $CaCO_3$
X	Arsenic(total)	ND (<0.5)	1.27	0.89 µg/L	2	EPA 200.8	0.1/0.5 µg/l
X	Barium (total)	5.84	21.1	13.5 µg/L	2	EPA 200.8	0.5/2 µg/l
X	Cadmium (total)	ND (<0.02)	ND (<0.02)	<0.02 µg/L	2	EPA 200.8	.05/.25 µg/l
X	Chromium (total)	ND (<0.2)	0.94	0.57 µg/L	2	EPA 200.8	0.2/1 µg/l
X	Copper (total)	2.02	2.19	2.11 µg/L	2	EPA 200.8	0.4/2 µg/l
	Iron (total)					EPA 200.7	12.5/50 µg/l
X	Lead (total)	0.111	0.895	0.503 µg/L	2	EPA 200.8	0.1/.5 µg/l
	Manganese (total)					EPA 200.8	0.1/0.5 µg/l
X	Mercury (total) pg/L	ND (<0.2)	ND (<0.2)	<0.2 µg/L	2	EPA 1631E	0.2/0.5 pg/l
	Molybdenum(total)					EPA 200.8	0.1/0.5 µg/l
X	Nickel(total)	0.31	0.84	0.58 µg/L	2	EPA 200.8	0.1/0.5 µg/l
X	Selenium (total)	ND (<1.0)	ND (<1.0)	< 1.0 µg/L	2	EPA 200.8	1/1 µg/l
X	Silver (total)	ND (<0.02)	ND (<0.02)	<0.02 µg/L	2	EPA 200.8	.04/.2 µg/l
X	Zinc (total)	ND (<0.5)	3.60	2.1 µg/L	2	EPA 200.8	0.5/2.5 µg/l

Detection level (DL) or detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure given in 40 CFR part 136, Appendix B.

Quantitation Level (QL) also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1, 2, or 5) x 10^n, where n is an integer. (64 FR 30417).
ALSO GIVEN AS:
The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

Note: Detected metals concentrations have consistently been below MTCA A Cleanup Levels and MCLs (which are applicable as there is no potential for stormwater to impact surface water). Other analyses have included SVOCs (EPA Method 8270D) and VOCs (EPA Method 8260C), both of which were non-detect for all analytes.

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5. Does this facility use any of the following chemicals as raw materials in production, produce them as part of the manufacturing process, or are they present in the wastewater? (*The number following the chemical name is the Chemical Abstract Service (CAS) reference number to aid in identifying the compound.*) ☐ YES ☒ NO

If yes, specify how the chemical is used and the quantity used or produced *(Use additional sheets, if necessary and label as attachment E5.)*:

Petroleum products are stored on-site, but water has been tested for VOCs and SVOCs with no detections.

Acrylamide/79-06-1
Acrylonitrile/107-13-1
Aldrin/309-00-2
Aniline/62-53-3
Aramite/140-57-8
Arsenic/7440-38-2
Azobenzene/103-33-3
Benzene/71-43-2
Benzidine/92-87-5
Benzo(a)pyrene/50-32-8
Benzotrichloride/98-07-7
Benzyl chloride/100-44-7
Bis(chloroethyl)ether/111-44-4
Bis(chloromethyl)ether/542-88-1
Bis(2-ethylhexyl) phthalate/ 117-81-7
Bromodichloromethane/75-27-4
Bromoform/75-25-2
Carbazole/86-74-8
Carbon tetrachloride/56-23-5
Chlordane/57-74-9
Chlorodibromomethane/124-48-1
Chloroform/67-66-3
Chlorthalonil/1897-45-6
2,4-D/94-75-7
DDT/50-29-3
Diallate/2303-16-4
1,2 Dibromoethane/106-93-4
1,4 Dichlorobenzene/106-46-7
3,3' Dichlorobenzidine/91-94-1
1,1 Dichloroethane/75-34-3
1,2 Dichloroethane/107-06-2
Nitrofurazone/59-87-0
N-nitrosodiethanolamine/ 1116-54-7
N-nitrosodiethylamine/55-18-5
N-nitrosodimethylamine/62-75-9
N-nitrosodiphenylamine/86-30-6
N-nitroso-di-n-propylamine/ 621-64-7
N-nitrosopyrrolidine/930-55-2
N-nitroso-di-n-butylamine/ 924-16-3
N-nitroso-n-methylethylamine/ 10595-95-6
PAH/NA
PBBs/NA
PCBs/1336-36-3
1,2 Dichloropropane/78-87-5
1,3 Dichloropropene/542-75-6
Dichlorvos/62-73-7
Dieldrin/60-57-1
3,3' Dimethoxybenzidine/119-90-4
3,3 Dimethylbenzidine/119-93-7
1,2 Dimethylhydrazine/540-73-8
2,4 Dinitrotoluene/121-14-2
2,6 Dinitrotoluene/606-20-2
1,4 Dioxane/123-91-1
1,2 Diphenylhydrazine/122-66-7
Endrin/72-20-8
Epichlorohydrin/106-89-8
Ethyl acrylate/140-88-5
Ethylene dibromide/106-93-4
Ethylene thioureae/96-45-7
Folpet/133-07-3
Furmecyclox/60568-05-0
Heptachlor/76-44-8
Heptachlor epoxide/1024-57-3
Hexachlorobenzene/118-74-1
Hexachlorocyclohexane (alpha)/ 319-84-6
Hexachlorocyclohexane (tech.)/ 608-73-1
Hexachlorodibenzo-p-dioxin, mix/19408-74-3
Hydrazine/hydrazine sulfate/ 302-01-2
Lindane/58-89-9
2 Methylaniline/100-61-8
2 Methylaniline hydrochloride/ 636-21-5
4,4' Methylene bis(N,N- dimethyl)aniline/101-61-1
Methylene chloride (dichloromethane)/75-09-2
Mirex/2385-85-5
O-phenylenediamine/106-50-3
Propylene oxide/75-56-9
2,3,7,8-Tetrachlorodibenzo-p-dioxin / 1746-01-6
Tetrachloroethylene/127-18-4
2,4 Toluenediamine/95-80-7
o-Toluidine/95-53-4
Toxaphene/8001-35-2
Trichloroethylene/79-01-6
2,4,6-Trichlorophenol/88-06-2
Trimethyl phosphate/512-56-1
Vinyl chloride/75-01-4

Note: Petroleum-related compounds included on this list (e.g., benzene) may be present at the facility, but not as a raw material, are not part of a manufacturing process, and have not been detected in stormwater monitoring that has been conducted at the facility.

6. Are any other pesticides, herbicides, or fungicides used at this facility? ☐ YES ☒ NO

If yes, specify the material and quantity used.

De-Minimus use of commercial herbicides for nuisance weed control. There is no storage of such materials within the containment areas.

7. Are there other pollutants that you know of or believe to be present? ☐ YES ☒ NO

If yes, specify the pollutants and their concentration if known (attach laboratory analyses if available). ☐ DON'T KNOW

SECTION F. GROUND WATER INFORMATION

Provide available data measurements or range of measurements from monitoring wells or supply wells in the area of discharge. Provide the analytical method and detection limit, if known. Provide the location of each well on the map required in G.3 below. Attach well logs when available. Copy this page as necessary for each well. Provide the latitude and longitude in decimal format.

Ecology Well Tag ID # _____ *(exampleAAB123)*

Well ID # _____ *(example MW-1)*

Latitude: _____

Longitude: _____

Well Elevation (to the nearest 0.01 feet) _____ Check the appropriate box; the elevation measurement is relative to: the NAVD88 standard ☐ mean sea level ☐

Parameter	Units	Range of Measurements	Number of Analyses	Analytical Method	Detection Limit
BOD (5 day)	mg/L				
COD	mg/L				
Total organic carbon	mg/L				
Total dissolved solids	mg/L				
Dissolved Fixed Solids	mg/L				
pH	Standard units				
Conductivity	(micromhos/cm)				
Alkalinity	mg/L as $CaCO_3$				
Total hardness	mg/L				
Fecal coliform	organisms/100mL				
Total coliform	organisms/100mL				
Dissolved oxygen	mg/L				
Ammonia-N	mg/L				
Nitrate + nitrite-N, nitrate as N	mg/L				
Total kjeldahl N as N	mg/L				
Ortho-phosphate-P as P	mg/L				
Total-phosphate-P as P	mg/L				
Total Oil and Grease	mg/L				
Total petroleum hydrocarbon	☐mg/L ☐ µg/l				
Calcium	☐mg/L ☐ µg/l				
Chloride	☐mg/L ☐ µg/l				
Fluoride	☐mg/L ☐ µg/l				
Magnesium	☐mg/L ☐ µg/l				
Potassium	☐mg/L ☐ µg/l				
Sodium	☐mg/L ☐ µg/l				
Sulfate	☐mg/L ☐ µg/l				
Barium	☐mg/L ☐ µg/l				
Cadmium	☐mg/L ☐ µg/l				
Chromium	☐mg/L ☐ µg/l				
Copper	☐mg/L ☐ µg/l				
Iron	☐mg/L ☐ µg/l				
Lead	☐mg/L ☐ µg/l				

Manganese	☐mg/L ☐ µg/l				
Mercury	☐mg/L ☐ µg/l				
Selenium	☐mg/L ☐ µg/l				
Silver	☐mg/L ☐ µg/l				
Zinc	☐mg/L ☐ µg/l				
Depth to water level (to the nearest .01 feet)					

Note: Six groundwater monitoring wells are present at the facility associated with a MTCA Cleanup Action being completed under an Agreed Order. Sampling of these wells for stormwater quality parameters is not included in the MTCA scope of work (has included TPH and VOCs). It is expected that the flow from the Lined Containment to the Stormwater / fire system pond (which is inspected and sampled) would be representative of stormwater quality at the facility. Monitoring wells in the vicinity of the MTCA Cleanup Action would not be appropriate for use to assess impacts from stormwater and have therefore not been included. The average depth to groundwater in the vicinity of the stormwater pond is about 17 feet below ground surface.

SECTION G. SITE ASSESSMENT

The local library and local city or county planning offices may be helpful in providing the information required in this section. You may consult the Department of Ecology Water Resources Program to help identify wells within one mile of your site.

1. Land Application Sites: Provide the information below for each land application site. Provide the latitude/longitude (approximate center of the site; NAD83/WGS84 reference datum.) Attach a copy of the contract(s) authorizing use of any private land(s) used for each treatment site. Add table rows as necessary.

Legal Description (section/township/range) **Section 16/Township 2N/Range 1E**			
Latitude	Longitude	Acreage	Owner
45.6619	**-122.6959**	**31.12**	**NUSTAR TERMINALS OPERATIONS PARTNERSHIP L.P.**
Legal Description (section/township/range)			
Latitude	Longitude	Acreage	Owner
Legal Description (section/township/range)			
Latitude	Longitude	Acreage	Owner
Legal Description (section/township/range)			
Latitude	Longitude	Acreage	Owner

2. If this is a new discharge, list all environmental control permits or approvals needed for this project; for example, SEPA review, engineering reports, hydrogeologic reports, , , or air emissions permits.

   Not applicable. No additional permit required for stormwater infiltrate within the site. Stormwater infiltration is entirely within the subject facility.

3. Attach an original United States Geological Survey (USGS) 7.5 minute topographic map and aerial photograph(s) from an internet mapping site that shows the processing facility and sprayfield site(s). **USGS topographical maps are available from the Department of Natural Resources (360 902-1234), Metsker Maps (206 588-5222), some local bookstores, and internet sites.** Show the following on this map:

   a. Location and name of internal and adjacent streets.
   b. Surface water drainage systems within ¼ mile of the site.
   c. All wells within 1 mile of the site.
   d. Wastewater discharge points.
   e. Land uses and zoning adjacent to the wastewater application site.
   f. Groundwater gradient.

4. Describe the soils on the site using information from local soil survey reports. **Soils information is available from your local County Conservation District or from information contained in the sites hydrogeologic report**. *(Submit on separate sheet and label as attachment G.4.)*

5. Describe the local geology and hydrogeology within one mile of the site. Include any groundwater quality data. **The local library or local Soil Conservation Service may have this information**. *(Submit on separate sheet and label as attachment G.5.)*

6. List the names and addresses of contractors or consultants who provided information and cite sources of information by title and author.

   Apex Companies, LLC

   3015 SW First Avenue, Portland, Oregon

   Resources:

   - **Remedial Investigation and Risk Assessment Report, Ash Creek Associates, December 29, 2010.**
   - **Feasibility Study, Ash Creek Associates, July 12, 2012.**
   - **September 2015 Groundwater Monitoring Results, Apex Companies, November 5, 2015.**
   - **City of Vancouver Zoning Map B-3.**
   - **Soil Survey of Clark County, Washington (November 1972).**

SECTION H. STORMWATER

1. Do you have coverage under the Washington State Industrial Stormwater NPDES General permit? ☐ YES ☒ NO
   If yes, please list the permit number here. _____

   If no, have you applied for coverage under the Washington State Industrial Stormwater NPDES general permit? ☐ YES ☒ NO

Note: If you answered "no" to both questions above, complete the following questions 2 through 8.

2. Describe the size of the stormwater collection area.
   a. Unpaved area **772,000 (182,000 as lined containments)** sq.ft.
   b. Paved area **113,000** sq.ft. (outside of containment area)
   c. Other collection areas (roofs) **61,000** sq.ft. (outside of containment area)

3. Does your facility's stormwater discharge to: *(Check all that apply)*
   ☐ Storm sewer system; name of storm sewer system *(operator):*
   ☐ Sanitary sewer
   ☐ Directly to surface waters of Washington State *(e.g., river, lake, creek, estuary, ocean).*
   Specify waterbody name _____
   ☐ Indirectly to surface waters of Washington State *(i.e., flows over adjacent properties first).*
   ☒ Directly to ground waters of Washington State via:
   ☐ Dry well
   ☐ Drainfield
   ☒ Other **(Infiltration Pond for lined containment area and direct infiltration for remaining containment areas)**

4. Areas with industrial activities at facility: *(check all that apply)*
   ☐ Manufacturing building
   ☒ Material handling
   ☒ Material storage
   ☐ Hazardous waste treatment, storage, or disposal *(refers to RCRA, Subtitle C facilities only)*
   ☐ Waste treatment, storage, or disposal
   ☐ Application or disposal of wastewaters
   ☐ Storage and maintenance of material handling equipment
   ☐ Vehicle maintenance
   ☐ Areas where significant materials remain
   ☐ Access roads and rail lines for shipping and receiving
   ☐ Other _____

5. Material handling/management practices

   a. Types of materials handled and/or stored outdoors: *(check all that apply)*

☐ Solvents	☐ Hazardous wastes
☐ Scrap metal	☐ Acids or alkalies
☒ Petroleum or petrochemical products	☐ Paints/coatings
☐ Plating products	☐ Woodtreating products
☐ Pesticides	☐ Other *(please list)*: _____

   b. Identify existing management practices employed to reduce pollutants in industrial stormwater discharges: *(check all that apply)*

☒ Oil/water separator	☐ Detention facilities
☒ Containment	☒ Infiltration basins
☒ Spill prevention	☒ Operational BMPs
☐ Surface leachate collection	☒ Vegetation management
☒ Overhead coverage	☒ Other *(please list)*: **Contact stormwater (i.e., from truck rack and tank bottoms) is collected and transported off-site for disposal.**

6. Attach a map showing stormwater drainage/collection areas, disposal areas and discharge points. This may be a hand drawn map if no other site map is available. Label this as attachment H.8.

Stormwater containment and infiltration areas are shown on Figure 2.

Note: **Stormwater in the Lined Containment area is inspected prior to release, and it is managed through the Infiltration Pond. The remaining containment areas across the facility infiltrate stormwater in place, except for at the truck rack and tank bottom water for which stormwater are collected and tranported off-site for disposal. Non-contact stormwater from the tank roofs is inspected and released to the ground within the unlined containment area for infiltration if there is no evidence of impacts (in accordance with NuStar Normal Operating Procedure NOP-VAN-25). Contact water within the tanks (tank bottom water) is collected and transported off-site for disposal. The unlined containment berms have a total footprint area of about 240,000 square feet and a storage capacity of 19.3 million gallons, which is in excess of the largest tank volume in each containment area plus the design storm rainfall volume. A historical release of petroleum products near the Infiltration Pond has resulted in impacts to groundwater that is being managed under Ecology oversight. Sampling of the Infiltration Pond has not observed any petroleum hydrocarbon.**

SECTION I. OTHER INFORMATION

1. Describe liquid or solid wastes generated that are not disposed of in the waste stream(s) and describe the method of disposal. For each type of waste, provide type of waste, name, address, and phone number of hauler.

Contact stormwater (i.e., from loading rack area and tank bottom water) is collected on-site and transported to an off-site disposal facility by a contracted waste hauler.

Current Hauler – CCS, 55 International Way, Longview, WA 98632 (360) 423-6316

2. Describe any storage areas used for raw materials, products, and wastes.

The facility has a total of 17 tanks available for products storage. Contacted stormwater is stored in facility storage tanks (truck rack stormwater runoff is stored in the oil/water separator tanks and tank bottom water is drawn directly from the tank). Storage tanks are within secondary containments (7 containment areas total) capable to contained the largest tank volume within the corresponding containment.

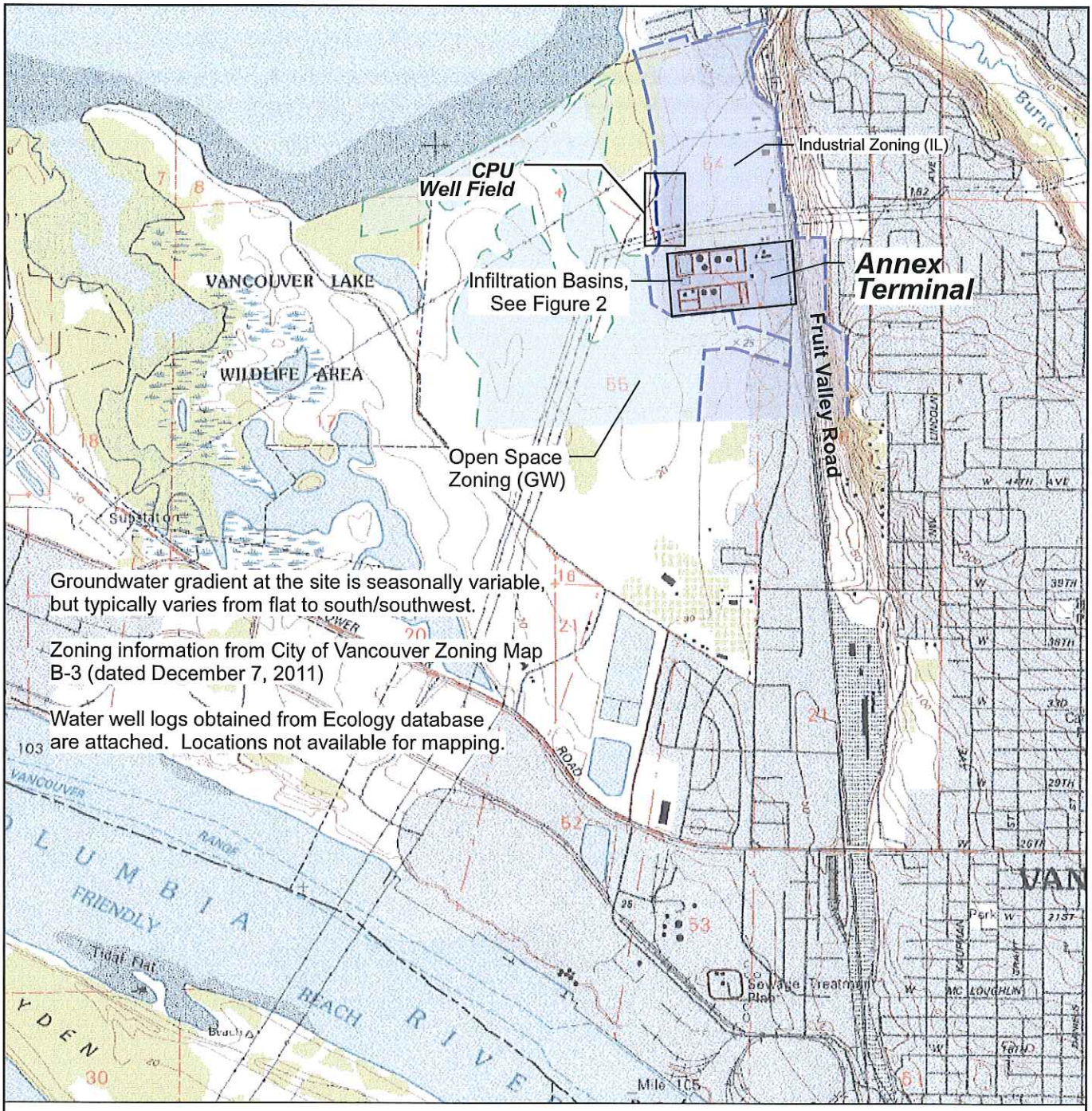
Summary of attachments that may be required for this application:
(Please check those attachments that are included)

- ☐ C.2. Production schematic flow diagram and water balance
- ☐ C.4. Wastewater treatment improvements
- ☐ C.7. Additional incidental materials
- ☒ E.4. Additional results of effluent testing
- ☐ G.1. Copies of land use contracts
- ☒ G.3. USGS topographical map [See Figure 1]
- ☒ G.4. Soils description
- ☒ G.5. Local geology and hydrology
- ☒ H.8. Stormwater drainage map [See Figure 2]

If you need this document in a format for the visually impaired, call the Water Quality Program at 360-407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Attachment C.2

Site Plan

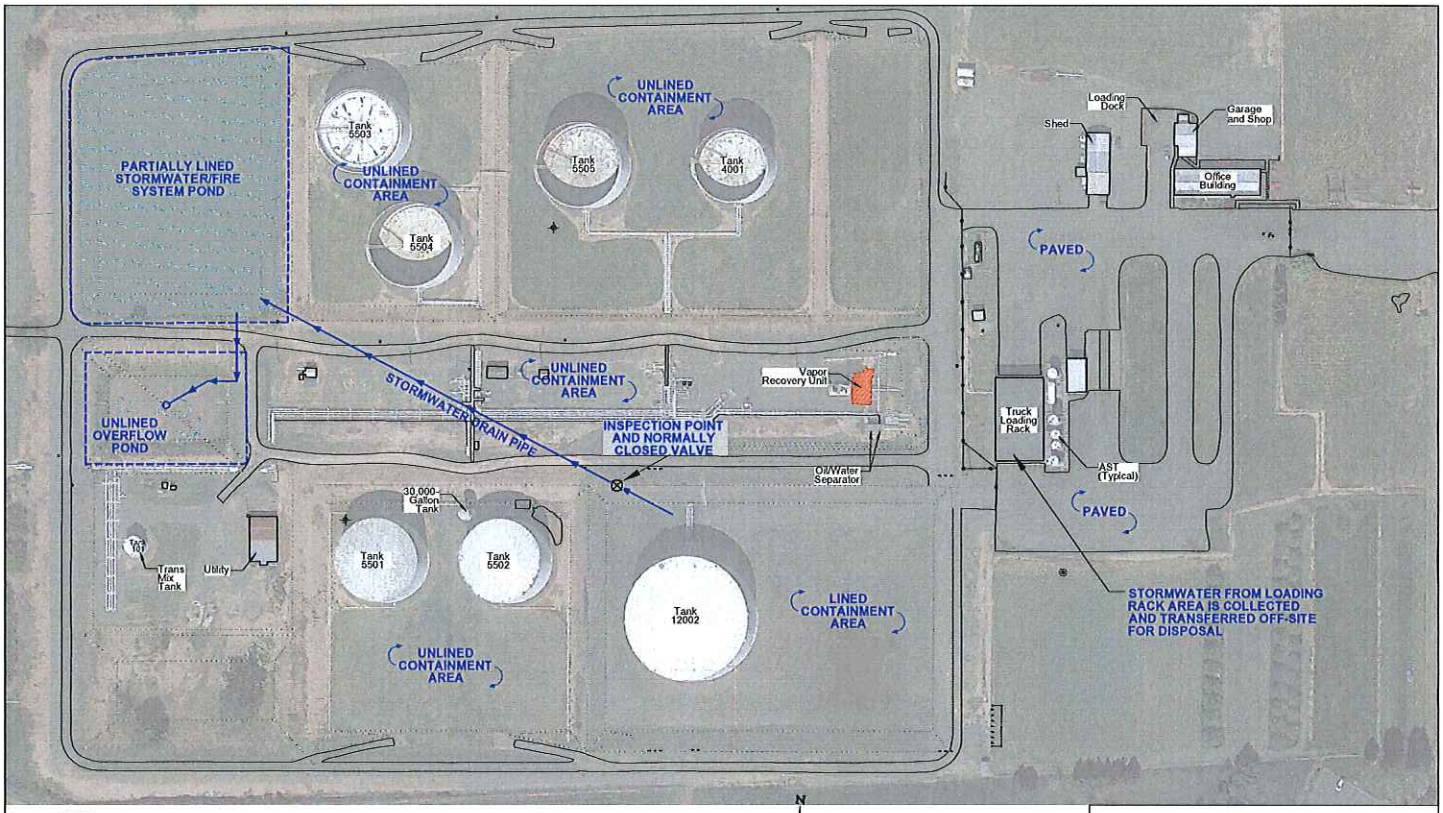


Base map prepared from USGS 7.5-minute quadrangle of Vancouver, WA, dated 1990, as provided by Topozone.

Site Location Map

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

APEX Apex Companies, LLC 3015 SW First Avenue Portland, Oregon 97201	Project Number	1569-10	Figure 1
	March 2015		



NOTES:

1. CONTACT STORMWATER AND TANK BOTTOM WATER IS REMOVED (SUCH AS WITH A VAC TRUCK) AND TRANSFERRED OFF-SITE FOR DISPOSAL.
2. NO DISCHARGE FROM UNLINED CONTAINMENT AREAS (100% INFILTRATION AND EVAPORATION)
3. FLOW FROM LINED CONTAINMENT AREA IS INSPECTED AND RELEASED TO STORMWATER POND IF ACCEPTABLE. IF FULL, STORMWATER POND CAN INFILTRATE AROUND PERIMETER (ABOVE LINER) OR OVERFLOW INTO ADJACENT STORM POND.
4. NO AVENUE FOR SURFACE WATER DISCHARGE FROM FACILITY.

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. Aerial photograph from Google Earth Pro (4/2015).

Site Plan

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

Apex Companies, LLC 3015 SW First Avenue Portland, Oregon 97201	Project Number	1569-10	Figure 2
	March 2016		

Regional Water Well Logs

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy 318106

WATER WELL REPORT

STATE OF WASHINGTON PAGE 1

Notice of Intent W159523.
UNIQUE WELL I.D. # AKS-795
Water Right Permit No.

(1) OWNER: Name Clark Public Utilities Address PO Box 8900 Vancouver, WA 98668

(2) LOCATION OF WELL: County Clark NE 1/4 NW 1/4 Sec 16 T 2 N.R. 1E WM

(2a) STREET ADDRESS OF WELL: (or nearest address) 5900 NW Fruit Valley Rd Vancouver, WA 98660

TAX PARCEL NO.: 147361000

(3) PROPOSED USE: ☐ Domestic ☐ Industrial ☒ Municipal ☐ Irrigation ☒ Test Well ☐ Other ☐ DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) TW-7
☒ New Well ☐ Deepened ☐ Reconditioned ☐ Decommission
Method: ☐ Dug ☒ Cable ☐ Rotary ☐ Bored ☐ Driven ☐ Jetted

(5) DIMENSIONS: Diameter of well 12 inches
Drilled 605 feet. Depth of completed well 590 ft.

(6) CONSTRUCTION DETAILS
Casing Installed:
☒ Welded 16 " Diam. from 0 ft. to 360 ft.
☐ Liner installed 12 " Diam. from +3 ft. to 400 ft.
☐ Threaded " Diam. from ft. to ft.

Perforations: ☐ Yes ☒ No
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location
Manufacturer's Name Johnsons
Type 304 Stainless Model No.
Diam. 8 inch Slot Size 60 from 390 ft. to 461 ft.
Diam. 8-inch Slot Size 60 from 521 ft. to 582 ft.

Gravel/Filter packed: ☒ Yes ☐ No ☐ Size of gravel/sand #6-10
Material placed from 360 ft. to 590 ft.

Surface seal: ☒ Yes ☐ No To what depth? 38 ft.
Material used in seal Bentonite
Did any strata contain unusable water? ☐ Yes ☐ No
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level 20 ft.
Static level Artesian 20.6 ft. below top of well Date 12/11/03
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? ☒ Yes ☐ No If yes, by whom? PGG (Mathes & Sons)
Yield: 700 gal./min. with 99.55 ft. drawdown after 72 hrs.
Yield: gal./min. with ft. drawdown after hrs.
Yield: gal./min. with ft. drawdown after hrs.
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
2	36.5	20	30.65	60	27.9
5	34.1	29	29.74	90	27.17
10	32.36	41	28.87	110	26.37

Date of test 3/13/07
Bailer test gal./min. with ft. drawdown after hrs.
Airtest gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? ☒ Yes ☐ No

RECEIVED
OCT 2 2008
Washington State Department of Ecology

ECY 050-1-20 (11/98)

(10) WELL LOG or DECOMMISSIONING PROCEDURE DESCRIPTION
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered.

MATERIAL	FROM	TO
Brown Silt	0	30
Brown Sand & Silt	30	37
Gray gravelly fine Sand w/ Silt interbeds	37	41
Gray fine Sand w/ Sea Herd & Grasses	41	50
Brownish-black fine Sand	50	65
Brownish-black, cobbly m-c Sand & Gravel	65	72
Brown gravelly m-c Sand	72	101
Brown fine Sand w/ some gravel	101	107
Brown, gravelly, f-c sand grading to m-c Sand & Gravel	107	116
Brown m-c Sand w/ silt interbeds	116	119
Brown Sand, Gravel & Cobbles	119	138
Brown slightly sandy Gravel & Cobbles	138	142
Brown slightly silty Gravel & cobbles w/ fine Sand	142	167
Brown Gravel & Cobbles w/ fine Sand	167	180
Gray silt bound cemented Sand & Gravel	180	250
Grayish very silt bound Sand & Gravel	250	255
Gray Clay	255	269
Gray silty slightly gravelly f-c Sand	269	272
Greenish-gray Clay	272	321
Greenish-gray sandy Silt w/ some gravel	321	342
Greenish gray silty Clay (SEE Page 2)	342	349

Work Started 10/9/03 Completed 12/09/03

WELL CONSTRUCTION CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Type or Print Name Tony Fernback License No. 1094
(Licensed Driller/Engineer)

Trainee Name License No.
Drilling Company Holt Drilling
(Signed) License No. 1094
(Licensed Driller/Engineer)
Address PO Box 1989, Milton WA 98354
Contractor's Registration No. BOARTLC941RA Date 9-15-08

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (360) 407-6600. The TDD number is (360) 407-6006.

File Original with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON
PAGE 2

Notice of Intent W159523
UNIQUE WELL I.D. # AKS-795
Water Right Permit No.

(1) OWNER: Name Clark Public Utilities Address PO Box 8900 Vancouver WA 98668

(2) LOCATION OF WELL: County Clark NE 1/4 NW 1/4 Sec 16 T 2 N.R. 1E WM

(2a) STREET ADDRESS OF WELL: (or nearest address)

TAX PARCEL NO.: 147361000

(3) PROPOSED USE: ☐ Domestic ☐ Industrial ☒ Municipal ☐ Irrigation ☒ Test Well ☐ Other ☐ DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) TW-7
☒ New Well ☐ Deepened ☐ Reconditioned ☐ Decommission
Method: ☐ Dug ☐ Bored ☒ Cable ☐ Driven ☐ Rotary ☐ Jetted

(5) DIMENSIONS: Diameter of well 12 inches
Drilled 605 feet. Depth of completed well 590 ft.

(6) CONSTRUCTION DETAILS
Casing Installed:
☐ Welded ☐ Liner installed ☐ Threaded
" Diam. from ft. to ft.
" Diam. from ft. to ft.
" Diam. from ft. to ft.

Perforations: ☐ Yes ☐ No
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.

PAGE 1

Screens: ☐ Yes ☐ No ☐ K-Pac Location
Manufacturer's Name
Type Model No.
Diam. Slot Size from ft. to ft.
Diam. Slot Size from ft. to ft.

Gravel/Filter packed: ☐ Yes ☐ No ☐ Size of gravel/sand
Material placed from ft. to ft.

Surface seal: ☐ Yes ☐ No To what depth? ft.
Material used in seal
Did any strata contain unusable water? ☐ Yes ☐ No
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level ft. below top of well Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
Yield: gal./min. with ft. drawdown after hrs.
Yield: gal./min. with ft. drawdown after hrs.
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Airtest gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No

(10) WELL LOG or DECOMMISSIONING PROCEDURE DESCRIPTION
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered.

MATERIAL	FROM	TO
Brown silty Clay	349	356
Black Sand Stone	356	368
Gray Sandy Silt w/scattered Gravel	368	374
Brown silty fine Sand	374	387
Brown fine Sand	387	450
Gray fine Sand w/ minor gravel & wood frags	450	468
Greenish-gray silty Clay	468	493
Gray silty fine Sand w/ silt interbeds	493	516
Gray fine Sand w/wood frags	516	582
Greenish-gray Clay	582	605

RECEIVED
OCT 22 2008
Washington State Department of Ecology

Work Started 10/9/03 Completed 12/09/03

WELL CONSTRUCTION CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Type or Print Name Tony Ferenback License No. 1094 (Licensed Driller/Engineer)

Trainee Name License No.

Drilling Company Hart Drilling

(Signed) License No. 1094 (Licensed Driller/Engineer)

Address PO Box 1890, Milton WA 98354

Contractor's Registration No. BOARTLC941RA Date 9-15-08

(USE ADDITIONAL SHEETS IF NECESSARY)

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ECY 050-1-20 (11/98)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

DEPARTMENT OF ECOLOGY State of Washington

Construction/Decommission *("x" in circle)*

☒ Construction

☐ Decommission *ORIGINAL INSTALLATION*

Notice of Intent Number _____

CURRENT

Notice of Intent No. WE 18705

Unique Ecology Well ID Tag No. BIP-845

Water Right Permit No. G2-30381

Property Owner Name Clark Public Utilities

Well Street Address 5906 NW Fruit Valley Rd

City Vancouver County Clark

Location NW 1/4-1/4 NW 1/4 Sec 16 Twn 2N R 1E (s, t, r Still REQUIRED) EWM ☒ Or WWM ☐

Lat/Long Lat Deg 45° Lat Min/Sec 39' 49.92" Long Deg 122° Long Min/Sec 41' 40.71"

Tax Parcel No. (Required) 147383-000

PROPOSED USE: ☐ Domestic ☐ Industrial ☒ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other _____

TYPE OF WORK: Owner's number of well (if more than one) PW-4

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☒ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 20 inches, drilled 612 ft. Depth of completed well 612 ft.

CONSTRUCTION DETAILS

Casing Installed: ☐ Welded ☐ Liner installed ☐ Threaded

24" +1' 274'
20" Steel +3' 432' to 428 ft.
16" Steel from 468 ft. to 582 ft.
16" Steel From 609 ft. to 612 ft.

Perforations: ☐ Yes ☒ No

Type of perforator used _____

SIZE of perfs ___ in. by ___ in. and no. of perfs ___ from ___ ft. to ___ ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location _____

Manufacturer's Name Johnson

Type Stainless Steel Model No. _____

Diam. 16" Slot size 40 from 428 ft. to 468 ft.

Diam. 16 Slot size 40 from 542 ft. to 609 ft.

Gravel/Filter packed: ☒ Yes ☐ No Size of gravel/sand 8x12 Sand

Materials placed from 401 ft. to 612 ft.

Surface Seal: ☒ Yes ☐ No To what depth? 60 ft.

Material used in seal Cement 0-25', bentonite 25-60'

Did any strata contain unusable water? ☐ Yes ☐ No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

PUMP: Manufacturer's Name _____

Type: _____ H.P. _____

WATER LEVELS: Land-surface elevation above mean sea level 30 ft.

Static level 49.9 ft. below top of well Date 12/17/14

Artesian pressure ___ lbs. per square inch Date _____

Artesian water is controlled by _____ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☐ No If yes, by whom? R&G / Mathu

Yield: 3612 gal./min. with 62.4 ft. drawdown after 8 hrs.

Yield: ___ gal./min. with ___ ft. drawdown after ___ hrs.

Yield: ___ gal./min. with ___ ft. drawdown after ___ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
2	63.68	16	56.51	35	53.11
4	61.26	21	55.79	38	53.66
10	58.13	30	54.46	59	52.55

Date of test _____

Bailer test ___ gal./min. with ___ ft. drawdown after ___ hrs.

Airtest ___ gal./min. with stem set at ___ ft. for ___ hrs.

Artesian flow ___ g.p.m. Date _____

Temperature of water 12.6 Was a chemical analysis made? ☒ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formations: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Brown Silt	0	20
Brown fine silty Sand	20	35
Dark gray fine Sand (water)	35	60
Gray coarse Sand	60	72
Gray M-c Sand, gravel, cobbles	72	94
Brown coarse Sand	94	115
Brown coarse Sand & Gravel	115	195
Blue-green and gray silty Sand w/ medium gravel & trace green binder	195	210
Cemented medium Sand and Gravel, green binder	210	261
Green silty Sandy clay	261	263
Light blue sticky clay	263	283
Blue-green dense clay w/ lenses of fine sand & siltstone	283	309
Yellowish-brown clay	309	311
Blue sticky clay	311	317
Light blue clay w/ siltstone layer	317	351
Dark grey-green silt	351	353
Brown clay	353	356
Gray dense clay	356	366
Blaile Sandstone	366	371
Greenish-gray sticky clay	371	382
Greenish-gray clay	382	387
Greenish-gray silty fine Sand	387	404
Brown silty fine Sand	404	420
Brown silty very fine Sand w/ minor gravel	420	428
Brown fine Sand	428	445
Gray Silt	445	447

Start Date 7/28/14 Completed Date 12/18/14

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☐ Driller ☐ Engineer ☐ Trainee Name (Print) _____

Driller/Engineer/Trainee Signature _____

Driller or trainee License No. _____

IF TRAINEE: Driller's License No: _____

Driller's Signature: _____

Drilling Company Holt Services Inc

Address _____

City, State, Zip _____

Contractor's Registration No. _____ Date _____

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report

RECEIVED

JAN 26 2015

WA State Department of Ecology (SWRO)

Page 2/2

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

DEPARTMENT OF ECOLOGY State of Washington

Construction/Decommission *("x" in circle)*

☒ Construction

☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ____

PROPOSED USE: ☐ Domestic ☐ Industrial ☒ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other ____

TYPE OF WORK: Owner's number of well (if more than one) PW-4

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☒ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 22 inches, drilled 612 ft. Depth of completed well 612 ft.

CONSTRUCTION DETAILS 24" +1' 274'; 20" +3' 432'

Casing Installed: ☐ Welded 16" riser Diam. from 400 ft. to 428'; ☐ Liner installed 16" riser Diam. from 468 ft. to 542'; ☐ Threaded 16" tail Diam. From 609 ft. to 612'

Perforations: ☐ Yes ☒ No

Type of perforator used ____

SIZE of perfs ___ in. by ___ in. and no. of perfs ___ from ___ ft. to ___ ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location ____

Manufacturer's Name Johnson

Type Stainless Steel Model No. ____

Diam. 16" Slot size 40 from 428 ft. to 468 ft.

Diam. 16" Slot size 40 from 542 ft. to 609 ft.

Gravel/Filter packed: ☒ Yes ☐ No Size of gravel/sand 8 x 12 Sand

Materials placed from 401 ft. to 612 ft.

Surface Seal: ☒ Yes ☐ No To what depth? 60 ft.

Material used in seal Cement 0-25; bentonite 25-60

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ____ Depth of strata ____

Method of sealing strata off ____

PUMP: Manufacturer's Name ____

Type: ____ H.P. ____

WATER LEVELS: Land-surface elevation above mean sea level 30 ft.

Static level 49.9 ft. below top of well Date 12/17/14

Artesian pressure ____ lbs. per square inch Date ____

Artesian water is controlled by ____ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☒ Yes ☐ No If yes, by whom? PGG / Mathesian

Yield: 3612 gal./min. with 62.4 ft. drawdown after 8 hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
2	63.68	16	56.51	35	53.94
4	61.26	21	55.48	38	53.66
10	58.13	30	54.46	54	52.55

Date of test ____

Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.

Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.

Artesian flow ____ g.p.m. Date ____

Temperature of water 12.6 Was a chemical analysis made? ☒ Yes ☐ No

CURRENT

Notice of Intent No. WE18705

Unique Ecology Well ID Tag No. BIP-845

Water Right Permit No. G2-30381

Property Owner Name Clark Public Utilities

Well Street Address 5806 NW Fruit Valley Rd

City Vancouver County Clark

Location NW 1/4-1/4 NE 1/4 Sec 16 Twn 2N R 1E EWM ☑ or WWM ☐

(s, t, r Still REQUIRED)

Lat/Long Lat Deg 45° Lat Min/Sec 39' 49.52"

Long Deg 122° Long Min/Sec 41' 40.71"

Tax Parcel No. (Required) 147383-000

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Gray fine Sand	447	469
Greenish gray sticky Clay	469	497
Greenish gray Silt w/ fine sand interbeds	497	527
Gray silty very fine Sand w/ wood	527	532
Gray slightly silty very fine Sand w/ wood	532	542
Gray fine Sand	542	609
Greenish-gray Clay	609	612

Start Date 7/28/14 Completed Date 12/18/14

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Randy Holt

Driller/Engineer/Trainee Signature [signature]

Driller or trainee License No. 1099

IF TRAINEE: Driller's License No: ____

Driller's Signature: ____

Drilling Company Holt Services Inc

Address 10621 Todd Rd E

City, State, Zip Edgewood WA. 98372

Contractor's Registration No. HOLTSSI898J6 Date 1-21-15

 To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 012992

Water Right Permit No. _____

(1) OWNER: Name Hal Firestone Address 4236 NW. Fruit Valley Rd. Vancouver, Wa

(2) LOCATION OF WELL: County Clark NE ¼ NW ¼ Sec 16 T 2N N., R 1E W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: ☐ Domestic ☒ Irrigation ☐ DeWater ☐ Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) _____

Abandoned ☐ New well ☐ Deepened ☐ Reconditioned ☒ Method: Dug ☐ Cable ☒ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 10 inches. Drilled 65 feet. Depth of completed well 58 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 10 " Diam. from + 2 ft. to 48 ft.
Welded ☒ Liner installed ☐ Threaded ☐ _____ " Diam. from _____ ft. to _____ ft.

Perforations: Yes ☐ No ☒
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type Stainless Steel Model No. _____
Diam. 8" teles Slot size 30 from 43 ft. to 58 ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

SAND Gravel packed: Yes ☒ No ☐ Size of gravel # 8 Monterey
Gravel placed from 47 ft. to 58 ft.

Surface seal: Yes ☒ No ☐ To what depth? 20 ft.
Material used in seal Bentonite & Hole plug
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 27 ft. below top of well Date 7-1-88
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom? _____
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test _____
Bailer test 40 gal./min. with 0 ft. drawdown after 1 hrs.
Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
Artesian flow _____ g.p.m. Date 7-1-88
Temperature of water _____ Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO

RECEIVED 88 AUG -8 P 11:11 STATE OF WASHINGTON

Work started 6-20-88, 19. Completed 7-1-88, 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Hansen Drilling Co. Inc. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 6711 NE. 58th Ave, Vancouver, Wa. 98661
(Signed) Jim J. Hansen (WELL DRILLER) License No. 0171
Contractor's Registration No. HANSED*377NT Date July 15, 88, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329-

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. .....
Permit No. .....

(1) **OWNER:** Name Hal Firestone Address 4236 NW. Fruit Vally Rd. Vancouver, Wa. 9866(

(2) **LOCATION OF WELL:** County Clark — NE ¼ NW ¼ Sec. 16 T. 2 N., R. 1 E W.M.

Bearing and distance from section or subdivision corner

(3) **PROPOSED USE:** Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(4) **TYPE OF WORK:** Owner's number of well (if more than one) .....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) **DIMENSIONS:** Diameter of well 10 inches.
Drilled 65 ft. Depth of completed well 65 ft.

(6) **CONSTRUCTION DETAILS:**
Casing installed: 10 " Diam. from 0 ft. to 49 ft.
Threaded ☐ Tail 5 " Diam. from 58 ft. to 65 ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used .....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type Stainless steel Model No. .....
Diam. 6 Slot size 30 from 42 ft. to 58 ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☐ Size of gravel Sand Packed # 8 Monterey
Gravel placed from 47 ft. to 65 ft.

Surface seal: Yes ☒ No ☐ To what depth? 20 ft.
Material used in seal Bentonite & hole plug
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ..... Depth of strata .....
Method of sealing strata off .....

(7) **PUMP:** Manufacturer's Name .....
Type: ..... H.P. .....

(8) **WATER LEVELS:** Land-surface elevation above mean sea level .... ft.
Static level 27 ft. below top of well Date 12-22-87
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom? Johnson
Yield: 75 gal./min. with 4'10 ft. drawdown after 1 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test .....
Bailer test ..... gal./min. with ..... ft. drawdown after ..... hrs.
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? Yes ☐ No ☒

(10) **WELL LOG:**

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Brown top soil	0	2
Brown sticky clay	2	17
Brown sandy fine sand	17	30
Greyish fine sand, water	30	45
Greyish blue heaving sand	45	58
Fine packed sand	58	65

RECEIVED
DEC 11 1987
DEPARTMENT OF ECOLOGY
WATER RESOURCES

Work started Dec. 15, 19 87 Completed Dec. 22, 19 87

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Hansen Drilling Co. Inc.
(Person, firm, or corporation) (Type or print)

Address 6711 NE. 58th Ave. Vancouver, Wa. 98661
0221 Murnett Johnson

[Signed] Murnett Johnson
(Well Driller)

License No. C-51 Date Dec. 23, 19 87
HANSED*377NT

(USE ADDITIONAL SHEETS IF NECESSARY)

Appli.4884
Per. 4597
Cert.: 3880

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

WELL LOG

Record by Driller
Source Driller's Record

Location: State of WASHINGTON
County Clark
Area
Map
¼ ¼ sec 16 T. 2 N., R. 1 E. W.M.

Diagram of Section

Drilling Co. R. J. Strasser Drilling Co.
Address 8110 S.E. Sunset Lane, Portland, Ore.
Method of Drilling drilled Date Dec. 13, 1958
Owner Pacific Supply Cooperative
Address Walla Walla, Washington
Land surface, datum ft. above / below
SWL: 17' Date, 19 Dims.:

Correlation	Material	From (feet)	To (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Cooling water for refinery process units & domestic supply		
	Topsoil	0	9
	Sand, fine	9	36
	Sand, coarse, some clay & gravel	36	57
	Sand, & gravel, some binder	57	84
	Sand, & gravel (water bearing)	84	103
	Sand, fine yellow	103	110
	Casing: 80" from 0' to 110'		
	Yield: 2800 gpm with 41' DD after 12 hrs.		
	Pump: 130 H.P. electric turbine		

Turn up

Sheet ____ of ____ sheets

Appli. 4884
Per. 4597
Cert.: 3880

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

WELL LOG

Record by Driller

Source Driller's Record

Location. State of WASHINGTON

County Clark

Area.

Map.

¼ ¼ sec 16 T. 2 N., R. 1 E.W.M.

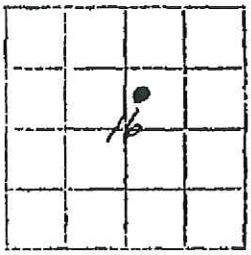


Diagram of Section

Drilling Co. R. J. Strasser Drilling Co.

Address 8110 S.E. Sunset Lane, Portland, Ore.

Method of Drilling drilled Date Dec. 13, 1956

Owner Pacific Supply Cooperative

Address Walla Walla, Washington

Land surface, datum ft. above / below

SWL 17' Date, 19 Dims.:

Consolidation	Material	From (feet)	To (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Cooling water for refinery process units & domestic supply		
	Topsoil	0	9
	Sand, fine	9	36
	Sand, coarse, some clay & gravel	36	57
	Sand, & gravel, some binder	57	84
	Sand, & gravel (water bearing)	84	103
	Sand, fine yellow	103	110
	Casing: 80" from 0' to 110'		
	Yield: 2800 gpm with 41' DD after 12 hrs.		
	Pump: 130 H.P. electric turbine		

Turn up

Sheet ____ of ____ sheets

WELL LOG.—Continued No. . . / - . . .

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Depth forward	———	

S. F No 7[illegible]—12-54—3M. [illegible]05.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

UNIQUE WELL I.D. NUMBER AABT56 (X Y Z 1 2 3)

CLR024

WELL TAGGING FORM

Date of Field Visit 1-29-93 By Chuck Lehotsky, Joe Cason

RECORD VERIFICATION

- ☒ Well Report available *(please attach)*
- ☐ Well Report not available
- ☐ Verification inconclusive

WELL OWNERSHIP; IF DIFFERENT FROM WELL REPORT

Title — First Name — Last Name CENEX

Street address 5420 Fruit Valley Road

City Vancouver State WA 98660

LOCATION OF WELL, IF DIFFERENT FROM WELL REPORT

Well Address Same as above

City _____ County _____

T. 2 N. R. 1 E WM Sec. 16 NE ¼ of the NW ¼

Latitude 45 ° 39 ' 41 "

Longitude 122 ° 41 ' 42 "

- ☐ GPS
- ☒ Topographic Map
- ☐ Survey
- ☐ Computer generated

Elevation at land surface 23 (feet)/meters *(circle one)*

- ☐ Digital Altimeter
- ☒ Topographic Map
- ☐ Other _____

Additional information, if available:

- ☒ Location marked on topographic map *(please attach)*
- ☐ Location marked on air photo *(please attach)*

Please attach this form to the Well Report and submit it to the Department of Ecology Water Resources Program Headquarters.

WELL CHARACTERISTICS

Physical Description of Well (size of casing, type of well, housing, etc.): 80"-diameter well with large electric turbine installed on concrete pad atop well. 8"-diameter access port exists on east side of well.

Location of Well Identification Tag: strapped to outside of 8"-diameter access port.

Was Supplemental Tag needed for ease of identifying well?
☒ NO ☐ YES

If yes, where was tag placed? _____

Scale 1:24,000 (1"=2,000')

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

Indicate the location of the well within the Section by drawing a dot at that point.

SECTION 16

COMMENTS: _____

FOR ECOLOGY WATER RESOURCES PROGRAM USE ONLY

Water Right # _____ Date Issued _____

Circle one: Application Permit Certificate Claim Exempt

CLR 024

Appli.4884
Per. 4597
Cert.: 3880

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

WELL LOG

Record by Driller
Source Driller's Record

Location. State of WASHINGTON
County Clark
Area
Map
¼ ¼ sec 16 T 2 N., R 1 E W

Diagram of Section

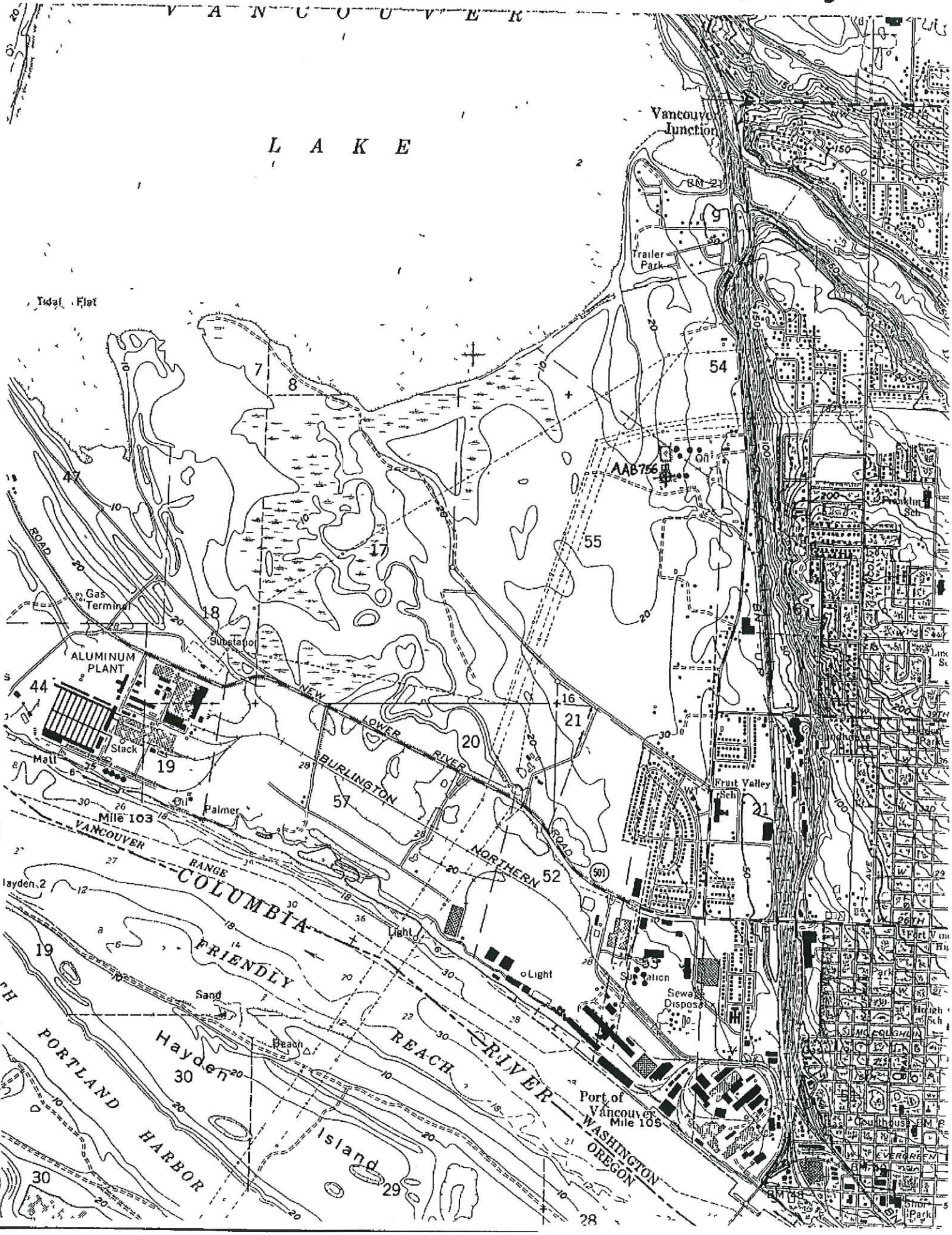
Drilling Co R. J. Strasser Drilling Co.
Address 8110 S.E. Sunset Lane, Portland, Ore.
Method of Drilling drilled Date Dec. 13, 1958
Owner Pacific Supply Cooperative
Address Walla Walla, Washington
Land surface, datum ft. above / below
SWL: 17' Date, 19 Dims.:

Correlation	Material	From (feet)	To (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary. In parentheses if material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings perforations, screens, etc.)		
	Cooling water for refinery process units & domestic supply		
	Topsoil	0	9
	Sand, fine	9	36
	Sand, coarse, some clay & gravel	36	57
	Sand, & gravel, some binder	57	84
	Sand, & gravel (water bearing)	84	103
	Sand, fine yellow	103	110
	Casing: 80" from 0' to 110'		
	Yield: 2800 gpm with 41' DD after 12 hrs.		
	Pump: 130 H.P. electric turbine		

Turn up

Sheet of sheets

Vancouver Quadrangle



STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG No. Appl'n. #4836

Date April 9, 1951

Record by well driller

Source driller's record

Location: State of WASHINGTON

County Clark

Area

~~NW~~ NW¼NE¼ &
NE ¼ NW¼ sec. 16 T. 2 N., R. 1 E. W.

Diagram of Section

Drilling Co. George L. Zent

Address Vancouver, Wash.

Method of Drilling Date, 19

Owner Wm. H. Brown

Address Vancouver, Wash.

Land surface, datum ft. above / below

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Soil	2	2
	Sandy clay	18	20
	Fine sand	6	26
	Coarse sand & water	22	48
	PUMP TEST:		
	Dim. 46'x10"		
	SWL: 20 ft.		
	DD: 3 ft.		
	Yield: 96 g.p.m.		
	Type & size of pump: 5 h.p. centri.		
	Type & size of motor: 5 hp 3 phase electric		
	CASING: 24" diam. ¼" in dredge pipe from 0 to 27 ft.		
	10" diam. DD tubing from 15 to 46'6"		
	Perforations: 10" pipe torch cut perforations from 22 to 42 ft.		

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Turn up Sheet of sheets

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG No. Appli. #4836

Date April 9, 1951

Record by well driller

Source driller's record

Location: State of WASHINGTON

County Clark

Area

~~xxx~~ NW¼NE¼ &
NE ¼ NW¼ sec. 16 T. 2 N., R. 1 E. W.

Diagram of Section

Drilling Co. George L. Zeht

Address Vancouver, Wash.

Method of Drilling Date, 19

Owner Wm. H. Brown

Address Vancouver, Wash.

Land surface, datum ft. above / below

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Soil	2	2
	Sandy clay	18	20
	Fine sand	6	26
	Coarse sand & water	22	48
	PUMP TEST:		
	Dim. 46'x10"		
	SWL: 20 ft.		
	DD: 3 ft.		
	Yield: 96 g.p.m.		
	Type & size of pump: 5 h.p. centri.		
	Type & size of motor: 5 hp 3 phase electric		
	CASING: 24" diam. ¼" in dredge pipe from 0 to 27 ft.		
	10" diam. DD tubing from 15 to 46'6"		
	Perforations: 10" pipe torch cut perforations from 22 to 42 ft.		

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Turn up Sheet of sheets

Attachment E.4

Additional Results of Stormwater Testing

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

April 21, 2015

Analytical Report for Service Request No: K1501111
Revised Service Request No: K1501111.01

Prad Shah
NuStar Energy
Vancouver, WA 98660

RE:

Dear Prad,

Enclosed is the revised report for the sample(s) submitted to our laboratory February 04, 2015
For your reference, these analyses have been assigned our service request number **K1501111.**

Copper, Nickel & Zinc were added to the metals list.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3364. You may also contact me via email at howard.holmes@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Howard Holmes
Project Manager

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
Idaho DHW	http://www.healthandwelfare.idaho.gov/Health/Labs/CertificationDrinkingWaterLabs/tabid/1833/Default.aspx	-
ISO 17025	http://www.pjlabs.com/	L14-50
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Michigan DEQ	http://www.michigan.gov/deq/0,1607,7-135-3307_4131_4156---,00.html	9949
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wisconsin DNR	http://dnr.wi.gov/	998386840
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577- 7222 Fax (360)636- 1068
www.alsglobal.com

ALS ENVIRONMENTAL

Client:	NuStar Energy	**Service Request No.:**	K1501111
Project:	NA	**Date Received:**	02/04/15
Sample Matrix:	Water		

Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier I data deliverables. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Two water samples were received for analysis at ALS Environmental on 02/04/15. The samples were received in good condition and consistent with the accompanying chain of custody form, except where noted on the cooler receipt and preservation form included in this report. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

No anomalies associated with the analysis of these samples were observed.

Diesel Range Organics by Method NWTPH-Dx-SGT

No anomalies associated with the analysis of these samples were observed.

Gasoline Range Organics by Method NWTPH-Gx

No anomalies associated with the analysis of these samples were observed.

Volatile Organic Compounds by EPA Method 8260

Calibration Verification Exceptions:
The following analyte was flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS18\0126F008.D: Vinyl Chloride. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

No other anomalies associated with the analysis of these samples were observed.

Semivolatile Organic Compounds by EPA Method 8270

Lab Control Sample Exceptions:
The upper control criterion was exceeded for Benzo(g,h,i)perylene in Duplicate Laboratory Control Sample (DLCS) KWG1501035-2. The analyte in question was not detected in the associated field samples. The error associated with elevated recovery indicated a high bias. The sample data was not significantly affected. No further corrective action was appropriate.

Approved by_____

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) for Diethyl Phthalate in the replicate Laboratory Control Sample (LCS) analyses (KWG1501035-1 and KWG1501035-2) was outside control criteria. All spike recoveries for the analyte in question were within acceptance limits in the LCS/DLCS. The error associated with an elevated RPD equated to a higher degree of variability. Since the affected target analytes were not detected in the sample, the quality of the sample data was not significantly affected. No further corrective action was taken.

Sample Notes and Discussion:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

No other anomalies associated with the analysis of these samples were observed.

Approved by_____

Chain of Custody

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CHAIN OF CUSTODY

ALS Environmental

SR# K1501111

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PAGE _____ OF _____ COC# _____

PROJECT NAME	NuStar Energy
PROJECT NUMBER	2565 NW Harborside Drive
PROJECT MANAGER	Vancouver, WA 98660
COMPANY NAME	
ADDRESS	prad.shah@nustarenergy.com
CITY/STATE/ZIP	Phone:503-312-6457
E-MAIL ADDRESS	Prad Shah
PHONE #	Project: NuStar - Annex Water
SAMPLER'S SIGNATURE	Date: February 03, 2015

Prad Shah

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics 625☐ 8270☐ SIM☐ 8270LL☐ SIM PAH☐	Volatile Organics 624☐ 8260☒ Hydrocarbons (see below) Gas☐ Diesel☐ Oil☐ BTEX☐ 8021☐	Oil & Grease/TRPH 1664 HEM☐ Oil☐ 1664 SGT☐	PCBs Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081☐ 8141☐ 8151☐	Chlorophenolics - 8151M PCP☐	Metals, Total or Dissolved (See List below) Tetra☐	Cyanide☐ Hex-Chrom☐	(circle) pH, Cond., Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS, Turb.	(circle) NH_3-N, COD, TKN, TOC, DOC, NO_2+NO_3, T-Phos	TOX 9020☐ AOX 1650☐ 506☐	Alkalinity ☐ CO_3☐ HCO_3☐	Dioxins/Furans 1613☐ 8290☐	Dissolved Gases RSK 175☐	CO_2☐ Methane☐ Ethane☐ Ethene☐	TPH GX	TPH DX	REMARKS
Annex Cont.																							
TPs #12002	02/03/15	130 PM		W		X	X	X				X									X	X	
Fire Pond	02/03/15	130 PM		W		X	X	X				X									X	X	

REPORT REQUIREMENTS

- X I. Routine Report: Method Blank, Surrogate, as required
- ___ II. Report Dup., MS, MSD as required
- ___ III. CLP Like Summary (no raw data)
- ___ IV. Data Validation Report
- ___ V. EDD

INVOICE INFORMATION

P.O. # 4501406073

Bill To: _____

TURNAROUND REQUIREMENTS

____ 24 hr. ____ 48 hr.

____ 5 day

X Standard (15 working days)

____ Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: _____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

☐ Sample Shipment contains USDA regulated soil samples (check box if applicable)

RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:	
Signature	Date/Time	Signature	Date/Time 2414 1140	Signature	Date/Time	Signature	Date/Time 2/4/15 1320
Printed Name	Firm	Printed Name	Firm ALS	Printed Name	Firm	Printed Name	Firm ALS

PC HH

Cooler Receipt and Preservation Form

Client / Project: Nustar Service Request K15 01111

Received: 2/4/15 Opened: 2/4/15 By: KD Unloaded: 2/4/15 By: KD

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____

   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
8.7	8.7	8.0	8.0	0	322			

4. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
6. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA Y N
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
All samples	various	X								

Notes, Discrepancies, & Resolutions: _____

Page____of____

Metals

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www.alsglobal.com

Client:	NuStar Energy	**Service Request:**	K1501111
Project:		**Date Collected:**	02/03/15 13:30
Sample Matrix:	Water	**Date Received:**	02/04/15 13:20
Sample Name:	Annex Cont Tr. #12002	**Basis:**	NA
Lab Code:	K1501111-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	6020A	ND U	ug/L	0.50	1	02/16/15 09:56	02/10/15	
Barium	6020A	**5.84**	ug/L	0.050	1	02/16/15 09:56	02/10/15	
Cadmium	6020A	ND U	ug/L	0.020	1	02/16/15 09:56	02/10/15	
Chromium	6020A	ND U	ug/L	0.20	1	02/16/15 09:56	02/10/15	
Copper	6020A	**2.02**	ug/L	0.10	1	02/16/15 09:56	02/10/15	
Lead	6020A	**0.111**	ug/L	0.020	1	02/16/15 09:56	02/10/15	
Mercury	7470A	ND U	ug/L	0.20	1	02/09/15 09:43	02/06/15	
Nickel	6020A	**0.31**	ug/L	0.20	1	02/16/15 09:56	02/10/15	
Selenium	6020A	ND U	ug/L	1.0	1	02/16/15 09:56	02/10/15	
Silver	6020A	ND U	ug/L	0.020	1	02/16/15 09:56	02/10/15	
Zinc	6020A	**4.50**	ug/L	0.50	1	02/16/15 09:56	02/10/15	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	NuStar Energy	**Service Request:**	K1501111
Project:		**Date Collected:**	02/03/15 13:30
Sample Matrix:	Water	**Date Received:**	02/04/15 13:20
Sample Name:	Fire Pond	**Basis:**	NA
Lab Code:	K1501111-002		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	6020A	**1.27**	ug/L	0.50	1	02/16/15 10:00	02/10/15	
Barium	6020A	**21.1**	ug/L	0.050	1	02/16/15 10:00	02/10/15	
Cadmium	6020A	ND U	ug/L	0.020	1	02/16/15 10:00	02/10/15	
Chromium	6020A	**0.94**	ug/L	0.20	1	02/16/15 10:00	02/10/15	
Copper	6020A	**2.19**	ug/L	0.10	1	02/16/15 10:00	02/10/15	
Lead	6020A	**0.895**	ug/L	0.020	1	02/16/15 10:00	02/10/15	
Mercury	7470A	ND U	ug/L	0.20	1	02/09/15 09:44	02/06/15	
Nickel	6020A	**0.84**	ug/L	0.20	1	02/16/15 10:00	02/10/15	
Selenium	6020A	ND U	ug/L	1.0	1	02/16/15 10:00	02/10/15	
Silver	6020A	ND U	ug/L	0.020	1	02/16/15 10:00	02/10/15	
Zinc	6020A	**3.60**	ug/L	0.50	1	02/16/15 10:00	02/10/15	

Client:	NuStar Energy	**Service Request:**	K1501111
Project:		**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ1501158-02		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	6020A	ND U	ug/L	0.50	1	02/16/15 08:45	02/10/15	
Barium	6020A	ND U	ug/L	0.050	1	02/16/15 08:45	02/10/15	
Cadmium	6020A	ND U	ug/L	0.020	1	02/16/15 08:45	02/10/15	
Chromium	6020A	ND U	ug/L	0.20	1	02/16/15 08:45	02/10/15	
Copper	6020A	ND U	ug/L	0.10	1	02/16/15 08:45	02/10/15	
Lead	6020A	ND U	ug/L	0.020	1	02/16/15 08:45	02/10/15	
Nickel	6020A	ND U	ug/L	0.20	1	02/16/15 08:45	02/10/15	
Selenium	6020A	ND U	ug/L	1.0	1	02/16/15 08:45	02/10/15	
Silver	6020A	ND U	ug/L	0.020	1	02/16/15 08:45	02/10/15	
Zinc	6020A	ND U	ug/L	0.50	1	02/16/15 08:45	02/10/15	

Client:	NuStar Energy	**Service Request:**	K1501111
Project:		**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ1501077-01		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Mercury	7470A	ND U	ug/L	0.20	1	02/09/15 09:17	02/06/15	

ALS Environmental

Diesel and Residual Range Organics-Silica Gel Treated

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Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp. dba ALS Environmental

Analytical Results

Client:	NuStar Energy	**Service Request:**	K1501111
Project:		**Date Collected:**	02/03/2015
Sample Matrix:	Water	**Date Received:**	02/04/2015

Diesel and Residual Range Organics - Silica Gel Treated

Sample Name:	Annex Cont Tr. #12002	**Units:**	ug/L
Lab Code:	K1501111-001	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	02/11/15	02/19/15	KWG1501158	
Residual Range Organics (RRO)	ND	U	500	1	02/11/15	02/19/15	KWG1501158	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	90	50-150	02/19/15	Acceptable
n-Triacontane	96	50-150	02/19/15	Acceptable

Comments:

Analytical Results

Client:	NuStar Energy	**Service Request:**	K1501111
Project:		**Date Collected:**	02/03/2015
Sample Matrix:	Water	**Date Received:**	02/04/2015

Diesel and Residual Range Organics - Silica Gel Treated

Sample Name:	Fire Pond	**Units:**	ug/L
Lab Code:	K1501111-002	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	02/11/15	02/19/15	KWG1501158	
Residual Range Organics (RRO)	ND	U	500	1	02/11/15	02/19/15	KWG1501158	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	94	50-150	02/19/15	Acceptable
n-Triacontane	100	50-150	02/19/15	Acceptable

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: NA
Date Received: NA

Diesel and Residual Range Organics - Silica Gel Treated

Sample Name: Method Blank
Lab Code: KWG1501158-3

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	02/11/15	02/19/15	KWG1501158	
Residual Range Organics (RRO)	ND	U	500	1	02/11/15	02/19/15	KWG1501158	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	83	50-150	02/19/15	Acceptable
n-Triacontane	87	50-150	02/19/15	Acceptable

Comments:

Gasoline Range Organics

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www.alsglobal.com

Analytical Results

Client:	NuStar Energy	**Service Request:**	K1501111
Project:		**Date Collected:**	02/03/2015
Sample Matrix:	Water	**Date Received:**	02/04/2015

Gasoline Range Organics

Sample Name:	Annex Cont Tr. #12002	**Units:**	ug/L
Lab Code:	K1501111-001	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	NWTPH-Gx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Gasoline Range Organics-NWTPH	ND	U	250	1	02/12/15	02/12/15	KWG1501258	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
1,4-Difluorobenzene	89	50-150	02/12/15	Acceptable

Comments:

ALS Group USA, Corp. dba ALS Environmental

Analytical Results

Client:	NuStar Energy	**Service Request:**	K1501111
Project:		**Date Collected:**	02/03/2015
Sample Matrix:	Water	**Date Received:**	02/04/2015

Gasoline Range Organics

Sample Name:	Fire Pond	**Units:**	ug/L
Lab Code:	K1501111-002	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	NWTPH-Gx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Gasoline Range Organics-NWTPH	ND	U	250	1	02/12/15	02/12/15	KWG1501258	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
1,4-Difluorobenzene	91	50-150	02/12/15	Acceptable

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: NA
Date Received: NA

Gasoline Range Organics

Sample Name: Method Blank
Lab Code: KWG1501258-3

Extraction Method: EPA 5030B
Analysis Method: NWTPH-Gx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Gasoline Range Organics-NWTPH	ND	U	250	1	02/12/15	02/12/15	KWG1501258	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
1,4-Difluorobenzene	94	50-150	02/12/15	Acceptable

Comments:

Semi- Volatile Organic Compounds

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www.alsglobal.com

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: 02/03/2015
Date Received: 02/04/2015

Semi-Volatile Organic Compounds by GC/MS

Sample Name: Annex Cont Tr. #12002
Lab Code: K1501111-001

Units: ug/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270D

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
N-Nitrosodimethylamine	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Aniline	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Bis(2-chloroethyl) Ether	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Phenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Chlorophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
1,3-Dichlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
1,4-Dichlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
1,2-Dichlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzyl alcohol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Bis(2-chloroisopropyl) Ether	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Methylphenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Hexachloroethane	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
N-Nitrosodi-n-propylamine	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Methylphenol†	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Nitrobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Isophorone	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Nitrophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,4-Dimethylphenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Bis(2-chloroethoxy)methane	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,4-Dichlorophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzoic acid	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
1,2,4-Trichlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Naphthalene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Chloroaniline	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Hexachlorobutadiene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Chloro-3-methylphenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Methylnaphthalene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Hexachlorocyclopentadiene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,4,6-Trichlorophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,4,5-Trichlorophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Chloronaphthalene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Nitroaniline	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Acenaphthylene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: 02/03/2015
Date Received: 02/04/2015

Semi-Volatile Organic Compounds by GC/MS

Sample Name: Annex Cont Tr. #12002
Lab Code: K1501111-001

Extraction Method: EPA 3520C
Analysis Method: 8270D

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dimethyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,6-Dinitrotoluene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Acenaphthene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
3-Nitroaniline	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
2,4-Dinitrophenol	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Dibenzofuran	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Nitrophenol	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
2,4-Dinitrotoluene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Fluorene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Chlorophenyl Phenyl Ether	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Diethyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Nitroaniline	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
2-Methyl-4,6-dinitrophenol	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
N-Nitrosodiphenylamine	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Bromophenyl Phenyl Ether	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Hexachlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Pentachlorophenol	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Phenanthrene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Anthracene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Di-n-butyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Fluoranthene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Pyrene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Butyl Benzyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
3,3'-Dichlorobenzidine	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Benz(a)anthracene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Chrysene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Bis(2-ethylhexyl) Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Di-n-octyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzo(b)fluoranthene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzo(k)fluoranthene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzo(a)pyrene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Indeno(1,2,3-cd)pyrene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Dibenz(a,h)anthracene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	

Comments:

Analytical Results

Client:	NuStar Energy	**Service Request:**	K1501111
Project:		**Date Collected:**	02/03/2015
Sample Matrix:	Water	**Date Received:**	02/04/2015

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Annex Cont Tr. #12002	**Units:**	ug/L
Lab Code:	K1501111-001	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Benzo(g,h,i)perylene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorophenol	58	39-103	02/11/15	Acceptable
Phenol-d6	61	38-107	02/11/15	Acceptable
Nitrobenzene-d5	62	46-115	02/11/15	Acceptable
2-Fluorobiphenyl	60	48-114	02/11/15	Acceptable
2,4,6-Tribromophenol	69	46-127	02/11/15	Acceptable
Terphenyl-d14	60	32-149	02/11/15	Acceptable

† **Analyte Comments**

4-Methylphenol	This analyte cannot be separated from 3-Methylphenol.

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: 02/03/2015
Date Received: 02/04/2015

Semi-Volatile Organic Compounds by GC/MS

Sample Name: Fire Pond
Lab Code: K1501111-002

Extraction Method: EPA 3520C
Analysis Method: 8270D

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
N-Nitrosodimethylamine	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Aniline	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Bis(2-chloroethyl) Ether	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Phenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Chlorophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
1,3-Dichlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
1,4-Dichlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
1,2-Dichlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzyl alcohol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Bis(2-chloroisopropyl) Ether	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Methylphenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Hexachloroethane	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
N-Nitrosodi-n-propylamine	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Methylphenol†	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Nitrobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Isophorone	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Nitrophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,4-Dimethylphenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Bis(2-chloroethoxy)methane	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,4-Dichlorophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzoic acid	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
1,2,4-Trichlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Naphthalene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Chloroaniline	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Hexachlorobutadiene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Chloro-3-methylphenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Methylnaphthalene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Hexachlorocyclopentadiene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,4,6-Trichlorophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,4,5-Trichlorophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Chloronaphthalene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Nitroaniline	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Acenaphthylene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: 02/03/2015
Date Received: 02/04/2015

Semi-Volatile Organic Compounds by GC/MS

Sample Name: Fire Pond
Lab Code: K1501111-002

Extraction Method: EPA 3520C
Analysis Method: 8270D

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dimethyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,6-Dinitrotoluene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Acenaphthene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
3-Nitroaniline	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
2,4-Dinitrophenol	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Dibenzofuran	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Nitrophenol	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
2,4-Dinitrotoluene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Fluorene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Chlorophenyl Phenyl Ether	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Diethyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Nitroaniline	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
2-Methyl-4,6-dinitrophenol	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
N-Nitrosodiphenylamine	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Bromophenyl Phenyl Ether	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Hexachlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Pentachlorophenol	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Phenanthrene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Anthracene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Di-n-butyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Fluoranthene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Pyrene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Butyl Benzyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
3,3'-Dichlorobenzidine	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Benz(a)anthracene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Chrysene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Bis(2-ethylhexyl) Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Di-n-octyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzo(b)fluoranthene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzo(k)fluoranthene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzo(a)pyrene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Indeno(1,2,3-cd)pyrene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Dibenz(a,h)anthracene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	

Comments:

Analytical Results

Client:	NuStar Energy	**Service Request:**	K1501111
Project:		**Date Collected:**	02/03/2015
Sample Matrix:	Water	**Date Received:**	02/04/2015

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Fire Pond	**Units:**	ug/L
Lab Code:	K1501111-002	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Benzo(g,h,i)perylene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorophenol	63	39-103	02/11/15	Acceptable
Phenol-d6	68	38-107	02/11/15	Acceptable
Nitrobenzene-d5	71	46-115	02/11/15	Acceptable
2-Fluorobiphenyl	71	48-114	02/11/15	Acceptable
2,4,6-Tribromophenol	80	46-127	02/11/15	Acceptable
Terphenyl-d14	59	32-149	02/11/15	Acceptable

† **Analyte Comments**

4-Methylphenol	This analyte cannot be separated from 3-Methylphenol.

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: NA
Date Received: NA

Semi-Volatile Organic Compounds by GC/MS

Sample Name: Method Blank
Lab Code: KWG1501035-3

Extraction Method: EPA 3520C
Analysis Method: 8270D

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
N-Nitrosodimethylamine	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Aniline	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Bis(2-chloroethyl) Ether	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Phenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Chlorophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
1,3-Dichlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
1,4-Dichlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
1,2-Dichlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzyl alcohol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Bis(2-chloroisopropyl) Ether	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Methylphenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Hexachloroethane	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
N-Nitrosodi-n-propylamine	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Methylphenol†	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Nitrobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Isophorone	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Nitrophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,4-Dimethylphenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Bis(2-chloroethoxy)methane	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,4-Dichlorophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzoic acid	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
1,2,4-Trichlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Naphthalene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Chloroaniline	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Hexachlorobutadiene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Chloro-3-methylphenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Methylnaphthalene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Hexachlorocyclopentadiene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,4,6-Trichlorophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,4,5-Trichlorophenol	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Chloronaphthalene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2-Nitroaniline	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Acenaphthylene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: NA
Date Received: NA

Semi-Volatile Organic Compounds by GC/MS

Sample Name: Method Blank
Lab Code: KWG1501035-3

Extraction Method: EPA 3520C
Analysis Method: 8270D

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dimethyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
2,6-Dinitrotoluene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Acenaphthene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
3-Nitroaniline	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
2,4-Dinitrophenol	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Dibenzofuran	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Nitrophenol	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
2,4-Dinitrotoluene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Fluorene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Chlorophenyl Phenyl Ether	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Diethyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Nitroaniline	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
2-Methyl-4,6-dinitrophenol	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
N-Nitrosodiphenylamine	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
4-Bromophenyl Phenyl Ether	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Hexachlorobenzene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Pentachlorophenol	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Phenanthrene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Anthracene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Di-n-butyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Fluoranthene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Pyrene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Butyl Benzyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
3,3'-Dichlorobenzidine	ND	U	24	1	02/05/15	02/11/15	KWG1501035	
Benz(a)anthracene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Chrysene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Bis(2-ethylhexyl) Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Di-n-octyl Phthalate	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzo(b)fluoranthene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzo(k)fluoranthene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Benzo(a)pyrene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Indeno(1,2,3-cd)pyrene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	
Dibenz(a,h)anthracene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: NA
Date Received: NA

Semi-Volatile Organic Compounds by GC/MS

Sample Name: Method Blank
Lab Code: KWG1501035-3

Extraction Method: EPA 3520C
Analysis Method: 8270D

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Benzo(g,h,i)perylene	ND	U	9.6	1	02/05/15	02/11/15	KWG1501035	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorophenol	67	39-103	02/11/15	Acceptable
Phenol-d6	68	38-107	02/11/15	Acceptable
Nitrobenzene-d5	72	46-115	02/11/15	Acceptable
2-Fluorobiphenyl	68	48-114	02/11/15	Acceptable
2,4,6-Tribromophenol	66	46-127	02/11/15	Acceptable
Terphenyl-d14	74	32-149	02/11/15	Acceptable

† **Analyte Comments**

4-Methylphenol	This analyte cannot be separated from 3-Methylphenol.

Comments:

Volatile Organic Compounds

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577- 7222 Fax (360)636- 1068
www.alsglobal.com

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: 02/03/2015
Date Received: 02/04/2015

Volatile Organic Compounds

Sample Name: Annex Cont Tr. #12002
Lab Code: K1501111-001

Extraction Method: EPA 5030B
Analysis Method: 8260C

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dichlorodifluoromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Chloromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Vinyl Chloride	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Bromomethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Chloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Trichlorofluoromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1-Dichloroethene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Acetone	ND	U	20	1	02/06/15	02/06/15	KWG1501078	
Carbon Disulfide	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Methylene Chloride	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
trans-1,2-Dichloroethene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1-Dichloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
2,2-Dichloropropane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
cis-1,2-Dichloroethene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
2-Butanone (MEK)	ND	U	20	1	02/06/15	02/06/15	KWG1501078	
Bromochloromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Chloroform	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Carbon Tetrachloride	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1-Dichloropropene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Benzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,2-Dichloroethane (EDC)	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Trichloroethene (TCE)	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,2-Dichloropropane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Dibromomethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Bromodichloromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
cis-1,3-Dichloropropene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
4-Methyl-2-pentanone (MIBK)	ND	U	20	1	02/06/15	02/06/15	KWG1501078	
Toluene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
trans-1,3-Dichloropropene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1,2-Trichloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Tetrachloroethene (PCE)	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
2-Hexanone	ND	U	20	1	02/06/15	02/06/15	KWG1501078	
1,3-Dichloropropane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: 02/03/2015
Date Received: 02/04/2015

Volatile Organic Compounds

Sample Name: Annex Cont Tr. #12002
Lab Code: K1501111-001

Extraction Method: EPA 5030B
Analysis Method: 8260C

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dibromochloromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,2-Dibromoethane (EDB)	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
Chlorobenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Ethylbenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1,1,2-Tetrachloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
m,p-Xylenes	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
o-Xylene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Styrene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Bromoform	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Isopropylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,1,2,2-Tetrachloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Bromobenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
n-Propylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2,3-Trichloropropane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
2-Chlorotoluene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,3,5-Trimethylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
4-Chlorotoluene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
tert-Butylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2,4-Trimethylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
sec-Butylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
4-Isopropyltoluene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,3-Dichlorobenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,4-Dichlorobenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
n-Butylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2-Dichlorobenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,2-Dibromo-3-chloropropane	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2,4-Trichlorobenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
Hexachlorobutadiene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
Naphthalene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2,3-Trichlorobenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	

Comments:

Analytical Results

Client:	NuStar Energy	**Service Request:**	K1501111
Project:		**Date Collected:**	02/03/2015
Sample Matrix:	Water	**Date Received:**	02/04/2015

Volatile Organic Compounds

Sample Name:	Annex Cont Tr. #12002	**Units:**	ug/L
Lab Code:	K1501111-001	**Basis:**	NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	103	73-122	02/06/15	Acceptable
Toluene-d8	93	65-144	02/06/15	Acceptable
4-Bromofluorobenzene	86	68-117	02/06/15	Acceptable

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: 02/03/2015
Date Received: 02/04/2015

Volatile Organic Compounds

Sample Name: Fire Pond
Lab Code: K1501111-002

Extraction Method: EPA 5030B
Analysis Method: 8260C

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dichlorodifluoromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Chloromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Vinyl Chloride	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Bromomethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Chloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Trichlorofluoromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1-Dichloroethene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Acetone	ND	U	20	1	02/06/15	02/06/15	KWG1501078	
Carbon Disulfide	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Methylene Chloride	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
trans-1,2-Dichloroethene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1-Dichloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
2,2-Dichloropropane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
cis-1,2-Dichloroethene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
2-Butanone (MEK)	ND	U	20	1	02/06/15	02/06/15	KWG1501078	
Bromochloromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Chloroform	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Carbon Tetrachloride	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1-Dichloropropene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Benzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,2-Dichloroethane (EDC)	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Trichloroethene (TCE)	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,2-Dichloropropane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Dibromomethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Bromodichloromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
cis-1,3-Dichloropropene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
4-Methyl-2-pentanone (MIBK)	ND	U	20	1	02/06/15	02/06/15	KWG1501078	
Toluene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
trans-1,3-Dichloropropene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1,2-Trichloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Tetrachloroethene (PCE)	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
2-Hexanone	ND	U	20	1	02/06/15	02/06/15	KWG1501078	
1,3-Dichloropropane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	

Comments:

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: 02/03/2015
Date Received: 02/04/2015

Volatile Organic Compounds

Sample Name: Fire Pond
Lab Code: K1501111-002

Extraction Method: EPA 5030B
Analysis Method: 8260C

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dibromochloromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,2-Dibromoethane (EDB)	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
Chlorobenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Ethylbenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1,1,2-Tetrachloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
m,p-Xylenes	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
o-Xylene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Styrene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Bromoform	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Isopropylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,1,2,2-Tetrachloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Bromobenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
n-Propylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2,3-Trichloropropane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
2-Chlorotoluene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,3,5-Trimethylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
4-Chlorotoluene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
tert-Butylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2,4-Trimethylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
sec-Butylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
4-Isopropyltoluene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,3-Dichlorobenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,4-Dichlorobenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
n-Butylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2-Dichlorobenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,2-Dibromo-3-chloropropane	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2,4-Trichlorobenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
Hexachlorobutadiene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
Naphthalene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2,3-Trichlorobenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: 02/03/2015
Date Received: 02/04/2015

Volatile Organic Compounds

Sample Name: Fire Pond
Lab Code: K1501111-002

Units: ug/L
Basis: NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	101	73-122	02/06/15	Acceptable
Toluene-d8	92	65-144	02/06/15	Acceptable
4-Bromofluorobenzene	85	68-117	02/06/15	Acceptable

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: NA
Date Received: NA

Volatile Organic Compounds

Sample Name: Method Blank
Lab Code: KWG1501078-5

Extraction Method: EPA 5030B
Analysis Method: 8260C

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dichlorodifluoromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Chloromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Vinyl Chloride	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Bromomethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Chloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Trichlorofluoromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1-Dichloroethene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Acetone	ND	U	20	1	02/06/15	02/06/15	KWG1501078	
Carbon Disulfide	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Methylene Chloride	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
trans-1,2-Dichloroethene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1-Dichloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
2,2-Dichloropropane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
cis-1,2-Dichloroethene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
2-Butanone (MEK)	ND	U	20	1	02/06/15	02/06/15	KWG1501078	
Bromochloromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Chloroform	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Carbon Tetrachloride	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1-Dichloropropene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Benzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,2-Dichloroethane (EDC)	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Trichloroethene (TCE)	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,2-Dichloropropane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Dibromomethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Bromodichloromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
cis-1,3-Dichloropropene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
4-Methyl-2-pentanone (MIBK)	ND	U	20	1	02/06/15	02/06/15	KWG1501078	
Toluene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
trans-1,3-Dichloropropene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1,2-Trichloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Tetrachloroethene (PCE)	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
2-Hexanone	ND	U	20	1	02/06/15	02/06/15	KWG1501078	
1,3-Dichloropropane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	

Comments:

Analytical Results

Client: NuStar Energy
Project:
Sample Matrix: Water

Service Request: K1501111
Date Collected: NA
Date Received: NA

Volatile Organic Compounds

Sample Name: Method Blank
Lab Code: KWG1501078-5

Extraction Method: EPA 5030B
Analysis Method: 8260C

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dibromochloromethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,2-Dibromoethane (EDB)	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
Chlorobenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Ethylbenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,1,1,2-Tetrachloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
m,p-Xylenes	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
o-Xylene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Styrene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Bromoform	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Isopropylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,1,2,2-Tetrachloroethane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
Bromobenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
n-Propylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2,3-Trichloropropane	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
2-Chlorotoluene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,3,5-Trimethylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
4-Chlorotoluene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
tert-Butylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2,4-Trimethylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
sec-Butylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
4-Isopropyltoluene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,3-Dichlorobenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,4-Dichlorobenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
n-Butylbenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2-Dichlorobenzene	ND	U	0.50	1	02/06/15	02/06/15	KWG1501078	
1,2-Dibromo-3-chloropropane	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2,4-Trichlorobenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
Hexachlorobutadiene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
Naphthalene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	
1,2,3-Trichlorobenzene	ND	U	2.0	1	02/06/15	02/06/15	KWG1501078	

Comments:

Analytical Results

Client:	NuStar Energy	**Service Request:**	K1501111
Project:		**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Volatile Organic Compounds

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1501078-5	**Basis:**	NA

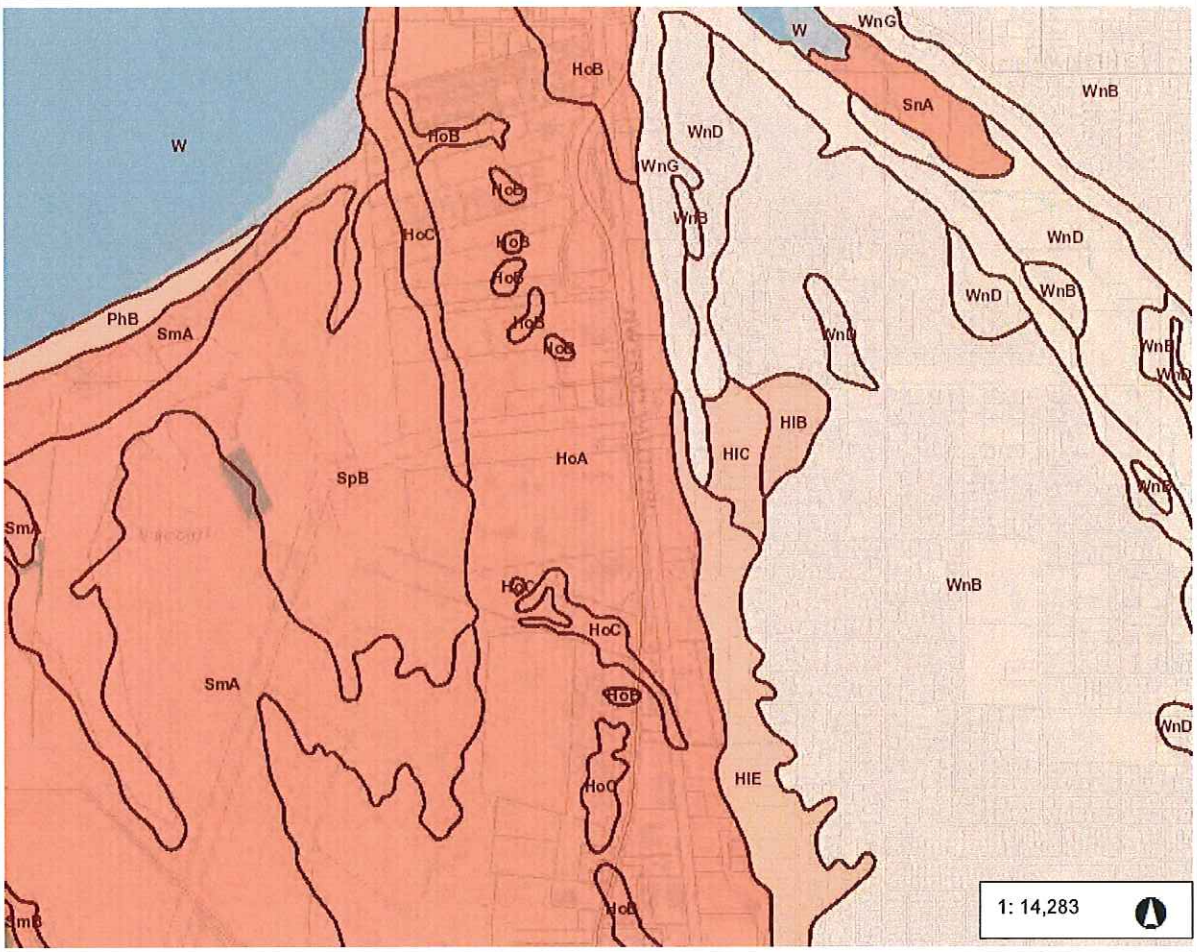
Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	99	73-122	02/06/15	Acceptable
Toluene-d8	91	65-144	02/06/15	Acceptable
4-Bromofluorobenzene	81	68-117	02/06/15	Acceptable

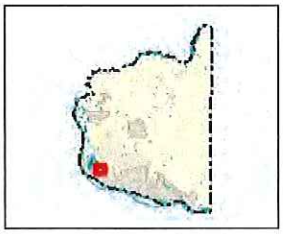
Comments:

Attachment G.4

Soils Description

Soil Map





Legend

- Soil Type
  - WWHM Soil Group
    - 1 - Excessively drained soils
    - 2 - Well drained soils
    - 3 - Moderately drained soils
    - 4 - Poorly drained soils
    - 5 - Wetland soils
    - Unknown
- Building Footprints
- Taxlots
- Cities Boundaries
- Urban Growth Boundaries

Notes:

2,380.5 0 1,190.23 2,380.5 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - http://gis.clark.wa.gov

SOIL SURVEY OF CLARK COUNTY, WASHINGTON

BY DALE A. McGEE, SOIL CONSERVATION SERVICE

SOILS SURVEYED BY DALE A. McGEE, RUDOLPH W. MAYKO, WILLARD A. CALL, CARL J. McMURPHY, AND JOHN G. KRAUTSCHEID, SOIL CONSERVATION SERVICE.

UNITED STATES DEPARTMENT OF AGRICULTURE, IN COOPERATION WITH THE WASHINGTON AGRICULTURAL EXPERIMENT STATION

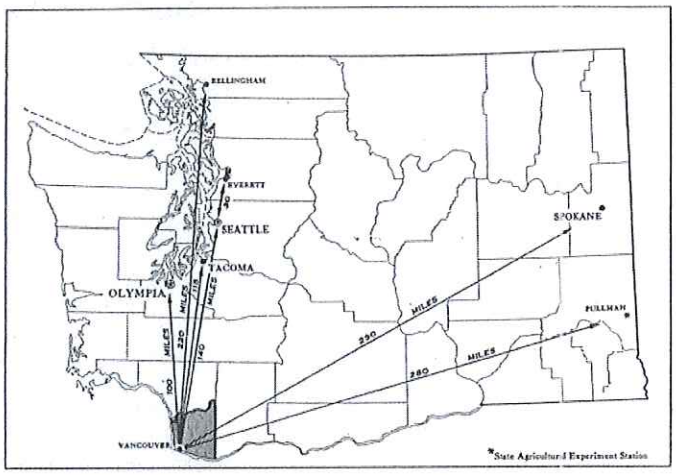


Figure 1.-Location of Clark County in Washington.

CLARK COUNTY is in the southwestern part of the State of Washington (fig. 1). The Columbia River forms its southern and western borders. It is bounded on the north by the Lewis River and on the east by Skamania County.

The land area comprises about 400,000 acres, or about 630 square miles. The population is approximately 101,000. The largest city, Vancouver, population 34,500, is the county seat and is 100 miles south of Olympia, the State capital. Vancouver is along the north shore of the Columbia River, opposite Portland, Oregon.

Economic development in Clark County is diversified. Farming is important, but it is secondary in value of total products to industrial products, which include lumber, pulp, paper, aluminum, carborundum, and chemicals. About 42 percent of the county is cleared and in farmland; the rest is forested or logged-off land. Most of the farmland lies in the central, western, and southwestern parts of the county. This area is composed of terraces and terrace plains, about 30 to 800 feet above sea level. The northern and eastern parts of the county are forested foothills and mountains of the Cascade Range. In these areas farming is confined to the larger valleys. Much of the cleared land is in hay and pasture.

Dairying is the most important farm enterprise in the county; it accounts for more than 40 percent of the value of farm products sold. Ranking second and third are livestock and poultry. Other important farm products are vegetables, berries, and orchard fruits.

The county lies in a long structural basin (Willamette-Puget Trough) between the Pacific Coast ranges to the west and the parallel Cascade Range to the east. The Columbia River, the major trunk stream of the Pacific Northwest, flows through the Cascade Range, borders Clark County as it crosses the trough, then passes through the Pacific Coast ranges into the Pacific Ocean to the west.

The western part of the county consists of a series of gently rolling alluvial terraces that form plains and benches rising steplike from the present level of the Columbia River. The elevations in these areas range from a few feet to more than 800 feet above sea level. The eastern part of the county consists of high old alluvial terraces against volcanic foothills and mountains of the western slopes of the Cascade Range. Along the eastern margin of the county, some of the higher peaks rise to an elevation of nearly 4,000 feet. Mountain ridges 2,000 to 3,000 feet in elevation are common. Much of this area is very steep, and a fall of 1,000 feet within a lateral distance of half a mile is not uncommon. The mountainous terrain is heavily dissected by streams that originate in this area and to the east. Most of the important streams that drain the county flow in a westerly direction. The more prominent streams are: the North Fork of the Lewis River; the East Fork of the Lewis River; the Washougal and Little Washougal Rivers; and Lacamas, Salmon, Big Tree, Cedar, Canyon, Mason, and Lockwood Creeks.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Clark County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the

Hesson clay loam, 30 to 55 percent slopes (HcF).-This soil is similar to Hesson clay loam, 0 to 8 percent slopes, except that the surface layer is 2 to 4 inches thinner. Included in mapping were some areas where the surface layer is gravelly clay loam. This soil occurs on terrace breaks that lead into valleys. The slopes are long. Surface runoff is rapid to very rapid, and the erosion hazard is severe to very severe where the surface is left bare.

This soil is too steep for cultivation, but it is suited to timber. (Capability unit VIe-3; woodland suitability group 3rH4; wildlife site 7)

Hesson very stony silty clay loam, 3 to 30 percent slopes (HhE).-This soil is in areas where local volcanic lava flows have deposited igneous rocks over the surface. It is generally near areas of Olympic soils. Included in mapping were a few areas where the slope is more than 30 percent and a few areas that are less than 3 feet deep to weathered gravel, cobblestones, and clay. Surface runoff is slow to rapid, and the erosion hazard is slight to severe if the surface is left bare.

This soil is suited to timber (Capability unit VIs-1; woodland suitability group 3dH3 ; wildlife site 12)

Hillsboro Series

The Hillsboro series consists of deep, well-drained soils on terraces. These are medium-textured soils that developed in deposits of old Columbia River alluvium. Most areas are nearly level to gently sloping, but strongly sloping to very steep areas are along drainageways and streams. Most areas are in the southwestern, central, and south-central parts of the county. The native, vegetation is dominantly Douglas-fir and a scattering of grand fir, bigleaf maple, and western dogwood. The understory consists principally of salal, ferns, Oregongrape, and vine maple. The annual precipitation is 40 to 50 inches.

Hillsboro soils are among the most productive terrace soils in the county; about 90 percent of the acreage is cultivated. These soils are used extensively for high-income crops, such as pole beans, strawberries, sweet corn, cucumbers, and other truck crops, and for hay and pasture. They are also used for urban development.

Hillsboro silt loam, 3 to 8 percent slopes (HoB).-This is the dominant soil in the southwestern part of the county. The relief is gently undulating. In most places the slopes are short.

In a typical profile the surface layer is dark-brown silt loam about 7 inches thick. The next layer is about 48 inches thick. In sequence from the top, the upper 17 inches is friable, dark-brown silt loam; the next 16 inches is friable, dark grayish-brown heavy silt loam; and the lower 15 inches is friable, dark grayish-brown silt loam. The next layer, to a depth of 86 inches, is dark grayish brown silt loam.

Included in mapping were areas between Whipple and Salmon Creek where the texture of the surface layer is nearly clay loam.

This soil is well drained, moderately permeable, and easily tilled. The available water capacity is very high. Fertility is moderately high. Surface runoff is slow, and the erosion hazard is slight.

Representative profile of Hillsboro silt loam, in a cultivated area 600 feet east of U.S. 99 and 350 feet north of 104th Street, 3 miles north of Vancouver, SE1/4NE1/4SW1/4 sec. 35, T. 3 N., R. 1 E.

Ap-0 to 4 inches, dark-brown (10YR 3/3) silt loam, pale brown (10YR 5/3) when dry; weak, very fine, granular structure ; soft, very friable, nonsticky and slightly plastic; no roots; strongly acid (pH 5.5) ; abrupt, smooth boundary. (3 to 6 inches thick)

A1-4 to 7 inches, dark-brown (10YR 3/3) silt loam, pale brown (10YR 5/3) when dry ; massive ; hard, firm, slightly sticky and slightly plastic ; few fine roots ; many very fine and medium, and few coarse, tubular and interstitial pores ; strongly acid (pH 5.5) ; clear, smooth boundary. (2 to 4 inches thick)

B1-7 to 17 inches, dark-brown (10YR 3/3) silt loam, pale brown (10YR 5/3) when dry; weak, medium and coarse, subangular blocky structure ; slightly hard, friable, sticky and plastic ; few fine roots ; many, very fine, tubular and interstitial pores ; thin, patchy clay films on ped surfaces; medium acid (pH 5.6) ; gradual, smooth boundary. (7 to 12 inches thick)

B21t-17 to 24 inches, dark-brown (10YR 3/3) heavy silt loam, brown (10YR 5/3) when dry; moderate, coarse, subangular blocky structure ; hard, friable, sticky and plastic ; very few, fine, fibrous roots ; many, fine, tubular and interstitial pores ; moderately thick, patchy clay films on ped surfaces and in pores ; strongly acid (pH 5.5) ; gradual, smooth boundary. (7 to 11 inches thick)

B22t-24 to 32 inches, dark grayish-brown (10YR 4/2) heavy silt loam, light brownish gray (10YR 6/2) when dry; moderate, medium and coarse, subangular blocky structure ; very hard, friable, sticky and plastic ; very few fine roots ; many, very fine, tubular and interstitial pores ; moderately thick, continuous clay films; strongly acid (pH 5.4) ; gradual, smooth boundary. (7 to 11 inches thick)

B23t-32 to 40 inches, dark grayish-brown (10YR 4/2) heavy silt loam, light brownish gray (10YR 6/2) when dry; weak, medium, prismatic structure breaking to moderate, medium, subangular blocky ; very hard, friable, slightly sticky and plastic ; no roots ; common, very fine, tubular pores ; moderately thick, patchy clay films on ped surfaces and moderately thick, continuous clay films in pores; very strongly acid (pH 5.0) ; gradual, smooth boundary. (6 to 12 inches thick)

B3t-40 to 55 inches, dark grayish-brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) when dry; weak, coarse, subangular blocky structure ; very hard, friable, slightly sticky and slightly plastic ; no roots ; common, very fine, interstitial pores ; moderately thick, patchy clay films ; strongly acid (pH 5.1) ; gradual, smooth boundary. (12 to 20 inches thick)

C1-55 to 72 inches, dark grayish-brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) when dry; few, fine, faint, dark-brown (7.5YR 4/2) mottles; massive ; hard, friable, nonsticky and nonplastic ; many, very fine, tubular pores ; thin clay films in pores; strongly acid (pH 5.3) ; gradual, smooth boundary. (12 to 20 inches thick)

C2-72 to 86 inches, dark grayish-brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) when dry; few, fine, faint, dark-brown (7.5YR 4/2) mottles; massive ; hard, friable, nonsticky and nonplastic ; common, very fine, tubular pores ; strongly acid (pH 5.5).

The A1 horizon ranges from very dark brown to dark brown in color. The B horizon ranges from 10YR to 7.5YR in hue and from 2 to 4 in chroma. In places the profile is loam to a depth of about 36 inches, sandy loam to a depth of 48 inches, and sand between 48 and 62 inches.

Most of the acreage of this soil is cultivated or in urban fringe development. Nearly all the crops suited to this area are grown. Pears, caneberries, strawberries (fig. 7), pole beans, potatoes, and walnuts are important truck crops. Alfalfa and red clover are important

Figure 7.-Strawberries on a Hillsboro silt loam. This area is near Salmon Creek.

legumes for hay, and white clover is important for pasture. Orchardgrass and ryegrass are the chief grasses for hay and pasture. (Capability unit IIe-1; woodland suitability group 2oL3 ; wildlife site 3)

Hillsboro loam, 0 to 3 percent slopes (HlA).-This soil is similar to Hillsboro silt loam, 3 to 3 percent slopes, except that the surface layer is 1 to 3 inches thicker, and the texture is loam to a depth of about 36 inches, sandy loam between a depth of 36 and 48 inches, and sand between a depth of 48 and 62 inches. Surface runoff is very slow, and the hazard of erosion is none to slight.

Where cultivated for a number of years, this soil tends to develop a tillage pan. Deep plowing or use of a subsoiler will alleviate this condition. The available water capacity is high.

Most of this soil is used for crops and pasture. Pole beans, strawberries, potatoes, and cucumbers are grown. Alfalfa or a mixture of red clover and ryegrass for hay is commonly grown in rotation with the cash crops. There is a small acreage of cane and tree fruits. (Capability unit I-2; woodland suitability group 3oH3; wildlife site 3)

Hillsboro loam, 3 to 8 percent slopes (HlB).-This is the dominant terrace soil in the central part of the county. It is similar to Hillsboro silt loam, 3 to 8 percent slopes, except that the profile is loam to a, depth of about 36 inches, sandy loam between a depth of 36 and 48 inches, and sand between a depth of 48 and 62 inches.

Where cultivated for a number of years, this soil tends to develop a tillage pan. Deep plowing or use of a subsoiler will alleviate this condition. The available water capacity is high.

Most of this soil is used for crops and pasture. Pole beans, strawberries, potatoes, and cucumbers are grown. Alfalfa or a mixture of red clover and ryegrass for hay is commonly grown in rotation with the truck crops. There is a small acreage of cane and tree fruits. (Capability unit IIe-1; woodland suitability group 3oH3 ; wildlife site 3)

Hillsboro loam, 8 to 15 percent slopes (HlC).-This soil is similar to Hillsboro silt loam, 3 to 8 percent slopes, except that the surface laver is 1 to 3 inches thinner, and the texture is loam to a depth of about 36 inches, sandy loam between a depth of 36 and 48 inches, and sand between a depth of 48 and 62 inches. Surface runoff is medium, and the erosion hazard is moderate. The slopes are complex and rather short.

Pole beans, strawberries, potatoes, and cucumbers are grown. Alfalfa or a mixture of red clover and ryegrass for hay is commonly grown in rotation with the cash crops. There is a small acreage of cane and tree fruits.

Cross-slope seeding and winter cover crops help control erosion. The available water capacity is high. (Capability unit IIIe-5; woodland suitability group 3oH3; wildlife site 3)

Hillsboro loam, 15 to 20 percent slopes (HlD).-This soil is along the edge of drainageways and streams. It is similar to Hillsboro silt loam, 3 to 8 percent slopes, except that the slopes are longer, and the texture is loam to a depth of about 36 inches, sandy loam between a depth of 36 and 48 inches, and sand between a depth of 48 and 62 inches. Surface runoff is medium, and the erosion hazard is moderate.

Grasses and legumes are more common on this soil than other crops.

Use of machinery is difficult because of the slopes. Conservation practices, such as cross-slope seeding, and the use of long-lived grasses and legumes in the rotation are needed to control loss of soil. The available water capacity is high. (Capability unit IIIe-5; woodland suitability group 3oH3; wildlife site 3)

Hillsboro loam, 20 to 30 percent slopes (HlE).-This soil is similar to Hillsboro silt loam, 3 to 8 percent slopes, except that the surface layer is 1 to 3 inches thinner, and the texture is loam to a depth of about 36 inches, sandy loam between a depth of 36 and 48 inches, and sand between a depth of 48 and 62 inches. It occurs along the edges of drainageways and streams. Surface runoff is medium to rapid, and the erosion hazard is moderate to severe if the surface is left bare through the winter.

Pasture is the main use where this soil is cleared. Uncleared areas are used primarily for timber production. The available water capacity is high. (Capability unit IVe-2; woodland suitability group 3oH3; wildlife site 3)

Hillsboro loam, 30 to 50 percent slopes (HlF).-This soil occurs along Salmon Creek and its tributaries. It is similar to Hillsboro silt loam, 3 to 8 percent slopes, except that the surface layer is 2 to 4 inches thinner, and the texture is loam to a depth of about 36 inches, sandy loam between a depth of 36 and 48 inches, and sand between a depth of 48 and 62 inches. Surface runoff is rapid to very rapid, and the erosion hazard is severe to very severe if the surface is left bare in winter.

This soil is suited to timber.

The available water capacity is high. (Capability unit VIe-3 ; woodland suitability group 3rH4; wildlife site 3)

Hillsboro silt loam, 0 to 3 percent slopes (HoA).-This soil is similar to Hillsboro silt loam, 3 to S percent slopes. Surface runoff is very slow, and there is no erosion hazard.

Most of the acreage of this soil is cultivated or in urban fringe development. Nearly all the crops suited to this area are grown. Pears, caneberries, strawberries, pole beans, potatoes, and walnuts are important truck crops. Alfalfa and red clover are important legumes for hay, and white clover is important for pasture. Orchardgrass and ryegrass are the chief grasses for hay and pasture. (Capability unit I-2; woodland suitability group 2oL3; wildlife site 3)

Hillsboro silt loam, 8 to 15 percent slopes (HoC).-This soil is similar to Hillsboro silt loam, 3 to 8 percent slopes, except that the surface layer is 1 to 3 inches thinner. Surface runoff is medium, and the erosion hazard is moderate. Host of the slopes are short.

Nearly all the crops suited to this area are grown. Pears, caneberries, strawberries, pole beans, potatoes, and walnuts are important cash crops. Alfalfa and red clover are the important legumes for hay, and white clover for pasture. Orchardgrass and ryegrass are the chief grasses for hay and pasture.

This soil is easily cultivated. Cross-slope tillage and grasses and legumes in the rotation are needed to control erosion. (Capability unit IIIe-5; woodland suitability group 2oL3 ; wildlife site 3)

Hillsboro silt loam, 15 to 20 percent slopes (HoD).-This soil is along streams and major drainageways. It is similar to Hillsboro silt loam, 3 to 8 percent slopes, except that the surface layer is 2 to 3 inches thinner. Surface runoff is medium, and the erosion hazard is moderate.

Most of the crops grown on Hillsboro silt loam, 3 to 8 percent slopes, are grown on this soil. More long-lived grasses and legumes are grown because the steeper slopes create an erosion hazard and difficulty in operation of machinery. (Capability unit IIIe-5 ; woodland suitability group 2oL3 ; wildlife site 3)

Hillsboro silt loam, 20 to 30 percent slopes (HoE).-This soil is along Salmon Creek, Whipple Creek, and other major drainageways in the western part of Clark County. It is similar to Hillsboro silt loam, 3 to 8 percent slopes, except that the surface layer is 2 to 4 inches thinner. Surface runoff is medium to rapid, and the erosion hazard is moderate to severe if the surface is left bare.

Most of the crops grown on Hillsboro silt loam, 3 to 8 percent slopes, are grown on this soil. More of the acreage is used for long-lived grasses and legumes because of the moderately steep slopes. (Capability unit IVe-2; woodland suitability group 2oL3; wildlife site 3)

Hillsboro silt loam, 30 to 65 percent slopes (HoG).This soil is similar to Hillsboro silt loam, 3 to 8 percent slopes, except that the surface layer is 7 to 10 inches thick. Surface runoff is rapid to very rapid, and the erosion hazard is severe to very severe if the surface is left bare.

This soil is suited to Douglas-fir. (Capability unit VIe-3 ; woodland suitability group 2rL5 ; wildlife site 3)

Hillsboro bouldery silt loam, 3 to 8 percent slopes (HsB).-Most of the acreage of this soil is on terraces along the Columbia River. The soil is similar to Hillsboro silt loam, 3 to 8 percent slopes, except that it is bouldery on the surface. Included in mapping were a few areas steeper than 8 percent. The available water capacity is high.

The soil in most places is too bouldery to be cultivated. The boulders range in weight from a few hundred pounds to several tons. They can be removed only at considerable cost. Much of the acreage is view property and is gradually developing into residential use. (Capability unit Vs-1; wildlife site 12; not assigned to a woodland suitability group)

Hockinson Series

The Hockinson series consists of deep, moderately well drained and somewhat poorly drained, nearly level to gently sloping soils on terraces. These are loamy soils that formed in old alluvium of mixed origin. Nearly all the acreage is near Hockinson and Battle Ground, but some of the acreage is near Manor. The native vegetation on Hockinson soils is Oregon ash, Oregon white oak, western redcedar, red alder, hardhack, sedges, and water-tolerant grasses. The average annual precipitation is between 50 and 60 inches.

About 95 percent of the acreage has been cleared, and the soils are used chiefly for hay and pasture. In areas that are artificially drained, irrigated pasture, and some row crops, such as cucumbers, pole beans, and potatoes, are grown. Crops that require spring planting cannot be grown unless the soils are drained. Without artificial

Attachment G.5

Local Geology and Hydrogeology

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

Prepared for:
NuStar Terminals Operations Partnership L.P.

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Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

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.