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Uplands Remedial Investigation Report BNSF Wishram Railyard (Ecology Site Name BNSF Track Switching Facility)

Wishram, Washington

20 October 2020

Prepared for

BNSF Railway Company
605 Puyallup Avenue
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KJ Project No. 2096120.02

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BNSF Wishram Railyard
(Ecology Site Name BNSF Track Switching Facility)
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Ecology Agreed Order No. DE 12897

Prepared by:

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This report was prepared by the staff of Kennedy/Jenks Consultants, Inc. under the supervision of the engineer whose seal and signature appear below.

The findings, recommendations, specifications, or professional opinions presented in this report were prepared in accordance with the generally accepted professional engineering practice and within the scope of the project. No other warranty, either expressed or implied, is provided.

/2020

Ryan Hultgren, Project Engineer
WA PE License 51860

October 2020

K/J 2096120.02

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List of Acronyms

Acronym	Description
%RE	percent reference emitter
A.F.E.	Authorization for Expenditure
amsl	above mean sea level
AO	Agreed Order
API	American Petroleum Institute
ARI	Analytical Resources Inc.
AS	air sparge or air sparging
ASTM	ASTM International
bgs	below ground surface
BNSF	BNSF Railway Company
BTEX	benzene, toluene, ethylbenzene, and xylenes
btoc	below top of casing
CLARC	Cleanup Levels and Risk Calculation
cP	Centipoise
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CRMP	cultural resources management plan
CSM	conceptual site model
CUL	cleanup level
DAHP	Washington Department of Archaeology and Historic Preservation
DO	dissolved oxygen
DOH	Washington State Department of Health
DOT	U.S. Department of Transportation
DPE	dual phase extraction
DRO	diesel-range organics
Ecology	Washington State Department of Ecology
EDR	Environmental Data Resources, Inc.
EIM	Environmental Information Management
EPA	United States Environmental Protection Agency
EPH	extractable petroleum hydrocarbons
ESC	ESC Lab Sciences
°F	degrees Fahrenheit
FS	feasibility study
ft/day	feet per day
ft^2/d	square feet per day

Acronym	Description
ft/ft	feet per foot
g/cc	grams per cubic centimeter
gpd	gallons per day
GPR	ground penetrating radar
GPS	Global Positioning System
GRO	gasoline-range organics
HASP	Health and Safety Plan
Holt	Holt Services, Inc.
ID	Identification
IDW	investigation-derived wastes
IIWP	Initial Investigation Work Plan
ITRC	Interstate Technology and Regulatory Council
kg	Kilogram
LCS	laboratory control sample
LDRM	LNAPL distribution and recovery model
LIF	laser-induced fluorescence
LNAPL	light non-aqueous phase liquid
µg/L	micrograms per liter
MB	method blank
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MNA	monitored natural attenuation
MRL	method reporting limit
MS/MSD	matrix spike/matrix spike duplicate
MTCA	Model Toxics Control Act
NAPL	non-aqueous phase liquid
NWOR	Northwest’s Own Railway
NWTPH-Dx	Northwest Total Petroleum Hydrocarbons as Diesel and Oil Extended
NWTPH-Gx	Northwest Total Petroleum Hydrocarbons as Gasoline Extended
OHM	oil head monitoring
ORC	oxygen release compound
ORO	oil-range organics
ORP	oxidation-reduction potential
PAH	polycyclic aromatic hydrocarbon

Acronym	Description
PCB	polychlorinated biphenyl
PCC	State of Washington Pollution Control Commission
PID	photoionization detector
PTS	PTS Laboratories
PVC	polyvinyl chloride
PWC	public water supply
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
RGW	reconnaissance groundwater
RI	remedial investigation
RIWP	Remedial Investigation Work Plan
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
SGC	silica gel cleanup
SIM	selective ion monitoring
SOG	standard operating guideline
SOW	scope of work
SP&S	Spokane, Portland, and Seattle Railway
SVE	soil vapor extraction
SVOC	semivolatile organic compound
TEA	terminal electron receptor
TEF	Toxicity Equivalency Factor
TPH	total petroleum hydrocarbon
USACE	U.S. Army Corps of Engineers
UST	underground storage tank
UV	ultraviolet
VOC	volatile organic compound
WAC	Washington Administrative Code
W.M.	Willamette Meridian
Yakama Nation	Confederated Tribes and Bands of the Yakama Nation

Executive Summary

The Wishram Railyard is located in Klickitat County, Washington, approximately 13 miles northeast of The Dalles, Oregon, and 0.75 mile south of Washington State Route 14. The railyard is approximately 5,000 feet long (from northeast to southwest) and ranges from 150 to 720 feet wide (from northwest to southeast). Most of the railyard is comprised of track for switching operations. The portion of the railyard where industrial activities historically occurred (e.g., fuel storage, engine refueling, engine maintenance) is located at the westernmost extent (approximately 1,100 feet) of the yard, covering an area of approximately 6 acres. This is the area where the Uplands Remedial Investigation (RI) activities were focused and is referred to as "the site." The site location is shown on Figure ES-1. Current onsite structures include storage buildings, a maintenance shop (office and tool storage), two mainline tracks, and active track spurs (Figure ES-2).

The RI activities have been implemented pursuant to Agreed Order No. DE 12897, dated 7 October 2015; and performed in accordance with Washington State Department of Ecology's (Ecology) Model Toxics Control Act (MTCA) regulations published in Washington Administrative Code (WAC) 173-340 (Ecology 2007). The purpose of the RI was to investigate the nature and extent of site-related constituents in soil and groundwater at the railyard and evaluate related fate and transport mechanisms.

Site History

The Wishram Railyard was originally developed by the Spokane, Portland, and Seattle (SP&S) Railway between 1910 and 1912. The primary use of the railyard was, and remains, railcar switching. Historically, locomotive fueling and watering, as well as engine and car repairs occurred in the westernmost portion of the railyard (i.e., the site). Existing and historical site features are shown on Figures ES-2 through ES-4.

Historical Fueling Operations

Steam locomotive fueling using oil was conducted at the site from approximately 1912 through 1956. Diesel locomotives were fueled at the site from the early 1950s to the 1970s. Fueling facilities included a 30,000-barrel oil aboveground storage tank (AST) located north of the mainline tracks, an elevated oil service 28,000-gallon AST located south of the mainline tracks, an oil unloading trough east of the Power House, a concrete sump, as well as associated appurtenances and piping. The oil ASTs and appurtenances were removed in circa-1957 after the transition to diesel-fueled locomotives in the 1950s.

Diesel fueling was performed along a fueling spur and at a concrete fueling island (installed in 1949), located north and south, respectively, of the mainline tracks. The diesel fuel was initially stored in one 15,000-gallon and one 20,000-gallon underground storage tanks (USTs). In the late 1950s, diesel was stored in two 100,000-gallon ASTs (constructed in or after 1955) located northwest of the Maintenance Shop. Diesel fuel was transferred to and from the tanks by underground piping. The 100,000-gallon diesel ASTs were removed and fueling ceased at the site during the late 1970s.

Historical Maintenance Operations

Locomotives underwent maintenance and repairs in the former Engine House/Machine Shop. The former Engine House was constructed in 1911 as a rectangular run-through style building and underwent multiple additions until reaching its maximum footprint size in the 1940s (Figure ES-3). The former Engine House was demolished in the 1980s after it was no longer needed. Railcar repairs were performed in an area consisting of three tracks and the former (Car) Repair Shop, located to the southeast of the former Engine House/Machine Shop. The car repair shop building was removed in 1960.

Septic Drainage Field

A former septic drainage (leach) field and five septic tanks, located approximately 600 feet to the northeast of the former Engine House, was identified on a station layout map from 1959 (Figure ES-4). Historical maps indicate that the septic system and drainage field was constructed in a part of the railyard that was expanded to the south, around the time the Dalles Dam was constructed. The septic drainage field treated and discharged wastewater generated on the railyard, as well as wastewater generated by the City of Wishram (single-family homes, a hotel, restaurant, etc.) starting sometime before 1962 and ceasing prior to 1996.

Lake Celilo

In 1957, the U.S. Army Corps of Engineers completed construction of The Dalles Dam, a hydroelectric dam just upstream of The Dalles, Oregon. The flood gates were closed in March 1957, and rising water created Lake Celilo, a 24-mile-long reservoir on the Columbia River. In the vicinity of the railyard, the surface water elevation increased by approximately 40 feet in just a few days, inundating formerly dry land south of the railyard (inundated lands), and significantly altering groundwater elevations and flow conditions beneath the railyard. Operation of the hydroelectric dam results in daily fluctuations in the surface water elevation.

Field Investigations

Investigation activities were initiated onsite in 2002 to evaluate potential impacts to subsurface soils and groundwater from historical railyard activities. BNSF performed voluntary independent investigative and remedial actions through 2015. In 2015, BNSF and Ecology entered into an AO directing future remedial investigation activities.

Site investigation and interim remedial activities performed prior to adoption of the AO included excavating and disposing soil containing petroleum hydrocarbons, removing and disposing former USTs, collecting soil and/or groundwater samples, conducting a laser-induced fluorescence (LIF) survey, and investigating light non-aqueous phase liquid (LNAPL) mobility in the vicinity of the former Power House. An air sparge/soil vapor extraction system was installed at the site in 2012, in the vicinity of the Maintenance Shop, and converted to a bioventing system in 2013.

AO No. 12897 directs BNSF to further investigate data gap areas to complete the RI at the site.

Field activities performed under AO No. 12897 were substantially conducted between August 2016 and November 2019 and included advancing soil borings, collecting soil and reconnaissance groundwater (RGW) samples from open boreholes, installing groundwater monitoring wells and collecting groundwater samples, installing four oil head monitoring (OHM) wells, collecting LNAPL samples for mobility testing, monthly inspection of the nearshore Columbia River surface, and collecting oil sheen/oil droplet samples from the surface of the Columbia River. An evaluation of groundwater flow conditions beneath and in the vicinity of the site, as well as the potential migration of dissolved hydrocarbons from the site to the Columbia River were also conducted as part of the RI activities. An initial investigation of the presence and extent of non-aqueous phase liquid (NAPL) impacts in the inundated lands bordering the site (Figure ES-5) was also conducted and will be reported under separate cover.

Laboratory Analytical Methods

Samples were typically submitted for one or more of the following analyses to further evaluate the presence of site-related constituents in soil and groundwater beneath the site:

- Petroleum hydrocarbons as gasoline-, diesel-, and oil-range organics (GRO, DRO, and ORO)
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX)
- Volatile organic compounds (VOCs)
- Semi-volatile organic compounds (SVOCs)
- Total and dissolved metals (RCRA 8 metals, iron, and manganese)
- Polycyclic aromatic hydrocarbons (PAHs)
- Polychlorinated biphenyls (PCBs).

Uplands RI Results

The following summarizes field observations and laboratory results of soil and groundwater samples collected from the site.

Site Lithology

The majority of soils beneath the site were imported from other areas along the Columbia River (Grande 1992; Austin and Dill 1996) during development of the railyard. Fill material, comprised primarily of poorly graded fine to medium sand and gravel, is commonly encountered from ground surface to approximately 28 feet below ground surface (bgs). Native fine to medium sands and silts are generally encountered from 28 feet bgs to the top of bedrock, which can be encountered as deep as 80 feet bgs. Based on available references and surrounding geologic outcroppings, bedrock beneath the site is composed of flood basalts of the Columbia River Plateau.

Site Hydrogeology

Groundwater flow conditions beneath the site were evaluated based on 16 months of groundwater elevation data recorded using pressure transducers installed in select monitoring wells and in the Columbia River. The results of this study indicate that a losing stream condition (i.e., net flux of water from the Columbia River to the site) occurs during the summer, fall, and winter months across the site, and a gaining stream condition (i.e., net flux of groundwater from the site to the Columbia River) occurs in the spring months for a majority of the wells. Overall, a losing stream condition is observed more often (approximately 80 percent of the time in wells along the river berm) than a gaining stream condition (Table ES-1). The implication is a net migration of water away from the river, integrated over the course of a given year, but also characterized by an undulating (back-and-forth flow) component of flow across the shoreline on a sub-month time-scale of weeks, days, or possibly even hours.

LNAPL Field and Testing Results

Residual hydrocarbons and LNAPL have been observed beneath the site primarily in two locations, north of the mainline in the vicinity of the Maintenance Shop and near the southern end of the site near the former underground oil pipelines and the former Power House (Figures ES-6, ES-7, and ES-8). LNAPL was formerly observed in two monitoring wells (WMW-7 and WMW-8) near the Maintenance Shop but has not been measured in either well since 2016. In the southern end of the site near the former underground oil pipelines, visible LNAPL has been observed in soil cores during drilling and is currently observed in three monitoring wells (OHM-1, OHM-2, and OHM-3). The LNAPL is estimated to be greater than 30 years old based on known facility operations.

LNAPL samples collected during the 2013 LIF investigation from monitoring well WMW-8 and soil boring B-12-11 were scanned with the LIF tooling and used to identify diesel-like and oil/Bunker C-like, respectively, LIF responses. LIF results indicate diesel-like LNAPL is predominantly observed in the shallow water table zone to the south of the former Fueling Island (Figure ES-6); whereas oil/Bunker C-like LNAPL is predominantly observed in the submerged zone (Figure ES-7) in the vicinity of former underground fuel oil supply piping and the former Oil Trough and former Oil Sump.

LNAPL south of the mainline (near former underground piping and the Power House area) is classified as mobile, as defined by Interstate Technology and Regulatory Council (ITRC), as evidenced by observations of measurable LNAPL in three of the four OHM wells (Figure ES-8). LNAPL was not observed in the LIF borings south of the LNAPL body [determined using percent reference emitter (%RE) greater than 60 to indicate the presence of potentially mobile LNAPL] nor in the river berm monitoring wells, indicating that the LNAPL body is not migrating (Figures ES-8 and ES-9). Results from LIF borings indicate some shallow residual LNAPL (determined using %RE values between 20 and 60) may be present south of the LNAPL body along the CR LIF transect at depths of approximately 6 to 7 feet bgs (TG-CR-04, TG-CR-04.5, and TG-CR-05) (above the water table) and at approximately 10 to 13 feet bgs (TG-CR-02 and TG-CR-03) (Figure ES-6).

Laboratory Results

Laboratory results indicate the primary site-related constituents include total petroleum hydrocarbon (TPH)-related compounds (primarily DRO and ORO, but also GRO in localized areas) and PAHs [reported in a small subset of samples above the applicable MTCA cleanup levels (CULs)] in soil and groundwater, and total and dissolved arsenic in groundwater.

Soil Sample Results

Site-related constituents of concern in soil include benzene, GRO, DRO, ORO, and PAHs (Table ES-2). Lead was reported above its MTCA Method A CULs in one of 126 soil samples and in no groundwater samples from monitoring wells. Arsenic (total and dissolved) has been reported above MTCA Method A CULs in site groundwater, but not in soil samples. Arsenic and lead are not considered site-related constituents of concern in soil.

DRO and/or ORO were reported in unsaturated soils at concentrations above the MTCA Method A CUL at a single sample location in the footprint of the former Engine House/Machine Shop and three locations south of the former Power House area. DRO and/or ORO were reported in saturated soils at concentrations above the MTCA Method A CULs in the vicinity of the Maintenance Shop, south and east of former diesel and oil fueling operations, in the vicinity of former underground oil pipelines, and in the vicinity of the former Power House (Figure ES-10). PAHs appear to be associated with DRO/ORO and are, therefore, included with the petroleum-related constituents.

GRO was reported at concentrations above its MTCA Method A CUL in 12 out of 53 samples, localized near two former 500-gallon gasoline USTs (southwest of the Maintenance Shop) and a former gasoline UST near the former Power House. Benzene was reported infrequently (in two out of 177 samples) at concentrations above MTCA Method A CULs and is considered a site-related constituent of concern associated with GRO.

Groundwater Sample Results

Site-related constituents of concern in groundwater include DRO, ORO, PAHs, and arsenic. A total of 66 RGW samples (not including duplicates) have been collected from temporary well screens installed in direct-push borings. Groundwater samples and/or depth to water/LNAPL measurements have been collected from 41 groundwater monitoring wells during groundwater monitoring events. Constituents reported above respective CULs in RGW and monitoring well samples are summarized in Tables ES-3 and ES-4, respectively.

DRO and ORO concentrations reported above their CULs typically occur in the southern and central portions of the site in the wells near the former oil pipelines, western portion of the berm, and the former Engine House, and in wells west of the Maintenance Shop (Figure ES-11). PAHs (primarily 1-methylnaphthalene) were identified in the southern part of the site and in the vicinity of the former Engine House at concentrations above screening levels, in areas where DRO and/or ORO are also present.

Total barium, cadmium, chromium, and lead were reported above their respective MTCA Method A CULs in screening level RGW samples collected from 2004 and 2016 (Table ES-3);

however, these metals are not site-related constituents of concern based on sampling results from site monitoring wells (Table ES-4).

Arsenic is present in groundwater at concentrations above CULs primarily in the southern central and eastern parts of the site (Figures ES-12 and ES-13), in areas where petroleum hydrocarbons and/or residual organics from the former Septic Drainage Field created reducing conditions in groundwater, resulting in transformation of naturally occurring arsenic in soil to the dissolved phase. Concentrations of arsenic above the CUL have not been reported in wells in the northeastern part of the site (Figure ES-13). The partitioning of arsenic between aqueous and adsorbed states is influenced by oxidation-reduction (redox conditions), pH, and competition from other ionic complexes. Arsenic concentrations typically attenuate outside an area of reducing geochemical conditions where dissolved oxygen (DO) and normalized geochemistry result in the adsorption of arsenic back to the soil matrix at concentrations within the range of naturally-occurring background. Concentrations of arsenic above the CUL have not been reported in wells in the northeastern part of the site.

Potential Exposure Pathways and Receptors

Potentially complete exposure pathways for human and ecological receptors at the site generally include: direct contact and/or incidental ingestion of impacted media (soil and groundwater) by construction workers and railyard workers; as well as surface water contact or ingestion by terrestrial animals and aquatic organisms and consumption of aquatic organisms by terrestrial animals or other aquatic organisms. The vapor intrusion pathway is not a complete exposure pathway due to lack of VOCs reported in soil and groundwater and lack of buildings in the impacted areas of the site. Human consumption of shallow site groundwater is also not a complete exposure pathway. Shallow groundwater beneath the site is not a current source of drinking water and is unlikely to be identified as a drinking (domestic) water supply in the future; potable water is supplied by the City of Wishram. Elevated regional background arsenic concentrations and the shallow depth (approximately 10 to 14 feet bgs) of the saturated interval support its unsuitability as a source of potable water.,

Inundated Lands Investigation

An investigation of the nature and extent of petroleum hydrocarbon impacts in the inundated lands located to the south of the site is being conducted concurrently with the upland RI. Field activities for the initial investigation were completed in June and August 2018 in accordance with the Nearshore Sediment Initial Investigation Work Plan (Nearshore IIWP) (CH2M 2018). Thirty rigid “Darts” composed of PAH-adsorbing media were deployed to screen Columbia River sediment in nearshore areas for the presence of NAPL. In addition, five surface sediment grab samples and one sediment core were collected from nearshore locations within the initial study area, as well as at an upstream background location. During nearshore sample collection activities, observation of sheens farther offshore than previously reported prompted a survey to assess the outboard extent of the sheens. Seven sediment cores were advanced in the area from where the sheen appeared to be originating. Figure ES-5 shows the locations of Darts deployed and sediment samples collected during the initial investigation.

Surface sediment grab samples and one sediment core collected from the area that Darts were deployed confirmed that neither ORO nor DRO were present in nearshore sediment at concentrations above applicable SCOs. Four sediment cores collected between approximately 40 and 130 feet south of the site berm shoreline contained a layer of debris-filled material with visible NAPL. This area is undergoing further investigation and results will be reported to Ecology under separate cover.

Conclusions

The purpose of the RI is to investigate the nature and extent of site-related constituents in soil and groundwater at the railyard and evaluate related fate and transport mechanisms. The RI results form the basis of the Conceptual Site Model that will be used to evaluate potential exposures to site-related constituents and support development of the feasibility study (FS) as part of the site remediation process. Based on the data and information collected and the analysis described herein, characterization of the nature and extent of impacts in the upland area of the site is complete.

Additional evaluation of the fate and transport of petroleum hydrocarbons and an evaluation of the risks to human health and the environment are planned to provide information needed to develop the forthcoming FS and future Draft Cleanup Action Plan (DCAP). Additional investigation and evaluation in the offshore (inundated lands) area of the Columbia River, where petroleum hydrocarbons identified in sediments were observed, is also planned. Information related to offshore conditions in the inundated lands area will be addressed in a separate investigation report.

Conclusions

The following conclusions have been established though the RI process and will provide the foundation for the evaluation of remediation alternatives through FS and DCAP development:

- Petroleum hydrocarbons and related compounds are present in soil and groundwater at the site in the vicinity of former USTs, former ASTs, and former infrastructure used to store and transfer fuel oils.
    - Petroleum hydrocarbons (reported as DRO and ORO) are present in soil and groundwater at concentrations above MTCA Method A CULs and are primarily related to loading, unloading, and storage of Bunker C type fuel oil and diesel fuel.
    - Hydrocarbons in the gasoline range (GRO) are present above the MTCA Method A CUL in a small number of soil samples (12 of 53 samples) and in no groundwater samples since 2004. GRO is present at locations near former gasoline tanks and does not represent a risk to human health or the environment.
    - VOCs typically associated with gasoline, such as BTEX compounds, which typically pose the greatest potential risk to receptors are not present in the majority of samples above MTCA Method A CULs (only two of 177 soil samples for benzene and no groundwater samples for benzene since 2004). Chlorinated solvents and other VOCs were not reported at concentrations above MTCA Method A CULs in soil and groundwater samples. The relative absence of VOCs and the lack of onsite

buildings in or near impacted areas indicates vapor intrusion is an incomplete exposure pathway under current site conditions.

- PAHs, including carcinogenic PAHs (cPAHs), which were used to calculate Total cPAHs, were reported above MTCA Method A CULs in less than 10 percent of soil and groundwater samples and are associated with samples that contained DRO and ORO.

- Metals reported in soil were below applicable MTCA Method A or B CULs in 125 of 126 samples; lead was reported above its MTCA Method A CUL in one soil sample. Arsenic is present in groundwater along the river berm, and in locations where petroleum hydrocarbons related to former industrial activities and residual organics related to the former Septic Drainage Field affect groundwater geochemistry and liberate background arsenic in soil into groundwater.

- Suspected legacy sources of petroleum hydrocarbons have been decommissioned and removed from the site and impacted soil has been removed as part of interim remedial measure (IRM) activities. Where implemented, IRMs successfully removed petroleum hydrocarbons down to the water table or bedrock such that soil samples collected from all but 11 of 145 soil borings/excavation confirmation sampling locations in four site areas in the unsaturated zone do not contain residual petroleum hydrocarbons above MTCA Method A CULs. A bioventing system was installed in the vicinity of the Maintenance Shop in 2012 and operated through July 2019 as an IRM.

- Hydrodynamic evaluation of the interaction between the Columbia River (Lake Celilo) and site groundwater indicates that a losing stream condition occurs during the summer, fall, and winter months across the site, and a gaining stream condition occurs in the spring months for a majority of the wells. Overall, a losing stream condition is observed more often (approximately 80 percent of the time in wells along the river berm) than a gaining stream condition. The implication is a net migration of water away from the river, infiltrating beneath the site during losing stream conditions.

- Mobility and migration evaluation in soil cores indicates LNAPL is classified as mobile as defined by ITRC. The formation of Lake Celilo caused a rapid and permanent increase in groundwater elevation at the site, submerging the majority of LNAPL in the subsurface and increasing the pore entry pressure of the submerged LNAPL, thereby minimizing or eliminating the potential for the submerged viscous LNAPL to migrate horizontally. The specific gravity of the LNAPL (0.96) and observations in OHM wells (LNAPL floating on top of the water table) indicate that the submerged LNAPL does not exhibit the potential to migrate vertically downward into the bedrock. LNAPL properties (e.g., viscosity) and investigation data collected over time (including the absence of LNAPL in river berm monitoring wells) indicate LNAPL is not migrating laterally beneath the site.

- Field observations and results from the inundated lands initial investigation indicate that droplets and sheen observed on the surface of the Columbia River are linked to impacts identified within the inundated lands area, and not to the uplands area. Additional evaluation of conditions in the inundated lands area is ongoing and will be reported under separate cover.

Executive Summary Tables

TABLE ES-1

MONTHLY AVERAGE RIVER VERSUS GROUNDWATER ELEVATIONS
BNSF Wishram Railyard, Wishram, Washington

Table14A: Monthly Average Measured Groundwater Elevation Minus River Elevation

Month	WMW-1	WMW-3	WMW-5	WMW-8	WMW-9	WMW-10	WMW-11	WMW-14	WMW-16	WMW-18
Apr	0.02	0.07	0.10	0.37	0.13	-0.05	-0.12	-0.04	-0.03	-0.09
May	0.01	0.09	0.20	0.49	0.19	0.00	-0.06	0.18	0.17	0.10
Jun	0.06	0.26	0.30	0.76	0.32	0.07	-0.02	0.23	0.20	0.14
Jul	-0.10	0.17	0.16	0.56	0.12	-0.11	-0.13	-0.08	-0.05	-0.02
Aug	-0.26	-0.10	-0.04	-0.16	-0.19	-0.31	-0.27	-0.33	-0.25	-0.20
Sep	-0.33	-0.13	0.01	-0.31	-0.20	-0.31	-0.26	-0.32	-0.23	-0.19
Oct	-0.46	-0.19	-0.07	-0.39	-0.21	-0.32	-0.25	-0.30	-0.24	-0.19
Nov	-0.45	-0.21	-0.10	-0.33	-0.20	-0.33	-0.26	-0.30	-0.24	-0.19
Dec	-0.22	-0.09	-0.02	-0.12	-0.19	-0.25	-0.24	-0.24	-0.13	-0.15
Jan	-0.15	0.10	0.20	0.02	-0.03	-0.08	-0.11	-0.08	-0.02	-0.03
Feb	-0.19	0.11	0.18	0.03	-0.03	-0.09	-0.14	-0.09	-0.02	-0.04
Mar	-0.08	-0.01	0.09	0.05	-0.12	-0.16	-0.21	-0.15	-0.07	-0.10

Table14B: Monthly Average Measured Groundwater Minus Modeled Groundwater Elevation

Month	WMW-1	WMW-3	WMW-5	WMW-8	WMW-9	WMW-10	WMW-11	WMW-14	WMW-16	WMW-18
Apr	0.12	0.25	0.31	0.62	0.28	0.03	-0.05	0.00	0.00	-0.05
May	0.04	0.16	0.30	0.64	0.25	0.02	-0.05	0.18	0.18	0.11
Jun	-0.03	0.09	0.12	0.55	0.19	0.01	-0.08	0.19	0.17	0.10
Jul	-0.13	0.08	0.05	0.41	0.06	-0.13	-0.15	-0.08	-0.05	-0.03
Aug	-0.23	-0.04	0.02	-0.09	-0.14	-0.28	-0.25	-0.31	-0.24	-0.19
Sep	-0.34	-0.14	0.00	-0.31	-0.22	-0.32	-0.26	-0.33	-0.24	-0.20
Oct	-0.48	-0.22	-0.10	-0.42	-0.24	-0.34	-0.26	-0.31	-0.25	-0.20
Nov	-0.45	-0.21	-0.10	-0.33	-0.20	-0.32	-0.26	-0.29	-0.24	-0.19
Dec	-0.21	-0.06	0.01	-0.08	-0.17	-0.24	-0.23	-0.24	-0.13	-0.15
Jan	-0.20	0.02	0.10	-0.10	-0.09	-0.12	-0.14	-0.10	-0.04	-0.06
Feb	-0.18	0.10	0.17	0.00	-0.03	-0.09	-0.13	-0.09	-0.01	-0.03
Mar	-0.07	0.02	0.12	0.10	-0.10	-0.16	-0.20	-0.15	-0.07	-0.10

Notes:

Values in Table 14A represent measured (Table 13A) monthly average groundwater elevations minus monthly average river elevations. Results are presented in units of feet.

Values in Table 14B represent measured (Table 13A) minus modeled (Table 13B) monthly average groundwater elevations.

Cell shading indicates the following conditions with respect to the Columbia River.

- [green] Losing stream condition (negative result from groundwater elevation minus river elevation)
- [blue] Gaining stream condition (positive result from groundwater elevation minus river elevation)

TABLE ES-2

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN SOIL SAMPLES
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A Unrestricted then Lowest B		Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
NWTPH-Gx													
Gasoline-Range Organics	mg/kg	30	Method A	53()	12(0)	19()	36%	0.004-7.29	1.5	1,300	B-12-3-13,B-12-4-40	Yes	The maximum concentration exceeds MTCA Method A screening level.
NWTPH-Dx - without silica gel cleanup													
Diesel-Range Organics	mg/kg	2,000	Method A	138(6)	4(0)	19(0)	13%	4.13-88.9	5.3	65,000	B-12-4-40	Yes	The maximum concentration exceeds MTCA Method A screening level.
Oil-Range Organics	mg/kg	2,000	Method A	138(6)	3(0)	21(0)	15%	10.2-1270	13.3	67,000	B-12-4-40	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A	138(6)	6(0)	26(0)	18%	2.07-42.6	10.4	132,000	B-12-4-40	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A	138(6)	6(0)	26(0)	18%	--	5.3	132,000	B-12-4-40	Yes	The maximum concentration exceeds MTCA Method A screening level.
NWTPH-Dx - with silica gel cleanup													
Diesel-Range Organics	mg/kg	2,000	Method A	236(2)	65(0)	123(0)	52%	0.025-30	12	60,600	E-15-14.5	Yes	The maximum concentration exceeds MTCA Method A screening level.
Oil-Range Organics	mg/kg	2,000	Method A	236(2)	59(0)	103(0)	43%	0.05-285	11.5	71,000	B-12-2-12	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A	236(2)	73(0)	130(0)	55%	0.0125-15	13.8	113,000	#9-12,B-12-11-35	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A	236(2)	73(0)	130(0)	55%	--	11.5	113,000	#9-12,B-12-11-35	Yes	The maximum concentration exceeds MTCA Method A screening level.
BTEX													
Benzene	mg/kg	0.03	Method A	177(6)	2(0)	11(1)	7%	0.00103-0.18	0.00135	0.14	B-12-11-35	Yes	The maximum concentration exceeds MTCA Method A screening level.
Toluene	mg/kg	7	Method A	177(6)	0(0)	13(1)	8%	0.00153-0.99	0.0065	0.16	B-12-2-12	No	Maximum concentration does not exceed the cleanup level.
Ethylbenzene	mg/kg	6	Method A	177(6)	0(0)	10(0)	5%	0.00107-0.99	0.00336	1.31	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
Xylene, m,p-	mg/kg	--		118(4)	0(0)	19(1)	16%	0.00413-0.2	0.00485	1.26	B-18-24(13.5-14.0)	No	Cleanup level not available for parameter.
Xylene, o-	mg/kg	16,000	Method B Non cancer	118(4)	0(0)	14(1)	12%	0.00258-0.99	0.0034	0.34	B-12-2-12	No	Maximum concentration does not exceed the cleanup level.
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A	118(4)	0(0)	21(1)	18%	0.00129-0.05	0.00584	1.4	B-12-11-35	No	Maximum concentration does not exceed the cleanup level.
Xylene, total	mg/kg	9	Method A	77(2)	0(0)	10(0)	13%	0.00322-0.146	0.0817	1.395	B-12-11-35	No	Maximum concentration does not exceed the cleanup level.
NWEPH													
C8-C10 Aliphatics	mg/kg	--		10()	0(0)	9()	90%	130	16	660	TG-D4-37	No	Cleanup level not available for parameter.
C10-C12 Aliphatic Hydrocarbons	mg/kg	--		10()	0(0)	9()	90%	12	54	2,600	TG-D4-37	No	Cleanup level not available for parameter.
C12-C16 Aliphatics	mg/kg	--		10()	0(0)	10()	100%	--	230	10,000	TG-A6-36	No	Cleanup level not available for parameter.
C16-C21 Aliphatics	mg/kg	--		10()	0(0)	10()	100%	--	240	11,000	TG-F6-29	No	Cleanup level not available for parameter.
C21-C34 Aliphatics	mg/kg	--		10()	0(0)	10()	100%	--	400	17,000	TG-A6-36,TG-F6-29	No	Cleanup level not available for parameter.
C8-C10 Aromatics	mg/kg	--		10()	0(0)	0()	0%	2.6-130	--	--	--	No	Cleanup level not available for parameter.
C10-C12 Aromatics	mg/kg	--		10()	0(0)	7()	70%	62-130	3.5	340	TG-E8-24	No	Cleanup level not available for parameter.
C12-C16 Aromatics	mg/kg	--		10()	0(0)	10()	100%	--	40	2,600	TG-E8-24	No	Cleanup level not available for parameter.
C16-C21 Aromatics	mg/kg	--		10()	0(0)	10()	100%	--	220	8,800	TG-A6-36	No	Cleanup level not available for parameter.
C21-C34 Aromatics	mg/kg	--		10()	0(0)	10()	100%	--	350	16,000	TG-A6-36	No	Cleanup level not available for parameter.
Semi Volatile Organic Compounds													
2-Methylphenol (o-Cresol)	mg/kg	4,000	Method B Non cancer	7()	0(0)	0()	0%	0.408-356	--	--	--	No	Detection frequency is 0%.
3&4-Methylphenol (m&p-Cresol)	mg/kg	--		7()	0(0)	0()	0%	0.408-356	--	--	--	No	Cleanup level not available for parameter.
Polycyclic Aromatic Hydrocarbons using SIM													
1-Methylnaphthalene	mg/kg	34	Method B Cancer	137(6)	4(0)	12(1)	9%	0.0203-1.3	0.0274	260	TG-D1-12	Yes	The maximum concentration exceeds MTCA Method B Cancer screening level.
2-Methylnaphthalene	mg/kg	320	Method B Non cancer	147(6)	1(0)	14(1)	10%	0.0134-0.526	0.0279	410	TG-D1-12	Yes	The maximum concentration exceeds MTCA Method B Non cancer screening level.
Acenaphthene	mg/kg	4,800	Method B Non cancer	153(6)	0(0)	14(0)	9%	0.0061-35.3	0.00807	18	TG-D1-12	No	Maximum concentration does not exceed the cleanup level.
Acenaphthylene	mg/kg	--		153(6)	0(0)	4(0)	3%	0.0061-35.3	0.28	3.8	TG-D1-12	No	Cleanup level not available for parameter.
Anthracene	mg/kg	24,000	Method B Non cancer	153(6)	0(0)	20(1)	13%	0.0061-35.3	0.00781	8.1	TG-D0-12	No	Maximum concentration does not exceed the cleanup level.
Benzo(a)anthracene	mg/kg	--		154(6)	0(0)	20(1)	13%	0.00619-35.3	0.00791	4.3	TG-D0-12	No	Cleanup level not available for parameter.
Benzo(a)pyrene	mg/kg	0.1	Method A (Sum cPAHs)	154(6)	5(0)	19(1)	13%	0.00619-35.3	0.00868	3.07	B-18-18(1.5-2.0)	Yes	The maximum concentration exceeds MTCA Method A (Sum cPAHs) screening level.
Benzo(b)Fluoranthene	mg/kg	--		154(6)	0(0)	22(1)	14%	0.00619-35.3	0.0078	4.24	B-18-18(1.5-2.0)	No	Cleanup level not available for parameter.
Benzo(g,h,i)Perylene	mg/kg	--		153(6)	0(0)	24(1)	16%	0.00619-35.3	0.00774	1.9	B-18-18(1.5-2.0)	No	Cleanup level not available for parameter.
Benzo(k)Fluoranthene	mg/kg	--		154(6)	0(0)	12(1)	8%	0.00614-35.3	0.00783	1.17	B-18-18(1.5-2.0)	No	Cleanup level not available for parameter.
Chrysene	mg/kg	--		154(6)	0(0)	23(1)	15%	0.00619-35.3	0.00746	10	TG-D0-12	No	Cleanup level not available for parameter.
Dibenz(a,h)Anthracene	mg/kg	--		154(6)	0(0)	10(0)	6%	0.00614-35.3	0.00719	0.582	B-18-18(1.5-2.0)	No	Cleanup level not available for parameter.
Fluoranthene	mg/kg	3,200	Method B Non cancer	153(6)	0(0)	24(1)	16%	0.00619-35.3	0.0077	6.61	B-18-18(1.5-2.0)	No	Maximum concentration does not exceed the cleanup level.
Fluorene	mg/kg	3,200	Method B Non cancer	153(6)	0(0)	15(0)	9%	0.0061-35.3	0.0105	24	TG-D1-12	No	Maximum concentration does not exceed the cleanup level.
Indeno(1,2,3-c,d)Pyrene	mg/kg	--		154(6)	0(0)	17(1)	11%	0.00619-35.3	0.00737	1.72	B-18-18(1.5-2.0)	No	Cleanup level not available for parameter.
Naphthalene	mg/kg	5	Method A	154(6)	4(0)	11(1)	8%	0.0134-35.3	0.0233	23.8	WSB-2-14	Yes	The maximum concentration exceeds MTCA Method A screening level.
Phenanthrene	mg/kg	--		153(6)	0(0)	29(1)	19%	0.00614-35.3	0.00744	41	WSB-2-14,TG-D0-12,TG-D1-12	No	Cleanup level not available for parameter.
Pyrene	mg/kg	2,400	Method B Non cancer	153(6)	0(0)	34(1)	22%	0.00619-35.3	0.00699	19	TG-D0-12	No	Maximum concentration does not exceed the cleanup level.
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A	154(6)	7(0)	17(1)	11%	0.0067-17.7	0.0542	679	TG-D1-12	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A	154(6)	7(0)	17(1)	11%	0	0.0281	679	TG-D1-12	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A (Sum cPAHs)	154(6)	12(0)	29(1)	19%	0.0031-17.7	0.0053	4.25	B-18-18(1.5-2.0)	Yes	The maximum concentration exceeds MTCA Method A (Sum cPAHs) screening level.
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A (Sum cPAHs)	154(6)	8(0)	29(1)	19%	0	0.00067	4.25	B-18-18(1.5-2.0)	Yes	The maximum concentration exceeds MTCA Method A (Sum cPAHs) screening level.

TABLE ES-2

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN SOIL SAMPLES
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A Unrestricted then Lowest B		Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
Volatile Organic Compounds													
1,1-Dichloropropene	mg/kg	--		122(6)	0(0)	1(0)	1%	0.00107-0.1	0.0454	0.0454	B-18-10(2.0-2.5)	No	Cleanup level not available for parameter.
1,2,3-Trimethylbenzene	mg/kg	800	Method B Non cancer	115(6)	0(0)	6(1)	6%	0.00107-0.00712	0.0043	8.52	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
1,2,4-Trimethylbenzene	mg/kg	800	Method B Non cancer	121(6)	0(0)	7(1)	6%	0.00107-0.1	0.00813	19	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
1,2-Dichloropropane	mg/kg	27	Method B Cancer	122(6)	0(0)	1(0)	1%	0.00107-0.127	0.0184	0.0184	B-18-18(52.5-53.0)	No	Maximum concentration does not exceed the cleanup level.
1,3,5-Trimethylbenzene	mg/kg	800	Method B Non cancer	122(6)	0(0)	2(0)	2%	0.00107-0.1	0.00961	0.942	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
Acetone	mg/kg	72,000	Method B Non cancer	122(6)	0(0)	9(0)	7%	0.0258-2.5	0.0313	0.106	B-18-29(2.0-2.5)	No	Maximum concentration does not exceed the cleanup level.
Chloroethane	mg/kg	--		122(6)	0(0)	1(0)	1%	0.0051-0.127	0.0248	0.0248	B-18-10(2.0-2.5)	No	Cleanup level not available for parameter.
Cymene (p-Isopropyltoluene)	mg/kg	--		122(6)	0(0)	2(0)	2%	0.00107-0.2	0.011	2.82	B-18-24(13.5-14.0)	No	Cleanup level not available for parameter.
Dibromomethane	mg/kg	800	Method B Non cancer	122(6)	0(0)	1(0)	1%	0.00107-0.127	0.00611	0.00611	B-18-10(2.0-2.5)	No	Maximum concentration does not exceed the cleanup level.
Isopropylbenzene	mg/kg	8,000	Method B Non cancer	122(6)	0(0)	1(0)	1%	0.00107-0.2	1.11	1.11	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
Methyl ethyl ketone (2-Butanone)	mg/kg	48,000	Method B Non cancer	122(6)	0(0)	11(0)	9%	0.0107-1	0.0185	0.0566	B-18-23(3.0-3.5)	No	Maximum concentration does not exceed the cleanup level.
Naphthalene	mg/kg	5	Method A	121(6)	1(0)	6(0)	5%	0.0051-0.2	0.016	19.7	B-18-24(13.5-14.0)	Yes	The maximum concentration exceeds MTCA Method A screening level.
n-Butylbenzene	mg/kg	4,000	Method B Non cancer	122(6)	0(0)	1(0)	1%	0.00107-0.5	2.68	2.68	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
n-Propylbenzene	mg/kg	8,000	Method B Non cancer	122(6)	0(0)	1(0)	1%	0.00107-0.1	2.39	2.39	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
Sec-Butylbenzene	mg/kg	8,000	Method B Non cancer	122(6)	0(0)	1(0)	1%	0.00107-0.1	1.82	1.82	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
trans-1,3-Dichloropropene	mg/kg	10	Method B Cancer (Total)	122(6)	0(0)	1(0)	1%	0.00107-0.127	0.00897	0.00897	B-18-10(2.0-2.5)	No	Maximum concentration does not exceed the cleanup level.
Metals													
Arsenic	mg/kg	20	Method A	121(6)	0(0)	29(1)	24%	2.07-2.7	1.16	9.65	B-18-18(1.5-2.0)	No	Maximum concentration does not exceed the cleanup level.
Barium	mg/kg	16,000	Method B Non cancer	121(6)	0(0)	121(6)	100%	--	36.5	6,500	WSB-2-14	No	Maximum concentration does not exceed the cleanup level.
Cadmium	mg/kg	2	Method A	121(6)	0(0)	0(0)	0%	0.289-0.709	--	--	--	No	Detection frequency is 0%.
Chromium, Hexavalent	mg/kg	19	Method A	4()	0(0)	0()	0%	10	--	--	--	No	Detection frequency is 0%.
Chromium, total	mg/kg	2,000	Method A	121(6)	0(0)	121(6)	100%	--	3.83	28.8	B-18-03(2.0-2.5)	No	Maximum concentration does not exceed the cleanup level.
Lead	mg/kg	250	Method A	126(6)	1(0)	126(6)	100%	--	0.969	387	WSB-2-8	Yes	The maximum concentration exceeds MTCA Method A screening level.
Mercury	mg/kg	2	Method A	121(6)	0(0)	17(0)	13%	0.0206-0.0806	0.0249	0.156	B-18-30(2.0-2.5)	No	Maximum concentration does not exceed the cleanup level.
Selenium	mg/kg	400	Method B Non cancer	121(6)	0(0)	2(0)	2%	0.345-2.83	0.411	0.457	WSB-2-8	No	Maximum concentration does not exceed the cleanup level.
Silver	mg/kg	400	Method B Non cancer	121(6)	0(0)	0(0)	0%	0.345-1.42	--	--	--	No	Detection frequency is 0%.
Metals - TCLP													
Barium	µg/L	100,000	TCLP Haz Waste Limit	4	0(0)	4(0)	100%	--	579	815	WSB-04-30-5	No	Maximum concentration does not exceed the TCLP level.

Abbreviations and Symbols:

" - -" denotes not measured, not available, or not applicable.
mg/kg = milligrams per kilogram
µg/L = milligrams per liter
BTEX = benzene, toluene, ethylbenzene, and xylenes compounds
EPH = Extractable Petroleum Hydrocarbons
NWTPH = Northwest Total Petroleum Hydrocarbon Method
SIM = selective ion monitoring
Total TPH-Dx = Total TPH-Dx concentrations were calculated by summing diesel-range organics (DRO) and oil-range organics (ORO) concentrations. Non-detects were included as noted.
Total cPAHs = Possible Total Carcinogenic Polycyclic Aromatic hydrocarbons (cPAHs) are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. Non-detects were included as noted.
Total Naphthalenes = Total Naphthalenes concentrations were calculated by summing 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene concentrations. Non-detects were included as noted.
Total Xylenes = Total Xylenes concentrations were calculated by summing Xylene, m,p- and Xylene, o- concentrations. Non-detects were included as noted.
(HitsOnly) = If an individual chemical was not detected, it was not included in the calculation.
(HalfDL) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation.
(HalfDL_WA) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration.

Notes:

Above CUL. Yes (Y) or No (N) based on reported resulted in at least one groundwater sample at a concentration above an applicable cleanup level (CUL).
If "Yes", the cell is shaded blue. Yes
Number of Analyses. Normal sample analyses are followed by duplicate sample analyses in parentheses.

Cleanup Levels (CUL)

Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for unrestricted land use (Method A) based on Washington State Administrative Code (WAC) 173-340-740 Table 740-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2020).

TABLE ES-3

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN RECONNAISSANCE GROUNDWATER SAMPLES
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Env Effects-Based Conc	Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
NWTPH-Gx														
Gasoline-Range Organics	µg/L	800/1000	Method A		32(2)	0(0)	9(0)	26%	50-100	20	390	WSB-04-6-GW,AS-12-3	No	Maximum concentration does not exceed the cleanup level.
NWTPH-Dx Without Silica Gel Cleanup (SGC)														
Diesel-Range Organics	µg/L	500	Method A	Fresh Diesel: 250 Weathered Diesel: 3,040	40(2)	Method A: 4(0) EEBC-F: 17(0) EEBC-W: 1(0)	25(0)	60%	100-400	108	38,900	B-18-24	Yes	The maximum concentration exceeds MTCA Method A screening level.
Oil-Range Organics	µg/L	500	Method A		40(2)	10(0)	24(0)	57%	250-500	258	9,270	B-18-24	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A		40(2)	20(0)	30(0)	71%	50-200	233	48,200	B-18-24	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HitsOnly)	µg/L	500	Method A		40(2)	18(0)	30(0)	71%	0	108	48,200	B-18-24	Yes	The maximum concentration exceeds MTCA Method A screening level.
NWTPH-Dx With Silica Gel Cleanup (SGC)														
Diesel-Range Organics	µg/L	500	Method A	Fresh Diesel: 250 Weathered Diesel: 3,040	28(1)	Method A: 11(0) EEBC-F: 13(0) EEBC-W: 4(0)	16(1)	59%	100-417	126	22,000	MWD-1-35	Yes	The maximum concentration exceeds MTCA Method A screening level.
Oil-Range Organics	µg/L	500	Method A		28(1)	9(0)	15(1)	55%	250-833	85	4,400	MWD-1-20	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A		28(1)	13(0)	16(1)	59%	50-209	219	23,800	MWD-1-35	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HitsOnly)	µg/L	500	Method A		28(1)	13(0)	16(1)	59%	0	219	23,800	MWD-1-35	Yes	The maximum concentration exceeds MTCA Method A screening level.
BTEX														
Benzene	µg/L	5	Method A		59(3)	0(0)	1(0)	2%	0.5-1	0.17	0.17	AS-12-3	No	Maximum concentration does not exceed the cleanup level.
Toluene	µg/L	1,000	Method A		59(3)	0(0)	1(0)	2%	0.5-5	2.14	2.14	WSB-04-34-GW	No	Maximum concentration does not exceed the cleanup level.
Ethylbenzene	µg/L	700	Method A		59(3)	0(0)	4(0)	6%	0.5-1	0.31	5.1	WSB-04-6-GW	No	Maximum concentration does not exceed the cleanup level.
Xylene, m,p-	µg/L	--			37(2)	0(0)	3(0)	8%	2	0.77	3.1	B-18-24	No	Cleanup level not available for parameter.
Xylene, o-	µg/L	1,600	B Non cancer		37(2)	0(0)	1(0)	3%	1	0.41	0.41	AS-12-3	No	Maximum concentration does not exceed the cleanup level.
Total Xylenes (HalfDL_WA)	µg/L	1,000	Method A		37(2)	0(0)	3(0)	8%	0.5	1.27	3.6	B-18-24	No	Maximum concentration does not exceed the cleanup level.
Xylene, total	µg/L	1,000	Method A		31(2)	0(0)	4(0)	12%	0.5-3	0.77	18.2	WSB-04-6-GW	No	Maximum concentration does not exceed the cleanup level.
Semi Volatile Organic Compounds										--				
2-Methylphenol (o-Cresol)	µg/L	400	B Non cancer		2()	0(0)	0()	0%	10		--	--	No	Detection frequency is 0%.
3&4-Methylphenol (m&p-Cresol)	µg/L	--			2()	0(0)	0()	0%	10		--	--	No	Cleanup level not available for parameter.
Polycyclic Aromatic Hydrocarbons using SIM														
1-Methylnaphthalene	µg/L	1.5	B Cancer		45(2)	2(0)	3(0)	6%	0.25-0.5	0.313	47.1	B-18-24	Yes	The maximum concentration exceeds MTCA B Cancer screening level.
2-Methylnaphthalene	µg/L	32	B Non cancer		45(2)	2(0)	2(0)	4%	0.25-0.5	43.5	47.4	B-18-24	Yes	The maximum concentration exceeds MTCA B Non cancer screening level.
Acenaphthene	µg/L	960	B Non cancer		47(2)	0(0)	5(0)	10%	0.05-1	0.0514	34.8	B-16-20 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Acenaphthylene	µg/L	--			47(2)	0(0)	2(0)	4%	0.05-1	0.0602	0.333	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Anthracene	µg/L	4,800	B Non cancer		47(2)	0(0)	13(0)	27%	0.05-1	0.0613	2.93	B-16-20 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Benzo(a)anthracene	µg/L	--			47(2)	0(0)	1(0)	2%	0.05-1	0.207	0.207	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Benzo(a)pyrene	µg/L	0.1	Method A		47(2)	0(0)	1(0)	2%	0.05-1	0.0842	0.0842	B-16-20 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Benzo(b)Fluoranthene	µg/L	--			47(2)	0(0)	1(0)	2%	0.05-1	0.11	0.11	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Benzo(g,h,i)Perylene	µg/L	--			47(2)	0(0)	1(0)	2%	0.05-1	0.133	0.133	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Benzo(k)Fluoranthene	µg/L	--			47(2)	0(0)	0(0)	%	0.05-1	--	--	--	No	Cleanup level not available for parameter.
Chrysene	µg/L	--			47(2)	0(0)	1(0)	2%	0.05-1	0.168	0.168	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Dibenz(a,h)Anthracene	µg/L	--			47(2)	0(0)	0(0)	%	0.05-1	--	--	--	No	Cleanup level not available for parameter.
Fluoranthene	µg/L	640	B Non cancer		47(2)	0(0)	3(0)	6%	0.05-1	0.11	2.19	B-16-20 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Fluorene	µg/L	640	B Non cancer		47(2)	0(0)	4(0)	8%	0.05-1	0.155	20.9	B-16-20 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Indeno(1,2,3-c,d)Pyrene	µg/L	--			47(2)	0(0)	1(0)	2%	0.05-1	0.0737	0.0737	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Naphthalene	µg/L	160	Method A		49(2)	1(0)	11(1)	24%	0.25-5	0.312	268	B-16-20 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Phenanthrene	µg/L	--			47(2)	0(0)	7(0)	14%	0.05-1	0.0513	23	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Pyrene	µg/L	480	B Non cancer		47(2)	0(0)	3(0)	6%	0.05-1	0.0802	1.31	B-16-20 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A		49(2)	1(0)	11(1)	24%	0.125-2.5	0.562	339	B-16-20 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total Naphthalenes (HitsOnly)	µg/L	160	Method A		49(2)	1(0)	11(1)	24%	0	0.312	339	B-16-20 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A		47(2)	1(0)	1(0)	2%	0.025-0.5	0.13	0.13	B-16-20 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A		47(2)	1(0)	1(0)	2%	0	0.125	0.125	B-16-20 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Volatile Organic Compounds														
1,2,3-Trimethylbenzene	µg/L	80	B Non cancer		44(2)	0(0)	1(0)	2%	1	2.74	2.74	B-18-24	No	Maximum concentration does not exceed the cleanup level.
1,2,4-Trimethylbenzene	µg/L	80	B Non cancer		46(2)	0(0)	1(0)	2%	1	21.5	21.5	B-18-24	No	Maximum concentration does not exceed the cleanup level.
Cymene (p-Isopropyltoluene)	µg/L	--			46(2)	0(0)	1(0)	2%	1-2	1.84	1.84	B-18-24	No	Cleanup level not available for parameter.
Isopropylbenzene	µg/L	800	B Non cancer		46(2)	0(0)	1(0)	2%	1-2	1.83	1.83	B-18-24	No	Maximum concentration does not exceed the cleanup level.
Naphthalene	µg/L	160	Method A		44(2)	1(0)	2(0)	4%	5	40	360	B-16-20 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
n-Propylbenzene	µg/L	800	B Non cancer		46(2)	0(0)	1(0)	2%	1	2.97	2.97	B-18-24	No	Maximum concentration does not exceed the cleanup level.

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN RECONNAISSANCE GROUNDWATER SAMPLES
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Env Effects-Based Conc	Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
Metals														
Arsenic, Dissolved	µg/L	5	Method A		44(2)	14(1)	27(1)	61%	2-10	2.28	15.5	B-18-17	Yes	The maximum concentration exceeds MTCA Method A screening level.
Arsenic, Total	µg/L	5	Method A		17(1)	10(1)	10(1)	61%	10	6.48	151	B-16-10 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Barium, Dissolved	µg/L	3,200	B Non cancer		44(2)	0(0)	44(2)	100%	0	21.1	143	B-16-15 (10.0) (20160809)	No	Maximum concentration does not exceed the cleanup level.
Barium, Total	µg/L	3,200	B Non cancer		17(1)	2(0)	17(1)	100%	0	120	8,620	B-16-10 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA B Non cancer screening level.
Cadmium, Dissolved	µg/L	5	Method A		44(2)	0(0)	0(0)	0%	1-2		--	--	No	Detection frequency is 0%.
Cadmium, Total	µg/L	5	Method A		17(1)	3(0)	5(1)	33%	1-2	3.92	19.3	B-16-10 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Chromium, total, Dissolved	µg/L	100	Method A		44(2)	0(0)	5(1)	13%	2-10	2.19	18.1	B-16-13 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Chromium, total, Total	µg/L	100	Method A		17(1)	4(0)	16(1)	94%	10	10.4	854	B-16-10 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Lead, Dissolved	µg/L	15	Method A		45(2)	0(0)	3(0)	6%	2-5	2.52	6.29	B-16-23 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Lead, Total	µg/L	15	Method A		18(1)	14(1)	18(1)	100%	0	6.33	4,530	B-16-23 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Mercury, Dissolved	µg/L	2	Method A		44(2)	0(0)	0(0)	0%	0.2		--	--	No	Detection frequency is 0%.
Mercury, Total	µg/L	2	Method A		17(1)	0(0)	4(1)	28%	0.2	0.297	1.45	DUP-01 (20160809)	No	Maximum concentration does not exceed the cleanup level.
Selenium, Dissolved	µg/L	80	B Non cancer		44(2)	0(0)	0(0)	0%	2-10		--	--	No	Detection frequency is 0%.
Selenium, Total	µg/L	80	B Non cancer		17(1)	0(0)	1(0)	6%	10-50	1.46	1.46	WSB-04-34-GW	No	Maximum concentration does not exceed the cleanup level.
Silver, Dissolved	µg/L	80	B Non cancer		44(2)	0(0)	0(0)	0%	2-5		--	--	No	Detection frequency is 0%.
Silver, Total	µg/L	80	B Non cancer		17(1)	0(0)	0(0)	0%	1-25		--	--	No	Detection frequency is 0%.

Abbreviations and Symbols:

" - -" denotes not measured, not available, or not applicable.

Total TPH-Dx = Total TPH-Dx concentrations were calculated by summing diesel-range organics (DRO) and oil-range organics (ORO) concentrations. Non-detects were included as noted.

Total cPAHs = Possible Total Carcinogenic Polycyclic Aromatic hydrocarbons (cPAHs) are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. Non-detects were included as noted.

Total Naphthalenes = Total Naphthalenes concentrations were calculated by summing 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene concentrations. Non-detects were included as noted.

Total Xylenes = Total Xylenes concentrations were calculated by summing Xylene, m,p- and Xylene, o- concentrations. Non-detects were included as noted.

(HitsOnly) = If an individual chemical was not detected, it was not included in the calculation.

(HalfDL_WA) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration.

µg/L = micrograms per liter

Notes

Above CUL. Yes (Y) or No (N) based on reported resulted in at least one groundwater sample at a concentration above an applicable cleanup level (CUL).

If "Yes", the cell is shaded blue. Yes

Number of Analyses. Normal sample analyses are followed by duplicate sample analyses in parentheses.

Cleanup Levels (CUL)

Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for groundwater (Method A) based on Washington State Administrative Code (WAC) 173-340-740 Table 720-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2020).

Environmental Effects-Based Concentrations (EEBC) for Surface Water. Value for Fresh Diesel (EEBC-F) based on Table 2 of Environmental Effects-Based Concentrations for Total Petroleum Hydrocarbons (TPH), February 2018, Ecology Publication No. 18-03-002. Value for Weathered Diesel (EEBC-W) based on Environmental Effects-Based Concentrations for Weathered Diesel-Range Organics, June 2020, Ecology Publication No. 20-03-008.

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN MONITORING WELL GROUNDWATER SAMPLES (2012 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Unit	MTCA A then Lowest B		Env Effects-Based Conc	Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
NWTPH-Gx														
Gasoline-Range Organics	µg/L	800 / 1000	Method A		123(34)	0(0)	30(10)	25%	50-500	10	420	WMW-8-20120313	No	Maximum concentration does not exceed the cleanup level.
NWTPH-Dx - without silica gel cleanup														
Diesel-Range Organics	µg/L	500	Method A	Fresh Diesel: 250 Weathered Diesel: 3,040	216(21)	Method A: 84(15) EEBC-F: 101(16) EEBC-W: 56(9)	112(16)	54%	200-250	203	28600	WMW-16-20171130	Yes	The maximum concentration exceeds MTCA Method A screening level.
Oil-Range Organics	µg/L	500	Method A		216(21)	110(18)	148(19)	70%	250-500	252	12600	WMW-03-20180823	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A		216(21)	125(18)	148(19)	70%	100-125	352	36300	WMW-16-20171130	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HitsOnly)	ug/L	500	Method A		216(21)	117(18)	148(19)	70%	0	252	36300	WMW-16-20171130	Yes	The maximum concentration exceeds MTCA Method A screening level.
NWTPH-Dx - with silica gel cleanup														
Diesel-Range Organics	µg/L	500	Method A	Fresh Diesel: 250 Weathered Diesel: 3,040	127(24)	Method A: 52(17) EEBC-F: 62(17) EEBC-W: 33(13)	68(21)	59%	100-250	71	21100	WMW-16-20171130	Yes	The maximum concentration exceeds MTCA Method A screening level.
Oil-Range Organics	µg/L	500	Method A		127(24)	45(16)	59(17)	50%	250-5000	51	8300	WMW-3-20131105-H	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A		127(24)	65(18)	70(21)	60%	50-125	111	25300	WMW-3-20131105-H	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HitsOnly)	ug/L	500	Method A		127(24)	61(18)	70(21)	60%	0	51	25300	WMW-3-20131105-H	Yes	The maximum concentration exceeds MTCA Method A screening level.
BTEX														
Benzene	µg/L	5	Method A		186(30)	0(0)	0(0)	0%	0.5-5	--	--	--	No	Detection frequency is 0%.
Ethylbenzene	µg/L	700	Method A		186(30)	0(0)	0(2)	1%	0.5-5	1	1	WMW-11-20140930-DUP,WMW-11-20150427-	No	Maximum concentration does not exceed the cleanup level.
Toluene	µg/L	1000	Method A		186(30)	0(0)	3(2)	2%	1-5	1.57	7.11	WMW-32-20180827	No	Maximum concentration does not exceed the cleanup level.
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A		118(9)	0(0)	0(0)	0%	0.5-2.5	--	--	--	No	Detection frequency is 0%.
Xylene, total	µg/L	1000	Method A		68(21)	0(0)	3(3)	7%	1.5-3	1.15	3	WMW-11-20140930-	No	Maximum concentration does not exceed the cleanup level.
Semi Volatile Organic Compounds														
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer		14(1)	0(0)	0(0)	0%	10-11.1	--	--	--	No	Detection frequency is 0%.
Methylphenol, 3 & 4	µg/L	--			14(1)	0(0)	0(0)	0%	10-11.1	--	--	--	No	Cleanup level not available for parameter.
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM														
1-Methylnaphthalene	µg/L	1.5	B Cancer		96(9)	10(0)	15(0)	14%	0.25-2.5	0.298	15	WMW-16-20181107	Yes	The maximum concentration exceeds MTCA B Cancer screening level.
2-Methylnaphthalene	µg/L	32	B Non cancer		96(9)	0(0)	3(0)	3%	0.25-2.5	0.912	1.95	WMW-16-20171130	No	Maximum concentration does not exceed the cleanup level.
Acenaphthene	µg/L	960	B Non cancer		100(10)	0(0)	23(4)	25%	0.05-1.11	0.0554	1.36	WMW-16-20171130	No	Maximum concentration does not exceed the cleanup level.
Acenaphthylene	µg/L	--			100(10)	0(0)	2(0)	2%	0.05-1.11	0.0541	0.103	RMD-1-20190507	No	Cleanup level not available for parameter.
Anthracene	µg/L	4800	B Non cancer		100(10)	0(0)	7(1)	7%	0.05-1.11	0.0536	0.126	RMD-1-20170919	No	Maximum concentration does not exceed the cleanup level.
Benzo(a)anthracene	µg/L	--			100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Cleanup level not available for parameter.
Benzo(a)pyrene	µg/L	0.1	Method A		100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Detection frequency is 0%.
Benzo(b)Fluoranthene	µg/L	--			100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Cleanup level not available for parameter.
Benzo(g,h,i)Perylene	µg/L	--			100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Cleanup level not available for parameter.
Benzo(k)Fluoranthene	µg/L	--			100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Cleanup level not available for parameter.
Chrysene	µg/L	--			100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Cleanup level not available for parameter.
Dibenz(a,h)Anthracene	µg/L	--			100(10)	0(0)	1(0)	1%	0.05-1.11	0.0689	0.0689	WMW-30-20180829	No	Cleanup level not available for parameter.
Fluoranthene	µg/L	640	B Non cancer		100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Detection frequency is 0%.
Fluorene	µg/L	640	B Non cancer		100(10)	0(0)	24(6)	27%	0.05-1.11	0.0608	1.35	RMD-1-20190507	No	Maximum concentration does not exceed the cleanup level.
Indeno(1,2,3-c,d)Pyrene	µg/L	--			100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Cleanup level not available for parameter.
Naphthalene	µg/L	160	Method A		100(10)	0(0)	10(1)	10%	0.25-2.5	0.271	1.25	RMD-1-20190507	No	Maximum concentration does not exceed the cleanup level.
Phenanthrene	µg/L	--			100(10)	0(0)	5(1)	5%	0.05-1.11	0.056	0.175	RMD-1-20180430	No	Cleanup level not available for parameter.
Pyrene	µg/L	480	B Non cancer		100(10)	0(0)	6(4)	9%	0.05-1.11	0.0507	0.077	D-2-20170919	No	Maximum concentration does not exceed the cleanup level.
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A		100(10)	0(0)	17(1)	16%	0.125-1.25	0.521	17.3	WMW-16-20181107	No	Maximum concentration does not exceed the cleanup level.
Total Naphthalenes (HitsOnly)	µg/L	160	Method A		100(10)	0(0)	17(1)	16%	0	0.271	17.3	WMW-16-20181107	No	Maximum concentration does not exceed the cleanup level.
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A		100(10)	0(0)	1(0)	1%	0.025-0.555	0.0421	0.0421	WMW-30-20180829	No	Maximum concentration does not exceed the cleanup level.
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A		100(10)	0(0)	1(0)	1%	0	0.00689	0.00689	WMW-30-20180829	No	Maximum concentration does not exceed the cleanup level.
Anions														
Nitrogen, Ammonia (as NH3)	µg/L	--			261(21)	0(0)	81(13)	33%	100-250000	100	1830	WMW-16-20171130	No	Cleanup level not available for parameter.
Nitrogen, Nitrate-Nitrite	µg/L	--			261(19)	0(0)	187(11)	71%	10-100	5	32400	WMW-12-20190822	No	Cleanup level not available for parameter.
Sulfate (as SO4)	µg/L	--			261(19)	0(0)	210(8)	78%	1200-100000	5010	10400000	WMW-17-20170920	No	Cleanup level not available for parameter.
Sulfide	µg/L	--			261(19)	0(0)	8(1)	3%	50	74	7200	WMW-11-20120314	No	Cleanup level not available for parameter.
Gases														
Ethane	µg/L	--			234(18)	0(0)	1(0)	0%	13	29.9	29.9	RMD-3-20161115	No	Cleanup level not available for parameter.
Ethylene	µg/L	--			234(18)	0(0)	1(0)	0%	13	16.2	16.2	RMD-3-20161115	No	Cleanup level not available for parameter.
Methane	µg/L	--			261(21)	0(0)	120(15)	48%	5-200	15.6	13200	RMD-1-20180426	No	Cleanup level not available for parameter.
Metals														
Iron, Dissolved	µg/L	11200	B Non Cancer		261(20)	7(0)	96(14)	39%	40-100	9.7	18400	WMW-16-20171130	Yes	The maximum concentration exceeds MTCA B Non Cancer screening level.
Manganese, Dissolved	µg/L	2240	B Non Cancer		234(18)	33(4)	193(17)	83%	5-10	5.12	6750	WMW-03-20180823	Yes	The maximum concentration exceeds MTCA B Non Cancer screening level.

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN MONITORING WELL GROUNDWATER SAMPLES (2012 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Unit	MTCA A then Lowest B		Env Effects-Based Conc	Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
Metals														
Arsenic, Dissolved	µg/L	5	Method A		65(13)	42(11)	59(13)	92%	2-10	2.18	37	WMW-24-20180830	Yes	The maximum concentration exceeds MTCA Method A screening level.
Arsenic, Total	µg/L	5	Method A		65(13)	39(11)	60(13)	94%	2-10	2.14	35.5	WMW-24-20180830	Yes	The maximum concentration exceeds MTCA Method A screening level.
Barium, Dissolved	µg/L	3200	B Non Cancer		40(3)	0(0)	40(3)	100%	0	17.7	152	WMW-29-20180831	No	Maximum concentration does not exceed the cleanup level.
Barium, Total	µg/L	3200	B Non Cancer		40(3)	1(0)	40(3)	100%	0	15.9	16500	WMW-30-20190820	Yes	The maximum concentration exceeds MTCA B Non Cancer screening level.
Cadmium, Dissolved	µg/L	5	Method A		39(3)	0(0)	0(0)	0%	1	--	--	--	No	Detection frequency is 0%.
Cadmium, Total	µg/L	5	Method A		39(3)	0(0)	0(0)	0%	1	--	--	--	No	Detection frequency is 0%.
Chromium, total, Dissolved	µg/L	100	Method A		39(3)	0(0)	12(3)	36%	2	2	15	WMW-26-20190507	No	Maximum concentration does not exceed the cleanup level.
Chromium, total, Total	µg/L	100	Method A		39(3)	0(0)	11(3)	33%	2	2.07	14	WMW-26-20190507	No	Maximum concentration does not exceed the cleanup level.
Lead, Dissolved	µg/L	15	Method A		102(9)	0(0)	1(0)	1%	2-5	5.69	5.69	WMW-30-20180829	No	Maximum concentration does not exceed the cleanup level.
Lead, Total	µg/L	15	Method A		102(9)	0(0)	2(0)	2%	2-5	2.85	9.68	WMW-23-20190508	No	Maximum concentration does not exceed the cleanup level.
Mercury, Dissolved	µg/L	2	Method A		39(3)	0(0)	0(0)	0%	0.2	--	--	--	No	Detection frequency is 0%.
Mercury, Total	µg/L	2	Method A		39(3)	0(0)	0(0)	0%	0.2	--	--	--	No	Detection frequency is 0%.
Selenium, Dissolved	µg/L	80	B Non Cancer		39(3)	0(0)	1(0)	2%	2	3.01	3.01	WMW-32-20180827	No	Maximum concentration does not exceed the cleanup level.
Selenium, Total	µg/L	80	B Non Cancer		39(3)	0(0)	1(0)	2%	2	3.09	3.09	WMW-32-20180827	No	Maximum concentration does not exceed the cleanup level.
Silver, Dissolved	µg/L	80	B Non Cancer		39(3)	0(0)	0(0)	0%	2	--	--	--	No	Detection frequency is 0%.
Silver, Total	µg/L	80	B Non Cancer		39(3)	0(0)	0(0)	0%	2	--	--	--	No	Detection frequency is 0%.

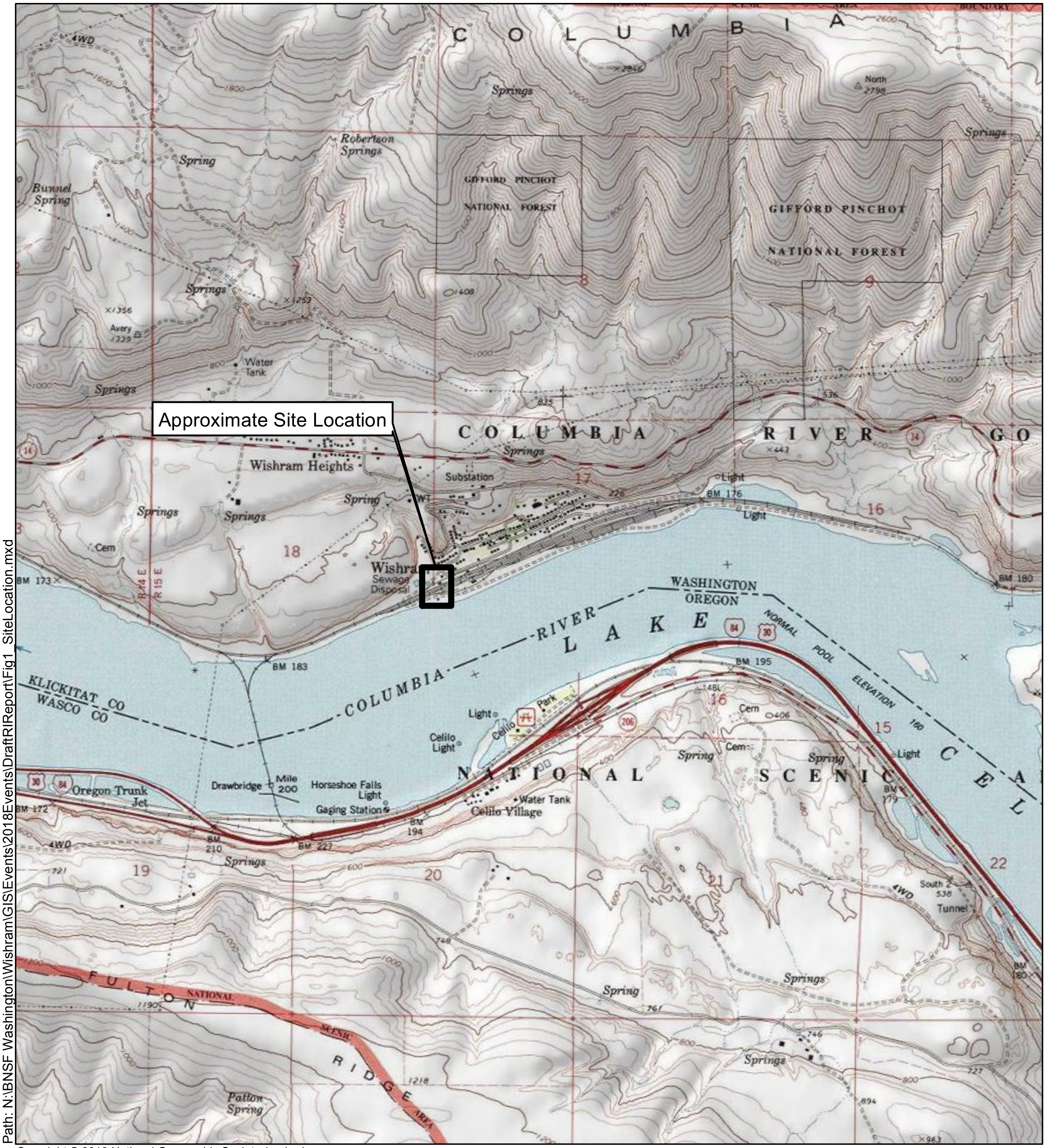
Abbreviations and Symbols:
" - -" denotes not measured, not available, or not applicable.
µg/L = micrograms per liter
BTEX = benzene, toluene, ethylbenzene, and xylenes compounds
NWTPH = Northwest Total Petroleum Hydrocarbon Method
SIM = selective ion monitoring
Total TPH-Dx = Total TPH-Dx concentrations were calculated by summing diesel-range organics (DRO) and oil-range organics (ORO) concentrations. Non-detects were included as noted.
Total cPAHs = Possible Total Carcinogenic Polycyclic Aromatic hydrocarbons (cPAHs) are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. Non-detects were included as noted.
Total Naphthalenes = Total Naphthalenes concentrations were calculated by summing 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene concentrations. Non-detects were included as noted.
Total Xylenes = Total Xylenes concentrations were calculated by summing Xylene, m,p- and Xylene, o- concentrations. Non-detects were included as noted.
(HitsOnly) = If an individual chemical was not detected, it was not included in the calculation.
(HalfDL_WA) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration.

Notes:
Above CUL. Yes (Y) or No (N) based on reported resulted in at least one groundwater sample at a concentration above an applicable cleanup level (CUL).
If "Yes", the cell is shaded blue. Yes
Number of Analyses. Normal sample analyses are followed by duplicate sample analyses in parentheses.

Cleanup Levels (CUL)
Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for groundwater (Method A) based on Washington State Administrative Code (WAC) 173-340-900 Table 720-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2020).
Environmental Effects-Based Concentrations (EEBC) for Surface Water. Value for Fresh Diesel (EEBC-F) based on Table 2 of Environmental Effects-Based Concentrations for Total Petroleum Hydrocarbons (TPH), February 2018, Ecology Publication No. 18-03-002. Value for Weathered Diesel (EEBC-W) based on Environmental Effects-Based Concentrations for Weathered Diesel-Range Organics, June 2020, Ecology Publication No. 20-03-008.

Executive Summary Figures

Path: N:\BNSF Washington\Wishram\GIS\Events\2018Events\DraftRIReport\Fig1_SiteLocation.mxd



N

0 0.5 1
Miles

Note:
1. Locations are approximate.

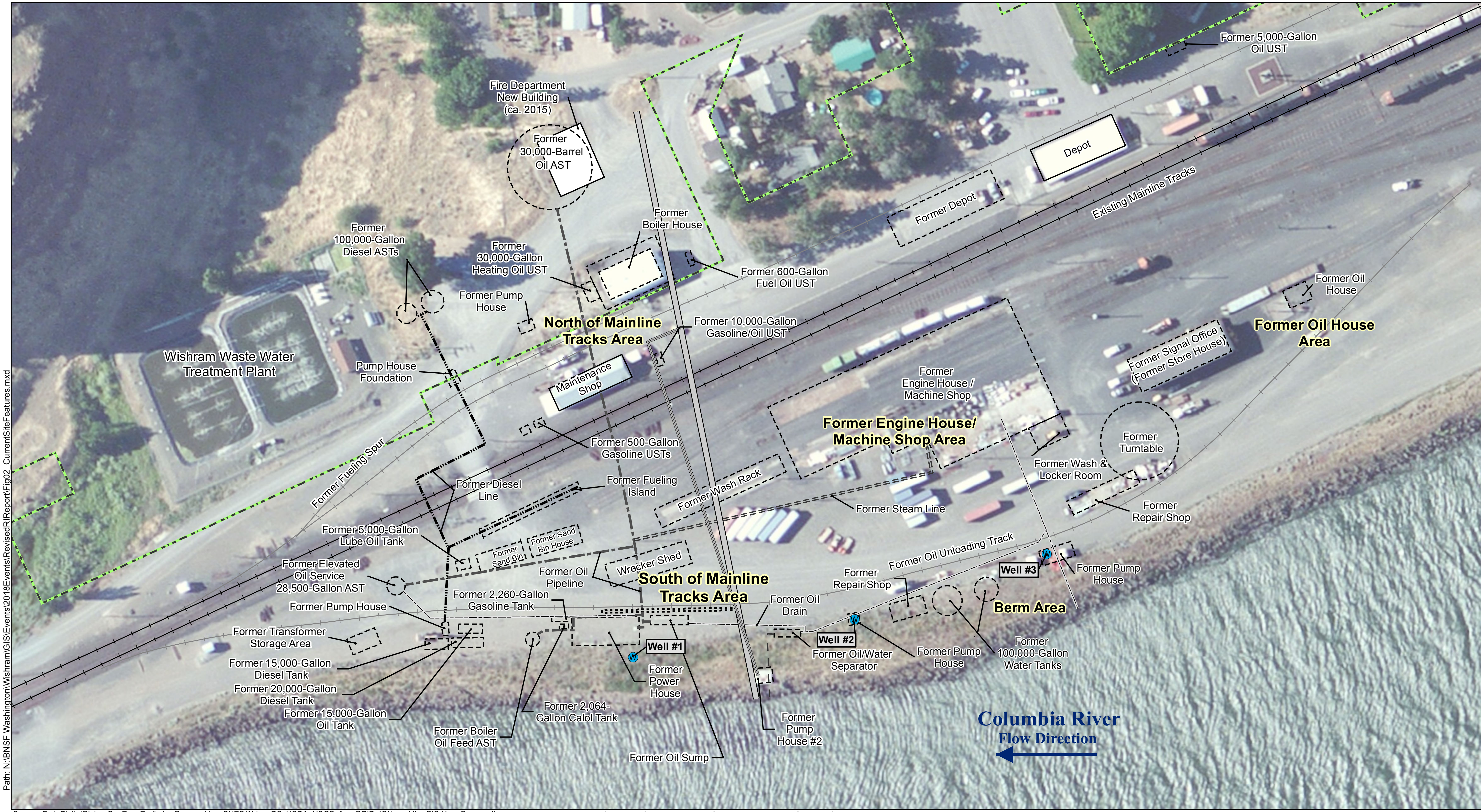
Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

Site Location Map

1896120*04
November 2018

Figure ES-1



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

- Former Water Supply Well (Approximate)
- Approximate BNSF Property Line
- Existing Site Feature
- Former Site Feature
- Former Bunker Fuel / Oil Pipeline
- Former Oil Drain
- Former Oil Trough
- Former Sewer Line (Potential)
- Stormwater Underdrain (A portion removed from service circa 1960)
- Stormwater Underdrain (Rerouted portion circa 1960)
- Former Diesel Line
- Former Steam Line

Note:
1. Locations are approximate.

N

0 50 100
Scale: Feet

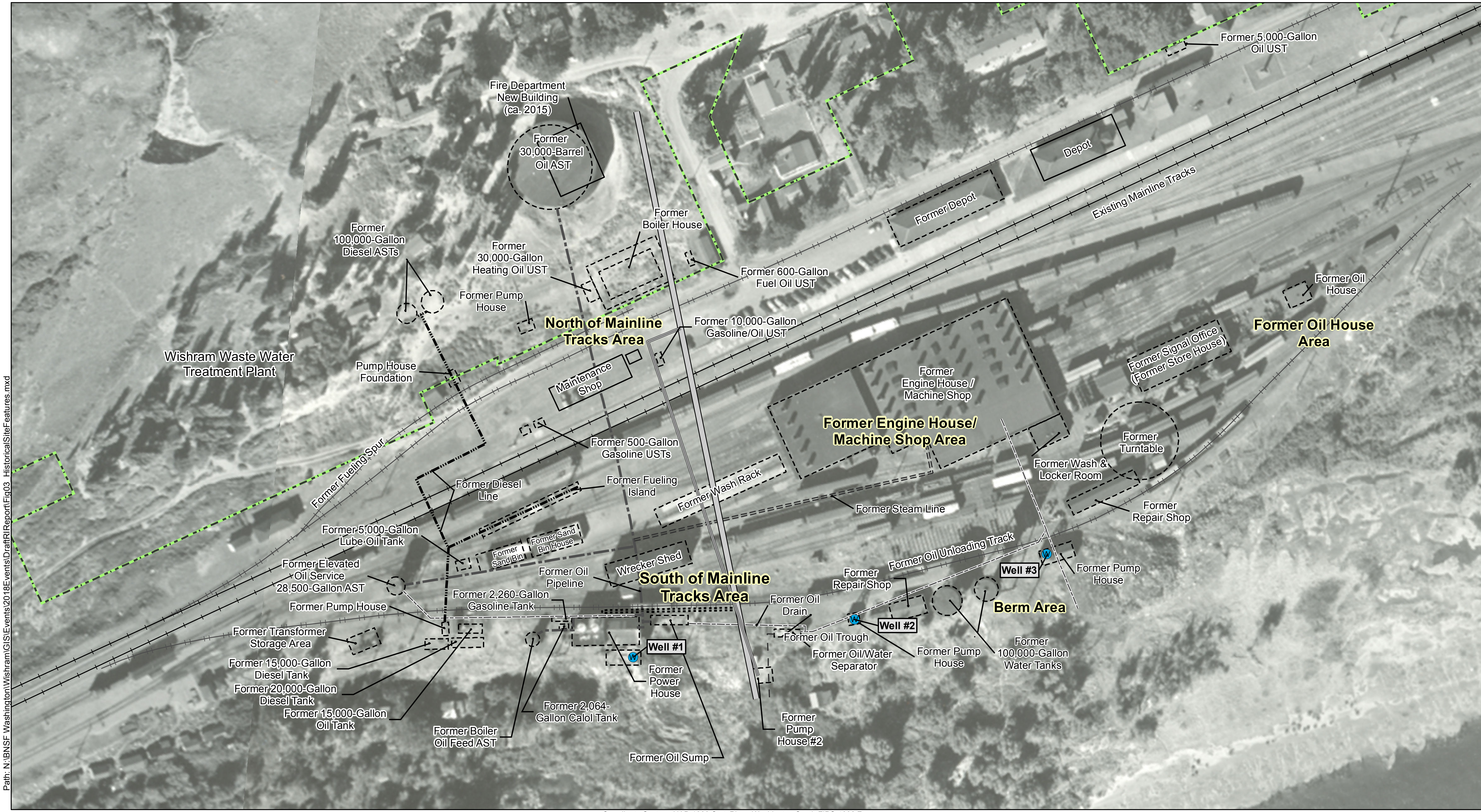
Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

Current and Historical Site Features

1896120.04
March 2020

Figure ES-2



Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

- W Former Water Supply Well (Approximate)
- Approximate BNSF Property Line
- Former Railroad Tracks
- Former Bunker Fuel / Oil Pipeline
- Former Oil Drain
- Former Oil Trough
- Former Sewer Line (Potential)
- Stormwater Underdrain (A portion removed from service circa 1960)
- Stormwater Underdrain (Rerouted portion circa 1960)
- Former Diesel Line
- Former Steam Line
- Existing Site Feature
- Former Site Feature

Notes:
1. Locations are approximate.
2. Background image from U.S. Army Corps of Engineers, 1951.

N

0 50 100
Scale: Feet

Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

Historical Site Features

1896120.04
March 2020

Figure ES-3

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

- Approximate BNSF Property Line
- Existing Site Feature
- Former Site Feature

N

0 50 100

Scale: Feet

Notes:
1. Locations are approximate.
2. Background image from U.S. Army Corps of Engineers, 1962.

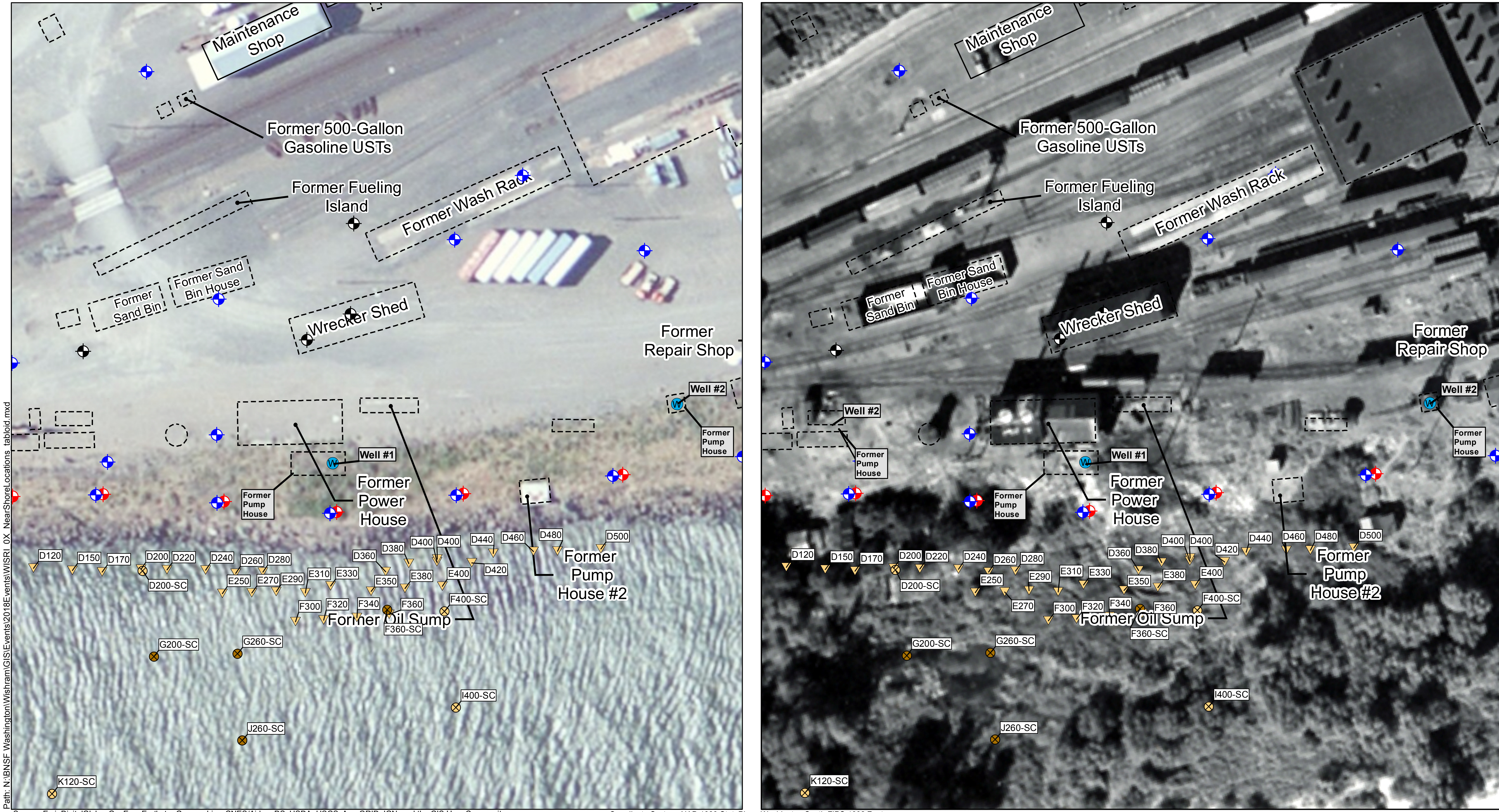
Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

Historical Site Features - East Area

1896120*00
July 2020

Figure ES-4



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

- Former Water Supply Well (Approximate)
- DART Location
- Sediment Core Location - No LNAPL Observed
- Sediment Core Location - LNAPL Observed
- Shallow Monitoring Well
- Deep Monitoring Well
- Oil Head Monitoring Well

Note:
1. Locations are approximate.
2. Aerial photograph on right dated 4 October 1951 obtained from USACE.

N

0 32.5 65

Scale: Feet

Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

Inundated Lands Sample Locations
June and August 2018

1896120.04
January 2019

Figure ES-5

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

- LNAPL Observed in Boring

LIF Response (Diesel, Oil and/or Mixed)

- Inferred Diesel/Oil-Like LNAPL (> 60 %RE)
- Residual LNAPL (20 to 60 % RE)
- No LNAPL or Residual LNAPL (< 20 %RE)
- Inferred Lateral Extent of Shallow (at water table) Diesel-Like LNAPL Impacts
- Inferred Lateral Extent of Shallow (at water table) Oil-Like LNAPL Impacts
- Approximate BNSF Property Line

Notes:
1. Locations are approximate.
2. LNAPL = light non-aqueous phase liquid
3. Inferred lateral extent of potentially mobile Diesel- or Oil-Like LNAPL based on interpretation of LIF waveforms (July 2013) and soil boring logs.

N

0 30 60

Scale: Feet

Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

Combined Inferred Shallow LNAPL Extent Map

1896120.00
August 2020

Figure ES-6

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

- LNAPL Observed in Boring

LIF Response (Diesel, Oil and/or Mixed)

- Inferred Diesel/Oil-Like LNAPL (> 60 %RE)
- Residual LNAPL (20 to 60 % RE)
- No LNAPL or Residual LNAPL (< 20 %RE)

- Inferred Lateral Extent of Submerged (below water table) Diesel-Like LNAPL Impacts
- Inferred Lateral Extent of Submerged (below water table) Oil-Like LNAPL Impacts
- Approximate BNSF Property Line

Notes:
1. Locations are approximate.
2. LNAPL = light non-aqueous phase liquid
3. Inferred lateral extent of potentially mobile Diesel- or Oil-Like LNAPL based on interpretation of LIF waveforms (July 2013) and soil boring logs.

N

0 30 60

Scale: Feet

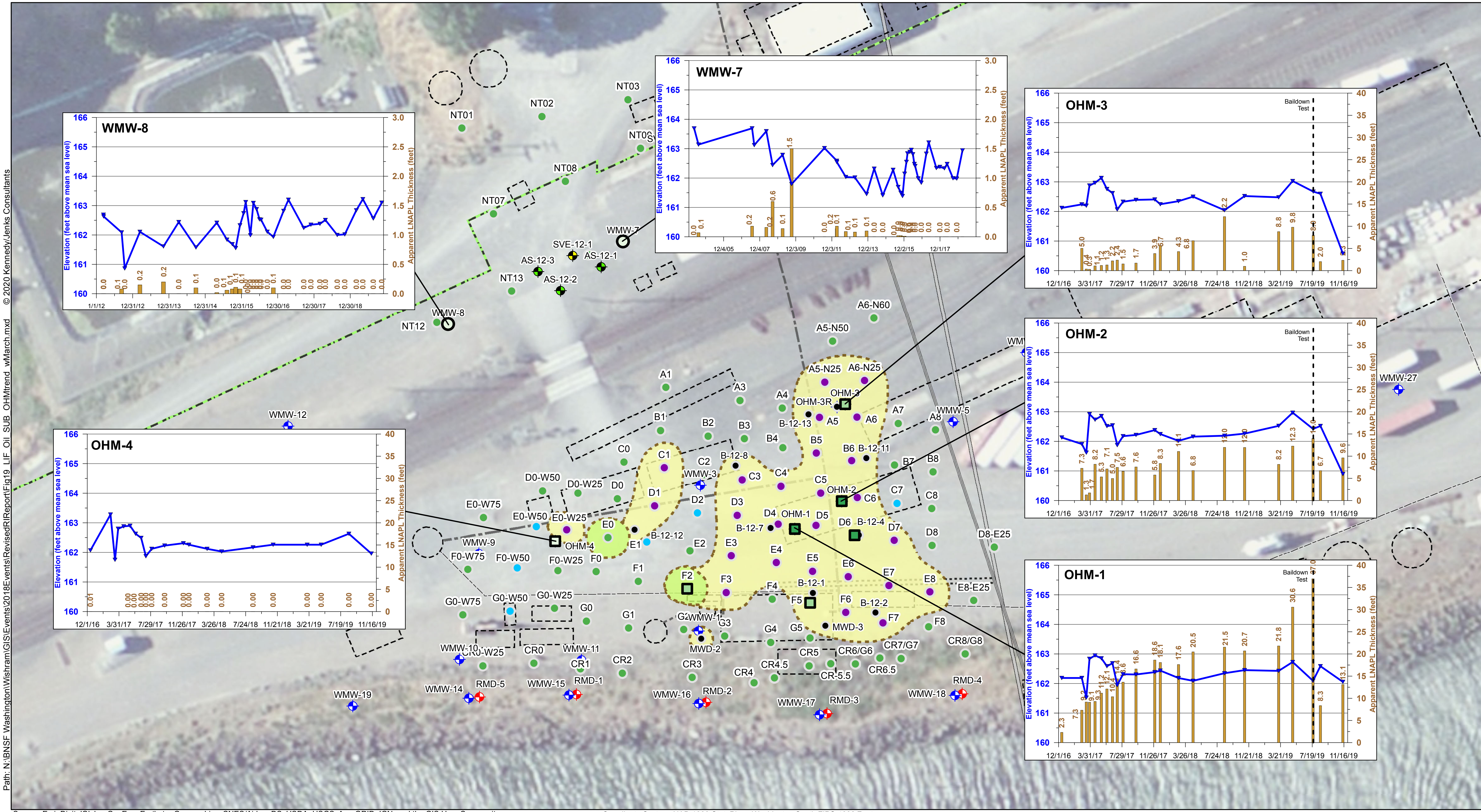
Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

Combined Inferred Submerged LNAPL Extent Map

1896120.00
July 2020

Figure ES-7



Path: N:\BNSF Washington\Wishram\GIS\Events\2018Events\RevisedRIReport\Fig19_LIF_Oil_SUB_OHMtrend_wMarch.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

- ● LNAPL Observed in Boring

LIF Response (Oil and/or Mixed)

- Inferred Oil-Like LNAPL (> 60 %RE)
- Residual TPH (20 to 60 % RE)
- No LNAPL or Residual TPH (< 20 %RE)
- Approximate Lateral Extent of Submerged Diesel Impacts
- Approximate Lateral Extent of Submerged Oil Impacts

Free Product Mobility Centrifugal Method Test Results (% LNAPL Removed as relative indicator of LNAPL Mobility)

- < 4% (Not Mobile LNAPL)
- 4 to 40% (Potentially Mobile LNAPL)
- > 40% (Mobile LNAPL)
- Approximate BNSF Property Line

Notes:
1. Locations are approximate.
2. LNAPL = light non-aqueous phase liquid
3. TPH = total petroleum hydrocarbons
4. Inferred lateral extent of Diesel- and Oil-Like LNAPL based on interpretation of LIF waveforms (July 2013) and soil boring logs.

N

0 30 60

Scale: Feet

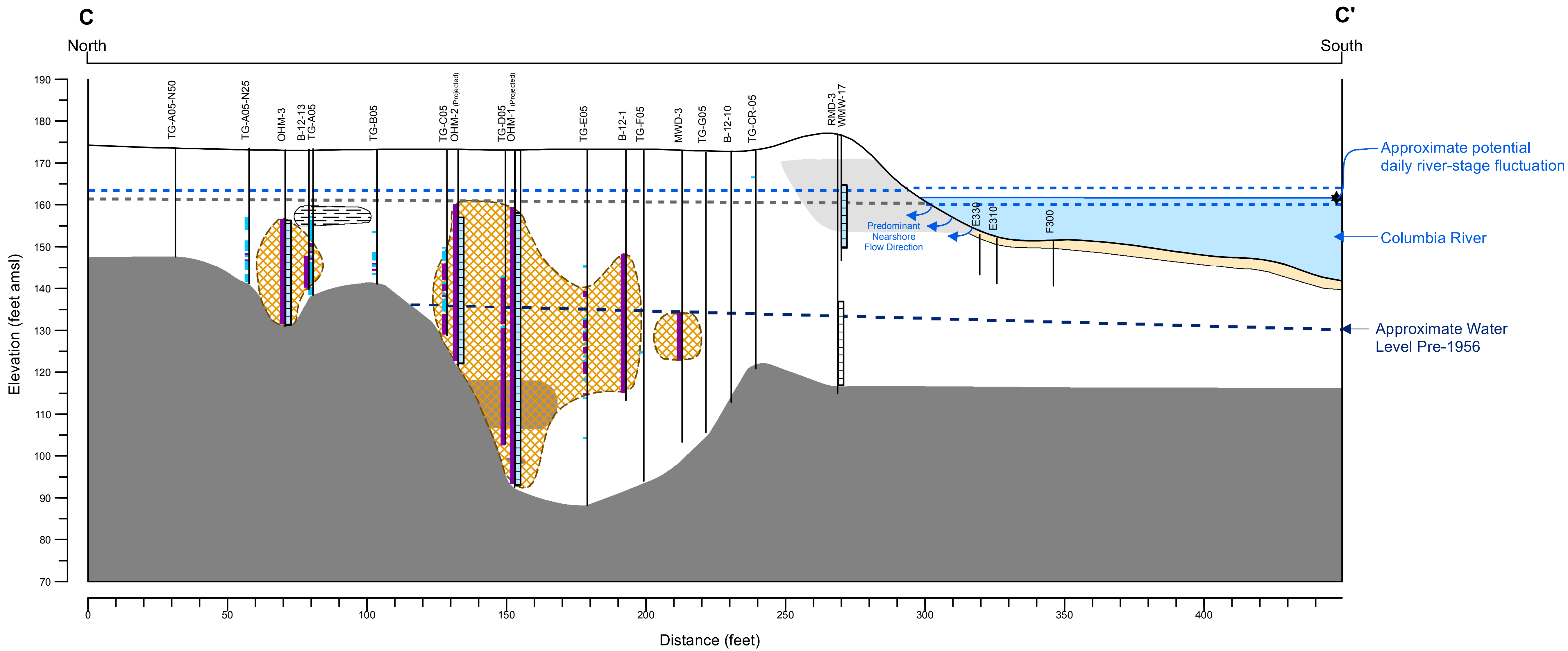
Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

LNAPL Distribution and Trend Charts

1896120.00
July 2020

Figure ES-8



Legend

- Inferred Maximum Measured Groundwater Elevation
- Inferred Minimum Measured Groundwater Elevation
- River Sediment (Interpreted)
- Columbia River

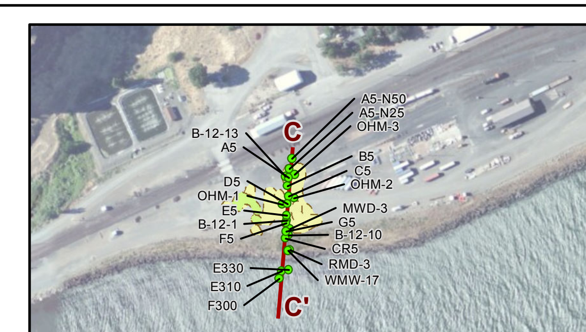
Lithology

- Gravelly Sand Fill Material
- Sand and Sand with Silt
- Gravel and Gravel with Sand
- Clay and Silty Clay
- Basalt Bedrock

- Well screen interval
- Well screen interval, blue shading indicates dissolved concentrations of diesel-range and/or oil-range organics in groundwater are above MTCA Method A cleanup levels (500 µg/L).

Inferred LNAPL/Residual TPH Extent

- Inferred Zone of Oil-like LNAPL
- Inferred Zone of Diesel-like LNAPL
- Inferred LNAPL in Boring
- Inferred Residual LNAPL in Boring



Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

Hydrogeologic Cross Section
Transect C to C'

Figure ES-9

Path: N:\BNSF Washington\Wishram\GIS\Events\2018Events\RevisedRIReport\Fig36_Soil_TPHDx_BWT_wExc.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

DRO Result / ORO Result

- Result is above MTCA Method A CUL
- Result is below MTCA Method A CUL
- Result is below laboratory reporting limit
- LNAPL Observed in Boring

Notes:
1. Locations are approximate.
2. DRO = Diesel-Range Organics.
   ORO = Oil-Range Organics.
3. Results present for soil samples collected between 2002 and 2018.
4. MTCA Method A Cleanup level for diesel- and oil-range organics (DRO and ORO) in soil is 2,000 milligrams per kilogram (mg/kg).
5. Saturated depths are from approximately 10 feet below ground surface (bgs) to bedrock.
6. Not all points are labeled. See Figures 7, 8, and 15 for complete labels.

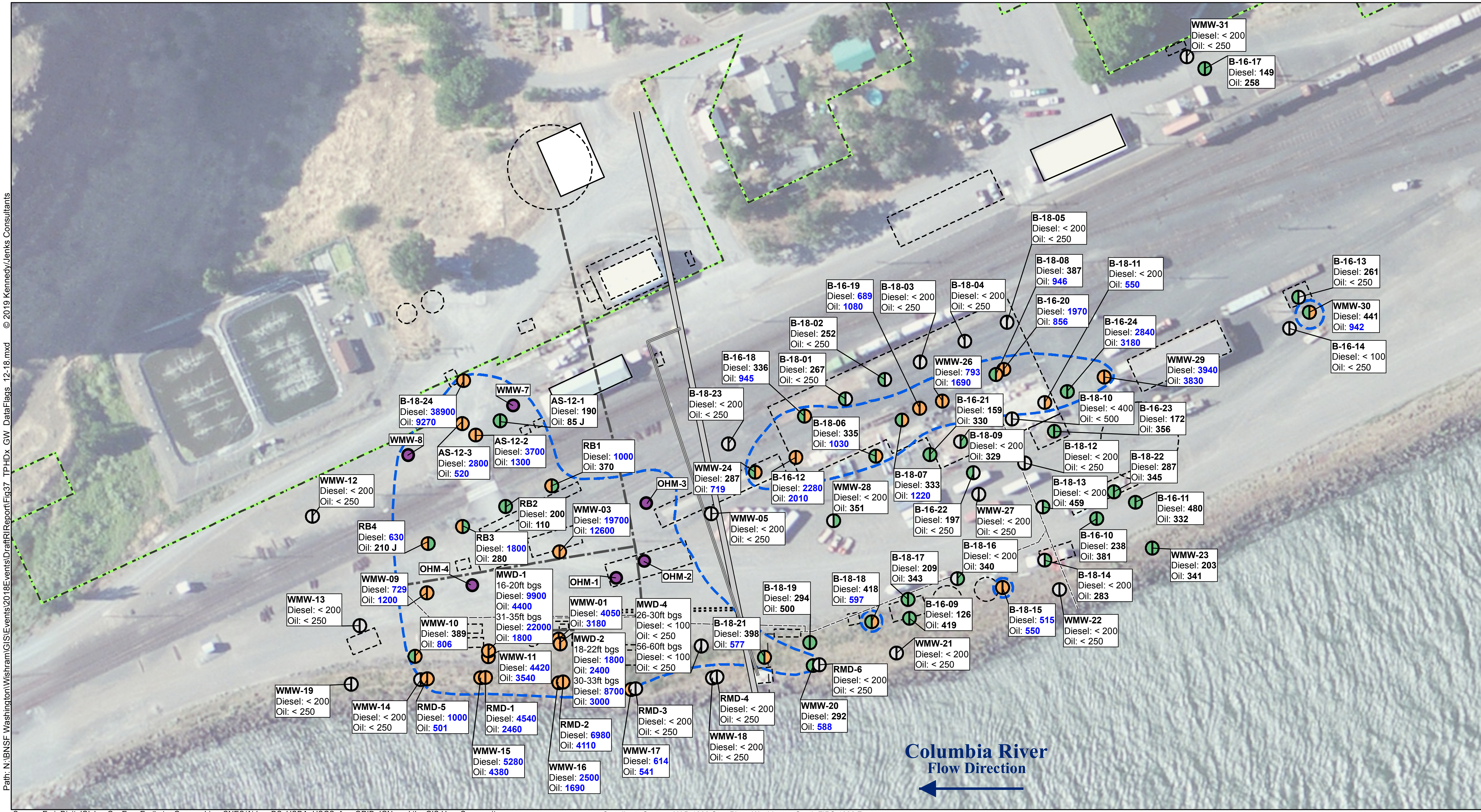
Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

DRO/ORO in Subsurface Soil (Saturated) - Main Area

1696120.02
August 2020

Figure ES-10



Path: N:\BNSF Washington\Wishram\GIS\Events\2018Events\DraftRIReport\Fig37_TPHDx_GW_DataFlags_12-18.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

DRO Result / ORO Result

Approximate Lateral Extent of Dissolved Phase Diesel and/or Oil

- Result is above MTCA Method A CUL
- Result is below MTCA Method A CUL
- Result is below laboratory reporting limit
- LNAPL observed, well not sampled

Note:
1. Locations are approximate.
2. "Diesel" = Diesel-Range Organics. "Oil" = Oil-Range Organics.
3. MTCA Method A Cleanup levels (CULs) for diesel- and oil-range organics (DRO and ORO) in groundwater is 500 micrograms per liter (µg/l).
4. Reconnaissance groundwater samples from 2012, 2014, 2016, and 2018 are shown. Samples from 2012 and 2014, and some samples from 2016, were analyzed with silica gel cleanup. Monitoring well sample resutls from August 2018 are shown.
5. Bold font indicates result reported above the laboratory reporting limit, blue font indicates result reported above the MTCA Method A CUL.

N

0 50 100

Scale: Feet

Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

Groundwater Sampling Results DRO and ORO (2012 - 2018) - Main Area

1696120.02
June 2019

Figure ES-11

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

Total Arsenic Result — Dissolved Arsenic Result

- Result is above MTCA Method A or B CUL
- Result is below MTCA Method A or B CUL
- Result is below laboratory reporting limit
- Not Analyzed

Note:
1. Locations are approximate.
2. Symbol type based on monitoring well sample results for dissolved (D) and total (T) arsenic during the August 2018 event, and reconnaissance groundwater sample results for dissolved arsenic only from the 2016 and 2018 investigations.
3. MTCA Method A Cleanup levels for arsenic in groundwater is 5 micrograms per liter (µg/l).

N

0 50 100

Scale: Feet

Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

Groundwater Samping Results Arsenic, August 2016 to August 2018 - Main Area

1896120.00
June 2020

Figure ES-12

Path: N:\BNSF Washington\Wishram\GIS\Events\2018Events\DraftRIReport\Fig44_GW_As_E.mxd © 2020 Kennedy/Jenks Consultants

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

Total Arsenic Result — Dissolved Arsenic Result

- Result is above MTCA Method A or B CUL
- Result is below MTCA Method A or B CUL
- Result is below laboratory reporting limit
- Not Analyzed

Note:
1. Locations are approximate.
2. Symbol type based on monitoring well sample results for dissolved (D) and total (T) arsenic during the August 2018 event, and reconnaissance groundwater sample results for dissolved arsenic only from the 2016 and 2018 investigations.
3. MTCA Method A Cleanup levels for arsenic in groundwater is 5 micrograms per liter (µg/l).

N

0 50 100

Scale: Feet

Kennedy/Jenks Consultants

BNSF Wishram Railyard
Wishram, Washington

Groundwater Samping Results Arsenic, August 2016 to August 2018 - East Area

1896120.00
June 2020

Figure ES-13

Section 1: Introduction

On behalf of the BNSF Railway Company (BNSF), Kennedy/Jenks Consultants, Inc. (KJ) prepared this Uplands Remedial Investigation (RI) Report for the BNSF Wishram Railyard (Ecology Site Name: BNSF Track Switching Facility) in Wishram, Washington (Figure 1). This Uplands RI Report incorporates Ecology's 18 December 2019 and 22 April 2020 comments to the Agency Review Draft Remedial Investigation Report for the BNSF Wishram Railyard (Draft RI Report) (KJ 2019) and Ecology's 22 April 2020 comments to the Draft response to comments (RTC) matrix (KJ 2020).

The activities conducted as part of the remedial investigation were described in the Remedial Investigation Work Plan (RIWP) [KJ 2016 (revised 2017)], which was approved by the Washington State Department of Ecology (Ecology) on 28 March 2016; and modified per Ecology's letter dated 3 February 2017 to BNSF, as well as the Remedial Investigation Work Plan Addendum (RIWP Addendum) (KJ 2018), which was approved by Ecology on 13 March 2018. RIWP and RIWP Addendum field investigation tasks were initiated in August 2016 and August 2018, respectively, and substantially completed by November 2018. This Uplands RI Report has been amended to include groundwater sampling results through November 2019. Groundwater monitoring on a quarterly/semiannual basis is ongoing.

The RI is being performed in accordance with the Ecology Model Toxics Control Act (MTCA) regulations published in Washington Administrative Code (WAC) 173-340 (Ecology 2007). The RIWP and RIWP Addendum activities have been implemented pursuant to an Agreed Order (AO, No. DE 12897) between Ecology and BNSF dated 7 October 2015.

The purpose of the RI is to investigate the nature and extent of chemical constituents in soil and groundwater at the railyard related to past site activities, and to evaluate their fate and transport mechanisms. The conceptual site model (CSM) developed from this RI will be used to evaluate potential exposures to site-related constituents and support development of the feasibility study (FS) as part of the site remediation process.

1.1 General Site Information

Wishram is located in Klickitat County, Washington, approximately 13 miles northeast of The Dalles, Oregon, and 0.75 mile south of Washington State Route 14. The railyard is approximately 5,000 feet long (from northeast to southwest) and ranges from 150 to 720 feet wide (from northwest to southeast). The portion of the railyard where historical industrial activities (e.g., fuel storage, engine refueling, engine maintenance) occurred and where RI activities are focused (i.e., the "site"), is located at the westernmost extent (approximately 1,100 feet) of the yard, covering an area of approximately 6 to 10 acres. The site location is shown on Figure 1.

The site is bounded by the town of Wishram to the north, the main portion of the railyard to the east, the Columbia River to the south and southwest, and railroad right-of-way to the west. The size of the railyard and the location of the Columbia River, which is the southern boundary of the railyard, have changed over time. In 1957, the U.S. Army Corps of Engineers (USACE) completed construction of The Dalles Dam. Construction of the dam created Lake Celilo, a

24-mile-long reservoir on the Columbia River. In the vicinity of the railyard, the surface water elevation rose by approximately 40 feet in just a few days. The rising water elevation inundated formerly dry land for more than 250 feet perpendicular to the former riverbank. Therefore, historical railyard upland was inundated by the formation of Lake Celilo. Current onsite structures include storage buildings, a maintenance shop (office and tool storage), two mainline tracks, and active rail spurs. Current site features are shown on Figure 2. Historical site features are shown on Figure 3.

1.2 Site History

The Wishram Railyard was originally developed by the Spokane, Portland, and Seattle (SP&S) Railway between 1910 and 1912. SP&S merged with several other railroads in 1970 to become the Burlington Northern Railroad, which subsequently merged with the Santa Fe in 1995 to form BNSF Railway. The primary historical use of the Wishram Railyard was railcar switching, conducted on approximately 35 yard track spurs that extended from the far eastern end of the site to the former Engine House. Additional uses included locomotive fueling and watering and locomotive engine and car repairs, occurring in the westernmost portion of the railyard (i.e., the site).

Reported locations and uses of former buildings and structures, former fueling areas, and former fuel storage in aboveground and underground storage tanks (ASTs and USTs) were identified using past reports, historical maps and aerial photographs, and historical documents including a summary of the Wishram Railyard presented in The Northwest's Own Railway (NWOR) Fall 2014 publication (NWOR 2014) and correspondences between SP&S Railway personnel including design plans and drawings for now-former site features. The historical documents were transmitted from BNSF to Ecology on 27 September 2017 (BNSF 2017).

Existing and historical site features are shown on Figure 2 (aerial photograph circa 2011) and Figure 3 (aerial photograph circa 1951) for the western portion (referenced herein after as the "Main Area") of the site and on Figure 4 (2011 aerial) and Figure 5 (aerial photograph circa 1962) for the eastern portion of the site. The digital aerial photographs from 1951 and 1962 included on Figures 3 and 5, respectively, were obtained from USACE in 2017. Additional digital aerial photography from years 1957 and 1967 obtained from USACE, as well as additional photographs obtained from an Environmental Data Resources, Inc. (EDR) records search conducted in 2016 are included in Appendix A.

1.2.1 Fueling Operations and Storage

Fueling of steam locomotives with oil was conducted at the site from approximately 1912 through 1956 and fueling of diesel locomotives was conducted from the early 1950s to the 1970s (NWOR 2014, Grande 1992). A coal chute was installed in 1921 due to a shortage of fuel oil, but reportedly never supplied coal to a locomotive beyond testing needs. The coal chute was removed in 1941 (BNSF 2017, NWOR 2014).

The former 30,000-barrel Oil AST (Figure 3), located north of the mainline tracks, was used as the main oil storage tank and to supply oil to the former Elevated Oil Service 28,000-gallon AST, located south of the mainline tracks. The Elevated Oil Service AST was mounted on steel supports and was used to supply oil to steam locomotives. Both oil tanks were removed in approximately 1957 after the transition to diesel-fueled locomotives in 1956.

Oil was delivered to the railyard by oil tank cars along the former Oil Unloading Track, which ran along the southern part of the railyard (Figure 3). In 1917, the former Oil Unloading Trough was constructed to the east of the former Power House. Three 3-foot by 3-foot by 2-foot deep concrete boxes were installed in the center of the oil unloading track on 40-foot centers to catch oil draining from tank cars positioned above the concrete boxes. The concrete boxes drained south to the oil unloading trough (3 feet wide by 140 feet long) which in turn drained into a concrete sump (see Figure 3) connected by pipe to the former Power House, from which the oil was moved by a pump to the 30,000-barrel Oil AST north of the mainline tracks. The former Oil Unloading Trough was removed in 1962 (NWOR 2014). Many features associated with the former oil fueling operations at the site had been removed in or prior to 1962, as shown in the 1962 (exact date unknown) aerial photograph.

Diesel fueling occurred along a former Diesel Fueling Spur and at a concrete former Fueling Island (installed in 1949), located north and south, respectively, of the mainline tracks (Untitled Map, 15 May 1956, in Appendix A) (see Figure 3). Historical drawings indicate that diesel was initially supplied to the fueling island from 15,000-gallon and 20,000-gallon Diesel USTs and a former Pump House (for fuel) located south of the former Oil Service AST (Figure 3). In the late 1950s, diesel for locomotive fueling was stored in two 100,000-gallon ASTs (constructed in or after 1955) located northwest of the Maintenance Shop. A former Pump House (foundation removed in 2005) located south of the tanks transferred diesel fuel to and from the tanks by underground piping to the fueling island. The 100,000-gallon Diesel ASTs were removed and fueling ceased during the late 1970s (KJ 2004b).

The approximate locations of former underground fueling oil and diesel supply pipelines are shown on Figures 2 and 3. Previously prepared maps for the site had identified an east-west oriented oil pipeline between the north-south oil pipeline (between former Power House and 30,000-barrel AST) and the former Engine House/Machine Shop area. Upon further review, it appears this line feature was for steam supply and return lines (see Figures 2 and 3). The approximate locations of former Oil Drain underground piping associated with the former Elevated Oil Service AST, former Oil Sump, and former Engine House are also shown on Figures 2 and 3. Reports or other information documenting removal of the oil drain lines was not found during review of historical information.

An Oil/Water Separator is identified on historical station plat maps approximately 140 feet east of the former Power House. SP&S correspondence from 6 November 1950 and 1 December 1950 states that a concrete oil/water separator was installed at the time the railyard was constructed but was never used for that purpose in the 35 years (at the time of the record) of facility operations, but rather used as a booster cistern for pumping water into a water tank. Reports or other information documenting removal of the former Oil/Water Separator was not found during review of historical information. A concrete footing is partially visible beneath soil and vegetation in the general area of where the former Oil/Water Separator appears on historical station plat maps.

A 5,000-gallon Lubricating Oil UST removed in 2005 was formerly located southwest of the former Diesel Fueling Island. The former Boiler House 30,000-gallon Heating Oil UST was removed in 2002. A former 2,260-gallon gasoline tank and 2,064-gallon Calol tank were formerly located on the northwestern corner of the former Power House, presumably removed in 1962 along with the former Power House. Other former USTs shown on Figures 2 through 5 and described in Table A1 of Appendix A appear to have been used for fueling onsite vehicles and/or boilers. These include two 500-gallon Gasoline USTs and a 10,000-gallon Gasoline / Oil UST by the Maintenance Shop, a 600-gallon Fuel Oil UST east of the former Boiler House, a 5,000-gallon Oil UST to the northeast of the Depot, and a 1,000-gallon Gasoline UST near a former Oil House on the eastern end of the site (Figure 4). Based on available records, the majority of the tanks were removed in or prior to 1988 (BNSF 1988).

Two former Oil Houses were located at the site. According to SP&S documents (BNSF 2017), two 2,000-gallon tanks and five 500-gallon tanks were located in the basement of the former Oil House located to the northeast of the former Store House (later a former Signal House). The tanks were used for storage of headlight oil, car oil, valve oil, superheat valve oil, engine oil, signal oil, and mineral seal oil. It is unknown which oil was stored in 2,000-gallon or 500-gallon capacity tanks. This oil house was removed in the 1960s. Information about oil storage at the former Oil House located east of the Depot is unknown (see Figure 5), as is its removal date along with the adjacent former 1,000-gallon Gasoline UST, though they were likely removed in the 1970s or 1980s, if not earlier.

1.2.2 Maintenance Operations

Locomotives underwent maintenance and repairs in the former Engine House/Machine Shop. According to the NWOR Fall 2014 publication, the former Engine House was constructed in 1911 as a rectangular run through type engine house and underwent multiple additions until reaching its maximum footprint size in the 1940s (extent shown on Figures 2 and 3). The former Engine House was reduced in size in 1960, due in part to diesel locomotives requiring less space for maintenance, and finally demolished in the 1980s after it was no longer needed.

Several of the former site buildings and support structures primarily used for servicing steam locomotives including the former Sand Bin and former Sand Bin House, former Wash Rack (for cleaning running gear on steam locomotives), and one of two former 100,000-gallon Water ASTs, were removed in the early 1960s after the transition to diesel-fueled locomotives in 1956.

Railcar repairs were performed in an area consisting of three tracks and the former (Car) Repair Shop, located to the southeast of the former Engine House/Machine Shop. In the late 1950s, the amount of railcar maintenance performed at the railyard was reduced, resulting in the removal of the car repair shop building in 1960 (NWOR 2014).

The former Turntable, used for turning locomotives, was operated at the site for a limited amount of time between approximately 1911 and 1922 when it was removed. The former Wrecker Shed was used to store a wrecking crane and support cars between approximately 1945 and 1958. Portions of the shed were demolished and/or relocated in 1960 for other purposes at the railyard including construction of the existing Maintenance Shop.

1.2.3 Onsite Utilities

The former Power House (Figure 3) contained up to three boilers to generate steam for heating and to operate machinery at the site [see Steam Pipe System Map and NWOR (2014) in

Appendix A]. The building expanded in size in 1945 to accommodate an increase from two to three boilers and was later removed in 1962 (NWOR 2014). Steam supply and/or return piping ran adjacent to the underground oil and diesel supply and oil drain lines (described below) as shown in the Steam Pipe System Map (see Appendix A). Steam supply lines also ran to the former Engine House, former Repair Shops, and to other railyard buildings.

Documentation describing the operational history of the former Boiler House located north of the mainline has not been located. The building is present in historical aerial photographs beginning in 1957 and in a photograph from 1962 in which the former Power House is no longer present (Appendix A). A drawing from 1956 illustrating the diesel fueling island includes a booster pump, housed in the former Boiler House, for a water line foam system for the former 100,000-gallon Diesel ASTs (Appendix A). As described in Section 2.1, a former Heating Oil Supply UST was removed from the former Boiler House in 2002.

Water for railyard operations was initially obtained from the Columbia River. Between 1918 and 1930, a total of three water supply wells (Wells #1, #2, and #3) were installed on railyard property to provide water for railyard operations, as well as domestic use in Wishram, Washington. The approximate locations of the three former water supply wells are shown on Figures 2 and 3 along with former Pump Houses which were installed for each well. Further details about the former water supply wells are provided in Section 2.2.8.1. The water supply wells were used to fill the two former 100,000-gallon Water Tanks (ASTs), one of which was removed after steam locomotive fueling and maintenance was discontinued in the late 1950s.

1.2.4 Septic Drainage Field

A former Septic Drainage (leach) Field and five septic tanks, located approximately 600 feet to the northeast of the former Engine House, was identified on a station layout map from 1959 (RIWP Addendum, KJ 2018) (see Figure 5). Historical maps indicate that the septic system and drainage field treated wastewater generated on the railyard, as well as that generated by the City of Wishram (single-family homes, a hotel, restaurant, etc.). Based on a review of available aerial photography, the drainage field first appeared in 1962 and was present in 1975, but not present in 1996. No additional operational information is currently available for the septic drainage system; however, the system was likely abandoned shortly after the construction and startup of the City wastewater treatment plant in circa 1978, located adjacent to and north-of the western-most extent of the railyard (Figure 2).

1.2.5 Lake Celilo

In March 1957, the USACE completed construction of The Dalles Dam, a hydroelectric dam just upstream of The Dalles, Oregon. Construction of the dam created Lake Celilo, a 24-mile-long reservoir on the Columbia River. In the vicinity of the railyard, the surface water elevation increased by approximately 40 feet in just a few days, inundating formerly dry land south of, and significantly altering groundwater elevations and flow conditions beneath, the railyard. Operation of the hydroelectric dam results in daily changes to the surface water elevation. Adjacent to the railyard, daily surface water elevation changes have been recorded from a few inches up to approximately 4 feet.

1.3 Site Use

Current site operations include Amtrak passenger service at the depot and railcar switching on track spurs located just south of the Depot (Figure 2). Railcar fueling and maintenance activities are no longer performed at the railyard. The former Signal Office (former Store House) was removed in 2018.

Section 2: Field Investigations

Investigation activities were initiated onsite in 2002 to evaluate potential impacts to subsurface soils and groundwater from historical railyard activities. BNSF performed voluntary independent investigation and remedial actions through 2015. BNSF and Ecology entered into an AO in 2015 directing future remedial investigation activities. The following summarizes characterization and independent remedial actions conducted on the railyard since 2002.

2.1 Previous Environmental Investigations and Interim Remedial Actions

Tables 1A and 1B summarize past investigation and interim remedial activities, respectively, that have occurred at the site between 2002 and 2015. The two tables provide references to investigation and/or remedial action reports prepared by KJ or others. Maps illustrating remedial action locations, as well as soil boring and monitoring well locations, are included on Figures 6A, 6B, 7, and 8 for activities conducted through 2015. Investigation activities have been conducted throughout the site and interim remedial activities were performed in areas where refueling or industrial activities had previously been conducted including the following:

- Maintenance Shop (north of the mainline tracks)
- Former Boiler House (north of the Maintenance Shop)
- Former 30,000-Barrel Oil AST
- Former 600-Gallon Fuel Oil and 10,000-Gallon Gasoline/Oil USTs
- Former 5,000-Gallon Oil UST at Depot
- Former 1,000-Gallon Gasoline UST and Former Oil House
- Former Transformer Storage Area
- Former Engine House and Turntable
- Former Power House
- Former 100,000-Gallon Diesel ASTs, former Pump House, and former 500-Gallon Gasoline USTs
- Former Fueling Island and 5,000-Gallon Lubricating Oil AST.

General areas within the upland remediation investigation areas where petroleum hydrocarbon-related constituents have been identified are indicated on Figures 2 and 3 and include north of the mainline tracks, south of the mainline tracks, the former Engine House/Machine Shop and vicinity, the berm area south of former Engine House/Machine shop, and the former Oil House east of the former Signal Office.

Site characterization actions were initially performed using conventional methods of advancing borings to characterize soil impacts and installing monitoring wells to evaluate dissolved phase impacts and the presence or absence of free-phase petroleum product [light non-aqueous phase liquid (LNAPL)]. Between 2002 and 2015, investigation activities included advancing 96 soil borings and installing 11 monitoring wells (WMW-1 through WMW-11), and collecting 135 soil samples, 71 excavation confirmation soil samples, 21 reconnaissance groundwater (RGW) samples (one-time samples collected from temporary wells installed in soil borings), and 91 groundwater samples (collected during 19 separate groundwater sampling events). In 2013, A high-resolution laser-induced fluorescence (LIF) survey was conducted to laterally and vertically delineate the presence of subsurface petroleum hydrocarbons. The survey including advancing the LIF probe at 102 locations from ground surface to contact with the underlying basement rock. Tables summarizing laboratory analytical results for soil (Table B1) and groundwater samples (Tables B2 and B3) collected from 2002 through 2019 are included in Appendix B. Table B1 in Appendix B contains laboratory analytical results from excavation confirmation soil samples collected in 2002, 2005, 2007, and 2010; locations of the excavation confirmation samples are shown on Figure 6B.

<u>January 2002</u>: A 30,000-gallon UST formerly used for storage of heating oil was discovered adjacent to the western side of the former Boiler House (Figure 2). Soil sampling activities identified the presence of diesel-range organics (DRO) and oil-range organics (ORO) in soil at concentrations above the MTCA Method A cleanup levels (CULs) (KJ 2003). DRO and ORO were analyzed using Ecology Method Northwest Total Petroleum Hydrocarbons as Diesel Extended (NWTPH-Dx). The UST and approximately 750 tons of petroleum hydrocarbon-impacted soil were removed in April 2002 (see Figure 6A for approximate lateral extent of the excavation area). Petroleum hydrocarbon-impacted soils were excavated to the top of the bedrock surface (to the extent practicable) at a depth of approximately 16 feet below ground surface (bgs). Based on sidewall confirmation samples (Figure 6B) from approximately 14.5 to 15.5 feet bgs (Table B1), an approximately 1.5-foot thick layer of soil (from approximately 14.5 to the top of bedrock at 16 feet bgs) containing DRO and ORO at concentrations above the MTCA Method A soil CULs remained in place just above the bedrock contact to the north, east, and south of the excavated area.

<u>September 2003</u>: A site assessment was conducted to evaluate hydrogeologic conditions and the extent of petroleum hydrocarbon-impacted soil south (potentially downgradient) of the former 30,000-gallon Heating Oil UST (KJ 2004a). Seven soil borings (WSB-1 through WSB-7) were continuously sampled for lithologic logging to depths ranging from 10 to 32 feet bgs (Figure 7) and selected samples were collected for DRO and ORO analysis. Soil samples from two borings (WSB-2 and WSB-5) contained concentrations of DRO and ORO above the MTCA Method A soil CULs for industrial properties (Table B1, Appendix B). Four monitoring wells (WMW-1 through WMW-4) were also installed in September 2003 (Figure 7). Groundwater samples collected in September 2003 from monitoring wells WMW-1 and WMW-2 contained DRO and/or ORO at concentrations above the MTCA Method A groundwater CULs (Table B1). Laboratory results reported DRO and ORO in samples from wells WMW-3 and WMW-4 to be below the MTCA Method A CULs.

<u>February/April 2004</u>: A site assessment was conducted to evaluate soil and groundwater conditions at nine locations identified to have been potentially associated with refueling or industrial activities (KJ 2004b). These locations included:

- Former 30,000-Barrel Oil AST
- Former 600-Gallon Fuel Oil and 10,000-Gallon Gasoline/Oil USTs
- Former 5,000-Gallon Oil UST at Depot
- Former 1,000-Gallon Gasoline UST and former Oil House
- Former Transformer Storage Area
- Former Engine House and Turntable
- Former Power House
- Former 100,000-Gallon Diesel ASTs, former Pump House, and former 500-Gallon Gasoline USTs
- Former Fueling Island and former 5,000-Gallon Lubricating Oil AST.

Soil borings were advanced at 27 locations (WSB-04-XX series) in and around the areas listed above (Figure 7). Soil samples were analyzed for one or more of the following constituents: DRO; ORO; gasoline-range organics (GRO); benzene, toluene, ethylbenzene, and total xylenes (BTEX); polycyclic aromatic hydrocarbons (PAHs); metals including arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver [referenced herein as Resource Conservation and Recovery Act (RCRA) 8 metals], and polychlorinated biphenyls (PCBs). Four soil samples were also submitted for analysis of select metals by the toxicity characteristic leaching procedure (TCLP) for waste profiling purposes. RGW samples were collected from eight borings for analysis of one or more of the following constituents: DRO, ORO, GRO, BTEX, volatile organic compounds (VOCs, two samples), RCRA 8 metals, and PCBs.

Soil samples results from the 2003 and 2004 investigations indicated four locations contained concentrations of DRO or ORO above the MTCA Method A industrial CUL for soil: 1) the former Power House, 2) the former Fueling Island, 3) the former 5,000-gallon Lubricating Oil AST, and 4) the former 30,000-gallon UST near the former Boiler House. One RGW sample (WSB-04-34) contained a total arsenic concentration above the MTCA Method A CUL for groundwater. The remaining analytes in RGW sample WSB-04-34 and the seven additional RGW samples were below the MTCA Method A CULs for groundwater.

Three monitoring wells (WMW-5, WMW-6, and WMW-7) were installed in April 2004 and included in the ongoing groundwater monitoring program. Groundwater samples collected in April 2004 from wells WMW-1 through WMW-7 were analyzed for one or more of GRO, DRO, ORO, BTEX, VOCs, PAHs, and RCRA 8 metals. Reported concentrations above MTCA Method A CULs for groundwater included benzene, DRO, and total arsenic in the sample from well WMW-2; total arsenic in samples from wells WMW-3 and WMW-5; and GRO and DRO in the sample from WMW-7.

2005: Remediation activities were conducted at the site resulting in the removal and offsite disposal of approximately 3,600 tons of petroleum hydrocarbon-impacted soil and debris at the Roosevelt Landfill; removal and recycling of approximately 1,800 gallons of petroleum from the former 5,000-gallon Lube Oil UST and associated piping; and removal and recycling of 10 tons of metal (KJ 2007). Excavation depths extended to the groundwater surface, typically encountered at approximately 10 to 12 feet bgs. Excavations were performed in multiple areas of the site including the former Pump House Foundation near the Maintenance Shop, former Fueling Island (south of mainline tracks), former Lube Oil UST Area, and former Power House Area. The approximate horizontal extent of the excavations is shown on Figure 6A and locations of excavation confirmation soil samples are shown on Figure 6B. Remedial activities included the following:

- The former Pump House Foundation was removed along with approximately 50 feet of associated piping. Approximately 900 tons of soil was excavated to depths ranging 5 to 15 feet bgs. An abandoned, sand-filled, former 15,000-gallon septic tank was encountered and a former 12-inch-diameter sewer pipe extending east-west from the Maintenance Shop was capped. One confirmation soil sample from the excavation bottom contained DRO and GRO above applicable MTCA Method A CULs, and a second sample contained GRO above applicable MTCA Method A CUL. Approximately 200 pounds of oxygen release compound (ORC) was placed into saturated soil in the bottom of the excavation prior to backfilling.

- The former Fueling Island concrete pad was removed and soil was excavated to 8 feet bgs. Field observations and laboratory analytical results from 2004 investigation soil boring WSB-04-9 had indicated petroleum impacts in soil; however, no petroleum-like staining or odors were encountered during excavation. Approximately 10 yards of soil and 200 yards of concrete were disposed of at Roosevelt Landfill and 100 yards of concrete was crushed and reused as backfill. Confirmation sample results were below applicable MTCA Method A CULs.

- Approximately 1,500 tons of petroleum-containing soil were removed from an area west and south of the former Fueling Island for offsite disposal, including the area of the former 5,000-gallon Lubricating (Lube) Oil UST. Approximately 1,500 gallons of unused lubricating oil was vacuumed out of the UST prior to it being disposed offsite. A total of 150 pounds of ORC was tilled into the bottom of portions of the excavation where groundwater or moist soil was encountered (depths greater than 10 feet bgs). Monitoring well WMW-6 was removed during removal of the UST. Approximately 300 gallons of diesel fuel and water were vacuumed from an abandoned fuel pipe discovered in this area, which appeared to have extended from the former Pump House to the northeast; the pipe was cleaned and capped. Approximately 200 gallons of bunker C oil were recovered from two 6-inch-diameter cast-iron fuel pipes which were also encountered in the excavation; the pipes were cleaned and disposed of offsite.

- Approximately 700 tons of soil were removed from the area near the former Power House and former Oil Trough and disposed of at the Roosevelt Landfill. Sixty pounds of

ORC were mixed into the base of the excavation (including both stained soil and soil that collapsed from the sidewalls) and the excavated area was backfilled and compacted (KJ 2007a). According to SP&S internal communications from 6 November 1950, oil lost in the process of loading and unloading was absorbed by soils in the yard (BNSF 2017). Approximately 250 tons of soil were also removed from the former Oil Sump (a concrete bunker measuring 40 feet long by 12 feet wide by 15 feet deep) located to the northeast of the former Power House and south of the former Oil Unloading Track (Figure 6A). The interior walls of the former Oil Sump were pressure washed and the concrete bunker was backfilled with clean soil.

- Monitoring well WMW-2, formerly located near the former Power House (Figure 7), was abandoned in 2005. During excavation activities, it was discovered that the well screen of WMW-2 had been constructed within a mass of oily timbers (removed during excavation) and within a few inches of the outside of the concrete walls of the former Oil Sump (Figure 6A). Groundwater samples collected in 2003 and 2004 from well WMW-2 contained DRO and/or ORO, benzene, total carcinogenic PAHs (cPAHs), and total arsenic at concentrations above MTCA Method A CULs.

<u>2007:</u> In response to a release of 40 gallons of diesel fuel adjacent to a spur track south of the railyard depot building, granular absorbent material was applied to the upper foot of affected ballast and impacted soil was later excavated. Fourteen direct-push soil borings were advanced in the release area to characterize the extent of impacted soil, and results indicated that DRO was present in three borings samples retrieved from between ground surface and 2 feet bgs. Approximately 9 tons of soil were excavated from the impacted area to a maximum depth of 2.5 feet bgs. Seven confirmation soil samples were collected from the base of the excavation and did not contain concentrations of DRO or ORO above the MTCA Method A CUL (KJ 2007b).

<u>2010</u>: A supplemental investigation was performed to identify potential sources of residual LNAPL in the vicinity of monitoring well WMW-7 (KJ 2010a). Accessible and previously identified potential sources of hydrocarbons in the vicinity of well WMW-7 were removed during the 2005 excavation activities. The supplemental investigation included subsurface mapping surveys using ground penetrating radar (GPR), magnetic, and electromagnetic methods to locate previously unidentified USTs or other subsurface structures. The supplemental investigation also included advancing 10 soil borings and collecting subsurface soil samples for laboratory analysis to further delineate the distribution of petroleum-containing soils. The results of this investigation did not identify additional potential sources of hydrocarbons that would potentially contribute to LNAPL observed in well WMW-7. Based on available investigative results for the Maintenance Shop area, the primary source of residual petroleum hydrocarbons appears to be submerged or immediately above bedrock in the vicinity of the former 30,000-gallon Heating Oil UST.

In 2010, further soil removal was performed in association with removal of a concrete structure believed to be the foundation for the former 28,500-gallon Oil Service AST (Figure 6A). As part of the concrete structure removal, an additional 628 tons of soil, concrete, and wood debris were excavated and disposed of at the Roosevelt Landfill. Confirmation soil samples collected following the excavation activities (Figure 6B) confirmed residual hydrocarbon concentrations in the excavation area were below MTCA Method A soil CULs for unrestricted land use (KJ 2010b).

2012: Additional site characterization activities were focused on the southern side of the mainline tracks near the former Fueling Island and former Power House. Soil borings were advanced to depths of up to 68.5 feet bgs. Of the 14 deep borings (B-12-1 through B-12-14, Figure 7) advanced in the vicinity of the former Power House, eight encountered LNAPL within the saturated zone, including: B-12-1, B-12-2, B-12-4, B-12-7, B-12-8, B-12-11, B-12-12, and B-12-13. The LNAPL was typically encountered at depths greater than 25 feet bgs and extended to a maximum depth of 68.5 feet bgs at one location.

Laboratory results of soil samples collected from the petroleum hydrocarbon-impacted intervals of the borings indicated GRO, DRO, and ORO concentrations were elevated above MTCA Method A industrial soil CULs. Benzene concentrations were above MTCA Method A CULs in two of the soil samples: B-12-2 and B-12-11 at depths of 12 feet and 36 feet bgs, respectively. Benzene concentrations were reported below the method reporting limit (MRL) but above the method detection limit (MDL); therefore, the results were flagged as estimated using a 'J' qualifier (KJ 2012). In addition, naphthalenes, including naphthalene and 1- and 2-methylnaphthalene compounds, were detected in two samples at concentrations above the MTCA Method A soil CUL for industrial properties.

Soil borings and RGW samples were collected along the length of the former Fueling Island south of the mainline tracks (RB1 through RB4). Based on these and previous results, diesel impacts encountered along the former Fueling Island appear to be sourced predominately from the residual LNAPL encountered north of the mainline tracks.

Four monitoring wells were installed in February 2012 (WMW-8 through WMW-11) and screened to evaluate shallow groundwater impacts. Well WMW-8 was installed to the west of well WMW-7, north of the mainline tracks. Wells WMW-9, WMW-10, and WMW-11 were installed along the western side of the Main Area near former diesel and oil storage tanks (Figure 7).

To address residual hydrocarbon in soil north of the mainline tracks, an air sparging (AS) and a soil vapor extraction (SVE) system were installed. The AS/SVE system consisted of three AS wells (AS-12-1, AS-12-2, and AS-12-3) and four SVE wells (SVE-12-1, SVE-12-2, SVE-2-3, and SVE-12-4) installed in the area north of the mainline tracks (refer to Figure 7). Because of irregularities in the presence of LNAPL in well WMW-7, AS was discontinued in June 2012. Due to fluctuating groundwater levels within the unconsolidated aquifer in this northern portion of the site, the SVE system was modified to operate as a bioventing system by injecting air into (rather than extracting air from) the unsaturated zone through the SVE wells. In June 2012, bioventing with ambient air through the SVE wells was initiated, operating in continuous mode (24 hours a day, 7 days a week) until April 2017, when the system blower failed. The system blower was replaced on 28 November 2017, and the bioventing system was restarted in continuous mode. Operation of the system continued through 24 July 2019, when the system was shut down to perform a respirometry test and to evaluate future system operation. Evaluation of the bioventing system will be included in the FS Report.

2013: A laser induced fluorescence (LIF) survey was conducted to further delineate the vertical and lateral extent of light non-aqueous phase liquid (LNAPL) beneath the site. The LIF survey was conducted by Dakota Technologies, Inc., of Fargo, North Dakota (Dakota), using the TarGOST LIF system, developed specifically for identifying long-chain petroleum hydrocarbons (e.g., oil, Bunker C, coal tar) in the subsurface (Dakota 2013). The LIF survey included 102 locations (Figure 8) advanced on approximately 12.5- to 50-foot centers (commonly 30- to 40-foot on-center). The LIF tooling was advanced to refusal (the top of bedrock surface) using a Geoprobe direct-push rig. Total boring depths ranged between approximately 12 feet below ground surface (bgs) (TG-NT11) to 93 feet bgs (TG-D06). An interpreted bedrock elevation map is included as Figure 9. Two LIF points (TG-NT12 and TG-NT12b) were advanced near well WMW-8, but only TG-NT12 was advanced to refusal. According to Dakota, the results of three of the test borings (TG-NT11, TG-NT10, and TG-NT11E40) were affected by instrumental artifacts and are not related to LNAPL on the site (Dakota 2013). The inferred LNAPL distribution beneath the site was refined using the data from the remaining 98 LIF locations and review of field and laboratory analytical data.

Soil borings were advanced at select locations immediately adjacent to LIF locations and soil samples were collected to correlate the LIF signal response to field observations and laboratory soil analytical concentrations for petroleum hydrocarbon. LNAPL samples collected from monitoring well WMW-8 and soil boring B-12-11 LNAPL were scanned with the LIF tooling and used to identify diesel-like and oil/Bunker C-like, respectively, LIF responses.

The LIF percent reference emitter (%RE) data were qualitatively evaluated with respect to field observations of the presence of LNAPL in soil borings, occurrence of measurable LNAPL thicknesses in monitoring wells and interpretation of the LIF logs for fuel types(s). The data were quantitatively evaluated with respect to soil laboratory analytical results for petroleum hydrocarbons and estimates of residual LNAPL concentrations. These data were assessed to determine ranges of LIF %RE responses indicating the potential presence of mobile LNAPL, residual LNAPL, or no LNAPL. Soil analytical data from field investigations conducted between 2003 and 2018 (including the 2013 LIF survey) were used in the evaluation of the LIF data and are included in Table 4. The correlations of LIF response data to field and laboratory data are presented on Figure 10. A summary of the interpretations of LIF logs and correlations between LIF results and field and laboratory analytical data is presented in Appendix D1.

As presented in Appendix D1, an LIF response of 60 %RE provides a conservative minimum threshold value above which potentially mobile diesel- or oil-like LNAPL may be present. An LIF response between 20 %RE and 60 %RE indicates that residual (nonmobile) LNAPL is potentially present and an LIF response below 20 %RE indicates residual LNAPL is not present above *de minimus* amounts. Reference emitter responses and NAPL mobility vary based on multiple factors; therefore, the %RE values are used as a guide for interpretation of relative LNAPL presence in the vicinity of the probe.

Figures 11 through 16 illustrate the LIF investigation results. LNAPL designations and %RE thresholds are presented on maps using the following symbols and colors:

LNAPL Designation (%RE Criteria):	Maps/Cross-Sections:
• Inferred Diesel/Oil-Like LNAPL (> 60 %RE)	Purple symbols
• Residual LNAPL (20 to 60 %RE)	Blue symbols
• No LNAPL or Residual LNAPL (< 20 %RE)	Green symbols (or none)

Figures 11 and 12 illustrate the interpreted lateral extent of diesel-like LNAPL at the water table (shallow) and submerged beneath the water table, respectively. Figures 13 and 14 illustrate the interpreted lateral extent of oil- or Bunker C fuel-like LNAPL at and above the water table and submerged, respectively. Figures 15 and 16 present the combined diesel- and oil / Bunker C-like LNAPL extents at the water table and submerged. For comparison, soil borings and wells [e.g., oil head monitoring (OHM) wells] are shown on Figures 11 through 16 as black symbols where either LNAPL was observed in a soil boring or measured as an apparent LNAPL thickness or sheen in a well. Shallow and submerged LNAPL was generally observed in two areas, on the western and eastern sides of the area south of the mainline tracks. On the western side, diesel-like LNAPL (residual or potentially mobile) was predominantly observed to the south of the former Fueling Island (diesel refueling began in 1950s), in the shallow water table zone (Figure 11). On the eastern side, oil-like LNAPL was predominantly observed submerged beneath and in the vicinity of former underground oil piping and the former Oil Unloading Trough and former Oil Sump (Figure 14).

Generalized geological cross sections are included as Figures 18 through 23; Figure 17 is a plan view map illustrating cross section locations. The cross sections illustrate the varying vertical extents of residual and potentially mobile LNAPL in the subsurface. Inferred potentially mobile LNAPL (labeled “LNAPL”), residual LNAPL, or no impact designations shown are based on calculating a maximum %RE value for each 0.5-foot interval in the LIF borings and comparing it to the %RE ranges [< 20% (no impact), 20 to 60 %RE (Residual LNAPL), and >60 %RE (LNAPL)]. No distinction is made for LNAPL type (e.g., diesel- or oil-like) on the cross-sections. Inferred extents of the LNAPL on the cross-sections are identified as diesel- or oil-like, as applicable.

Cross sections A-A’ and F-F’ show vertical zones of residual/mobile LNAPL impacts on the western side near the water table (diesel-like LNAPL) and in a separate, submerged zone (oil-like LNAPL). Cross sections B-B’, C-C’, and F-F’, illustrate the predominantly oil-like LNAPL impacts in the eastern submerged zone. Cross sections B-B’, C-C’, F-F’, and H-H’ (west) (Figures 18, 19, 23 and 24) show that potentially mobile LNAPL does not extend to or beneath the berm along the Columbia River. Further discussion of the site geology and extents of LNAPL impacts relative to site features is presented in Section 2.2.6.

During the LIF survey, a grab sample of oil/Bunker C NAPL was collected from a temporary well installed in soil boring (and LIF) location TG-D4 (Figure 8) and submitted to PTS Laboratories (PTS) of California for analysis of the following physical properties: specific gravity, density, viscosity, and interfacial/surface tension. Laboratory reports for the LNAPL physical properties are included in Appendix D2 and the results are discussed further in Section 2.3.3.4.

The TG-D4 LNAPL sample bottles were shipped to the laboratory at ambient temperatures per laboratory standard procedures (Appendix D2). Three bottles were filled with LNAPL collected from TG-D4 at 40 feet bgs and labeled accordingly. The chain-of-custody incorrectly identified the sample as a composite sample. Although there were multiple bottles of LNAPL collected from TG-D4, the LNAPL was collected from the same depth at the same date and time, therefore the sample from TG-D4 is more accurately described as a grab sample and not a composite sample.

Additionally, three soil cores (D6-30/32, F2-34.3/36.3, and F6-28/30) were collected, preserved by freezing with dry ice, and submitted to PTS for mobility analysis. The mobility analysis included: grain size analysis, pore fluid saturations, air/water drainage capillarity, free product mobility testing, residual saturation estimation, and effective porosity measurements. Laboratory reports for the mobility analysis are included in Appendix D. The results from the LNAPL mobility testing are presented in Section 2.3.3.4.

During the LIF survey, on 13 July 2013, oil droplets and an associated sheen were observed on the surface of the Columbia River adjacent to the site. BNSF reported the occurrence of the oil and sheen on the water surface to the National Response Center (NRC) and Ecology on the same date. The LIF survey did not identify a migration pathway for the oil LNAPL to the Columbia River through the unconsolidated sand aquifer. Monthly inspections for possible sheen along the riverbank area started in December 2013 and have been ongoing since.

2014: BNSF initiated an additional investigation in the vicinity of the former Power House (Figure 7) to evaluate the potentially mobility of the submerged oil LNAPL. This work included advancing nine pilot soil borings (OHM-1 through OHM-4, MWD-1 through MWD-4, and B-14-1), collecting continuous soil cores to assess the lithology in areas where OHM wells were planned to be installed, and soil sample collection for quantitative analysis of DRO and ORO impacts. OHM well locations were selected based on laboratory results, LIF survey data and soil boring logs for the pilot OHM borings (included in Appendix C), focusing on likely areas to monitor the oil LNAPL *in situ*.

2.2 Remedial Investigation Activities

BNSF and Ecology executed AO No. 12897 on 7 October 2015. The AO provides directives for further investigating data gap areas to complete the RI at the site. This section describes the characterization activities performed at the site since execution of the AO. RI activities were conducted to characterize the nature and extent of impacted soil and groundwater; assess subsurface hydrogeologic conditions; and evaluate site-related constituents in site media (soil, groundwater, and surface water). Work conducted for this RI, along with previous investigation and interim remedial actions, was performed under the supervision and direction of a geologist and/or engineer licensed by the State of Washington. The findings and results of site characterization activities are presented in Section 2.4. Tables summarizing laboratory analytical results for soil (Table B1) and groundwater samples (Tables B2 and B3) collected from 2016 through 2018 are included in Appendix B.

A CSM, based on the findings and results of the RI activities, is included as Section 3.

2.2.1 2016 Remedial Investigation Data Gaps

The RIWP described the performance of specific activities that were identified in the Scope of Work (SOW) provided as Exhibit B of the AO. Objectives identified in the RIWP and how data gaps have been addressed during implementation of the RI are summarized below.

Bank Characterization. The objective of further bank characterization was to 1) identify the occurrences of observed “tar-like nodules” along the riverbank and to sample those materials if present and 2) to perform sampling of observed oil droplets/sheen (if encountered) to assess their chemical composition.

Soil Investigation. The soil investigation objective was to further delineate the lateral and vertical distribution of impacted soils in data gap areas. Previous investigations yielded numerous soil analytical results for the site. However, review of past results, identified several data gaps that needed to be addressed to complete the comprehensive soil investigation. Additional sampling was performed to supplement the existing data set in the following ways:

- Confirming the general distribution of hydrocarbon compounds and LNAPL in soil from known releases and defining those areas where petroleum hydrocarbon constituent concentrations are greater than potential soil screening levels for the site, including those necessary for protection of groundwater.

- Evaluating other data gaps areas of the site where petroleum hydrocarbon compounds or other constituents were potentially used, stored, or distributed to assess potential impacts to site media. These areas included the former Transformer Storage Area [where polychlorinated biphenyls (PCBs) are potentially present in soils], former UST areas, former AST areas including the former 30,000-barrel Oil AST, two former Oil Houses used for oil storage, two former Repair Shops, the former Wash Rack, and around the former Engine House/Machine Shop.

Groundwater Investigation. The objective for further groundwater characterization was to collect adequate information to define the nature and extent of dissolved-phase constituents, understand site hydrogeologic conditions, and gather preliminary information to form the basis of an FS. Further definition of both groundwater chemistry and hydrogeologic conditions (i.e., groundwater flow gradients and river influence) was conducted to evaluate fate and transport of constituents of concern. Additional sampling and characterization were performed to supplement the existing data set in the following ways:

- Evaluate potential for submerged LNAPL accumulation in existing and new site monitoring wells.

- Evaluate the composition and level of saturation of LNAPL identified at the site.

- Assess potential LNAPL migration pathway through the sand aquifer and the potential for migration into the bedrock unit using OHM wells.

    - Install OHM wells in areas where the LNAPL appears to be in contact with bedrock and measure apparent LNAPL thickness. Collect LNAPL samples for physical properties analysis to assess the potential for oil to migrate vertically and soil core samples to assess LNAPL mobility.

    - Install shallow and deep monitoring wells on the river-side edge of the LNAPL to monitor the potential advancement of LNAPL towards the river.

- Evaluate existing and collect additional hydrogeologic data to assess the effects of daily and seasonal stage fluctuations in the river on site groundwater flow conditions and collect additional hydraulic parameters affecting groundwater flow (e.g., hydraulic conductivity).

- Assess possible dissolved phase constituents in groundwater resulting from historical refueling (including submerged LNAPL), maintenance, and other industrial activities conducted at the site including the data gaps areas identified above for soil investigations. This assessment included:

    - Establishing a monitoring well transect parallel to the adjacent Columbia River to assess dissolved concentrations of hydrocarbon compounds in site groundwater along the edge of the river.

    - Establishing a network of deep monitoring wells parallel to the adjacent Columbia River to evaluate the vertical extent of dissolved compounds along the edge of the river.

    - Evaluating the distribution of petroleum hydrocarbons in shallow groundwater along the western portions of the site.

    - Evaluating the presence of other potential compounds in groundwater at specific locations identified in the AO or in development of the RIWP (e.g., PCBs, PAHs, VOCs, and metals).

    - Evaluating natural attenuation parameters in selected monitoring wells.

RI field tasks conducted in accordance with the RIWP between August 2016 and July 2018 included the following:

- Advancing 24 soil borings (B-16-01 through B-16-24) for lithologic logging and field hydrocarbons screening [photoionization detector (PID) and sheen tests], collecting soil samples, and installing temporary wells to collect RGW samples. Field screening observations from soil borings are summarized in Table 3 and soil boring characteristics (locations, depths, etc.) are summarized in Table 5. Soil boring logs are provided in Appendix C.

- Installing seven shallow monitoring wells (WMW-12 through WMW-18) and performing quarterly (January 2017, November 2017, and February 2018) and/or semiannual (November 2016, April 2017, September 2017, and April 2018) groundwater sampling events. Wells WMW-12 and WMW-13 were installed along the western side of the site and wells WMW-14 through WMW-18 were installed in a transect parallel to the adjacent Columbia River. Well construction information is summarized in Table 6 and well construction logs are provided in Appendix C.

- Installing four deep monitoring wells (RMD-1 through RMD-4) adjacent to the Columbia River and performing four semiannual groundwater sampling events (November 2016, April 2017, September 2017, and April 2018).

- Installing four OHM wells (OHM-1 through OHM-4) in the area where LNAPL mass exists, collecting LNAPL samples for laboratory testing, soil cores for LNAPL mobility testing, and performing periodic LNAPL monitoring.

- Continuous water level gauging with pressure transducers in selected monitoring wells and in the Columbia River adjacent to the site between December 2016 and April 2018.

- Performing slug tests in December 2016 to assess the hydraulic conductivity of the saturated zone in five shallow monitoring wells (WMW-5, WMW-7, WMW-9, WMW-15, and WMW-18) and two deep monitoring wells (RMD-1 and RMD-4).

- Collecting oil sheen, droplet, and/or nodule samples from the surface of the Columbia River in August 2016, October 2016, August 2017, and September 2017 for laboratory analyses.

- Performing monthly bank (visual) inspections along the Columbia River.

2.2.2 2018 Remedial Investigation Addendum

Following implementation of the RIWP, Ecology identified additional data gaps not included in the RIWP. At Ecology's request, the RIWP Addendum (KJ 2018) was prepared to address the additional data gaps and implemented in summer 2018.

Soil and Groundwater Investigation. Prior to the RI, limited information was available to assess the potential for constituents in soil and groundwater in areas east of the former Bunker C oil and diesel fueling distribution line system. Several soil borings were advanced in this area during 2016 RI activities. DRO and/or ORO were reported in RGW samples from 14 of the 16 borings. Five of the RGW samples collected near the former Engine House/Machine Shop, contained DRO and/or ORO concentrations above the MTCA Method A CUL. Based on these results, Ecology identified data gaps including areas in the vicinity of the following:

- Former Engine House/Machine Shop, former Wash Rack, the rail area north of the former Wash Rack, former Repair Shop, former Turntable, two former Oil Houses, former Oil Drain Lines, and the former Oil/Water Separator.

- Extent of dissolved phase hydrocarbon impacts to the north of wells WMW-7 and WMW-8 near the existing Maintenance Shop and to the east near the former Boiler House.

- Area of a former Septic Tank and Septic Drainage field located to the northeast of the main site area.

Additional Shoreline Wells. Nine monitoring wells were installed adjacent to the shoreline during 2016 RI activities (shallow monitoring wells WMW-14 through WMW-18 and deep riverside monitoring wells RMD-1 through RMD-4). Groundwater samples collected from these wells contained concentrations of DRO and/or ORO above the MTCA A CUL. Five additional shallow and two additional deep riverside monitoring wells were installed along the shoreline for further delineation of the dissolved-phase constituents.

Status of Former Water Supply Wells*.* Three water supply wells were installed on the site between 1918 and 1930 to provide water for railyard operations, as well as domestic use in Wishram, Washington. Prior to the RI, the locations of these former water supply wells had not been confirmed in the field, and it was unknown whether they had been plugged and abandoned. During the RI, the locations and present status of these three wells were investigated.

Field tasks conducted in accordance with the RIWP Addendum between August 2018 and December 2018 included the following:

- Advancing 30 soil borings (B-18-01 through B-18-30) for lithologic logging and field hydrocarbons screening (PID) and sheen tests, collecting soil samples, and installing temporary wells to collect RGW samples.
- Installing 13 shallow monitoring wells (WMW-19 through WMW-24 and WMW-26 through WMW-32) and performing quarterly (August 2018 and November 2018) groundwater sampling events.
- Installing two deep monitoring wells (RMD-5 and RMD-6) adjacent to the Columbia River and performing one semiannual groundwater sampling event (August 2018).
- Performing slug tests in August 2018 to assess the hydraulic conductivity of the saturated zone in seven shallow monitoring wells (WMW-20, WMW-22, WMW-23, WMW-26, WMW-28, WMW-30, and WMW-31) and one deep monitoring well (RMD-6).
- Collecting oil sheen, droplet, and/or nodule samples from the surface of the Columbia River in August 2018 for laboratory analyses.
- Field and desktop assessments of the status of former water supply wells.
- Performing monthly bank (visual) inspections along the Columbia River.

2.2.3 Cultural Resource Monitoring

The site is known to be located in a culturally significant area due to its proximity to Celilo Falls. The Geoarchaeological Monitoring of Additional Remedial Investigations report (Jacobs 2018) provides a detailed description of the historical background of the site and its potential cultural resources. A cultural resources management plan (CRMP) (AECOM 2016) was developed to establish protocols for management of cultural resources identified on the site. The CRMP was submitted to the Washington State Department of Archaeology and Historic Preservation (DAHP) and the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation).

Subsurface investigative activities conducted in 2016 and 2018 were completed in accordance with the CRMP. Intrusive activities were performed under permit from DAHP.

Ecology performed government-to-government consultation with the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Confederated Tribes of Warm Springs on 28 October 2016, 29 May 2018, and 31 October 2019.

2.2.4 Laboratory Analytical Methods

Soil and groundwater samples were typically submitted for one or more of the following analyses listed below, although specific analyses varied for each sample in accordance with the RIWP and RIWP Addendum. Refer to Tables 7 and 8 for a list of analyses performed for each soil and groundwater sample, respectively.

- DRO and ORO using Ecology Method Northwest Total Petroleum Hydrocarbons as Diesel Extended (NWTPH-Dx) with and without silica gel cleanup (SGC).
- GRO using Ecology Method Northwest Total Petroleum Hydrocarbons as Gasoline Extended (NWTPH-Gx).
- BTEX using U.S. Environmental Protection Agency (EPA) Method 8260.
- VOCs using EPA Method 8260.
- Total (soil and water) and dissolved (water only) metals using EPA Methods 6010 and 6020 (and mercury by EPA Methods 7470 and 7471). Dissolved metals samples were field filtered using an inline 0.45-micron filter. Metals analyses typically included lead (primarily water samples) and RCRA 8 metals (soil and water samples).
- Semivolatile Organic Compounds (SVOCs) using EPA Method 8270
- PAHs using EPA Method 8270, including Select Ion Monitoring (SIM) as needed.
- PCBs using EPA Method 8082.

Monitoring well groundwater samples were also analyzed for general chemistry and monitored natural attenuation (MNA) parameters as listed below:

- Nitrate/nitrite by standard method E353.2.
- Ammonia using standard method E350.1
- Sulfate using standard method SW9056A.
- Sulfide using standard method SM4500-S-2 D or SM4500S2E
- Dissolved metals including iron and manganese using EPA Method 6020.
- Alkalinity (total, carbonate, and bicarbonate) using standard method 2320 B-2011.
- Methane using RSK 175.

LNAPL samples collected in 2019 from wells OHM-1, OHM-2, and OHM-3 were submitted for one or more of the analyses listed below:

- DRO and ORO using NWTPH-Dx method without SGC.
- VOCs using EPA Method 8260.
- Total metals (RCRA 8 plus copper, nickel, and zinc) using EPA Method 6010 and total mercury by EPA Methods 7471).
- PCBs using EPA Method 8082.
- Extractable petroleum hydrocarbons (EPH) using Ecology methods.

Oil sheen / oil nodule samples collected from the surface of the Columbia River were submitted for analyses as listed below (in the following order of priority based on available sample volume):

- DRO and ORO using NWTPH-Dx method
- Extractable petroleum hydrocarbons (EPH) using Ecology methods
- PAHs using EPA Method 8270 including SIM as needed
- VOCs using EPA Method 8260.

Samples were submitted to the analytical laboratories under standard chain-of-custody protocol. Samples were handled as described in the standard operating guidelines (SOGs) provided with the RIWP, including packing with ice in coolers for shipment to the analytical laboratories. Analytical methods, including laboratory methods, containers, and preservative requirements, were conducted in general accordance with laboratory specifications and the RIWP, Sampling and Analysis Plan (SAP), and Quality Assurance Project Plan (QAPP) (KJ 2016). See Section 2.3.1 for additional discussion of quality assurance/quality control (QA/QC) samples.

Most of the samples collected during the RI were submitted to ESC Lab Sciences (ESC) of Mount Juliet, Tennessee, for the primary analyses listed above. During the course of this project in mid-2018, ESC was purchased by Pace National. Select LNAPL and oil sheen / oil droplet samples were submitted to Analytical Resources Inc. (ARI) of Tukwila, Washington, for EPH and NWTPH-Dx analysis. Laboratory analytical reports are provided in Appendix E.

Data received from analytical laboratories was reviewed and validated by KJ. Overall, the analytical data are appropriate for their intended use. Analytical results for soil, groundwater, and oil sheen/oil droplet samples are presented in Section 2.3. Data validation is summarized in Section 2.3.1. Data validation reports are provided in Appendix F.

2.2.4.1 Cleanup Levels

CULs for the site have not been developed at this time. A summary of MTCA Method cleanup levels is presented in Table 2 along with freshwater applicable or relevant and appropriate requirements (ARARs). Establishment of cleanup standards for the site, including cleanup levels and points of compliance, will be determined during the FS stage and stated in the FS report after the reasonable maximum exposures are established.

To evaluate whether constituents analyzed in soil samples represent a concern, laboratory results were compared to CUL values based on MTCA Method A for unrestricted land use if available, then the lowest of Method B values based on WAC 173-340-740 Table 740-1 (MTCA Method A) and Cleanup Levels and Risk Calculation (CLARC) tables (MTCA Method B). For constituents without MTCA Method A CULs, which are protective of groundwater for drinking water use, soil sample laboratory results were also screened against default soil concentrations protective of groundwater (i.e., leaching) (obtained from MTCA Equation 747-1) in the vadose zone or in the saturated zone based on sample depth and range of saturated conditions at the site. CULs and screening levels were obtained from Ecology's CLARC master data table updated in January 2020.

There is no source for hexavalent chromium at the site. Hexavalent chromium was not reported above laboratory reporting limits in soil samples collected in 2004 from the vicinity of the former Engine House (KJ 2004). As stated in the CLARC chemical-specific considerations – January 2020, "If chromium VI is NOT present at the site, then the site assessor may assume that the measured concentration of total chromium is the concentration of chromium III." Accordingly, the MTCA Method A CULs listed in Table 2 for chromium are the CULs for chromium III.

To evaluate whether constituents analyzed in groundwater samples represent a concern, laboratory analytical results were compared to MTCA Method A for groundwater based on WAC 173-340-740 Table 720-1. Where MTCA Method A values were not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from CLARC tables have been used (accessed January 2020).

In a letter from Ecology to BNSF dated 17 December 2018, Ecology provided an environmental effects-based concentration [reported in Ecology Publication 18-03-002 (Ecology 2018f)] of 250 µg/L as a screening level for diesel-range total petroleum hydrocarbons (e.g., DRO) in surface water. The letter further required that BNSF "for the Remedial Investigation report, list the analytical results obtained using NWTPH-Dx in a comparison table that shows the screening levels and cleanup levels for the various exposure pathways." In June 2020, Ecology Publication 20-03-008 presented an environmental effects-based concentration for weathered diesel-range organics of 3,040 µg/L in surface water (Ecology 2020). In accordance with Ecology's 17 December 2018 letter, the environmental effects-based concentrations are included in Table 2 and are referenced in Tables 19 through 22 and Appendix B Tables B2 and B3. As stated above and in Ecology's letter, because CULs for the site have not been developed, groundwater sampling results for DRO have been compared in this Draft RI Report to the MTCA Method A CUL of 500 µg/L. Results for NWTPH-Dx analyses are presented in summary tables and on figures in this report as DRO, ORO, and as Total TPH-Dx (the sum of DRO and ORO). Total TPH-Dx was calculated by summing the individual concentrations of DRO and ORO as follows: If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration. A Total TPH-Dx calculated result is also presented based on detected analyte results only.

According to Ecology's *Guidance on Remediation of Petroleum-Contaminated Ground Water By Natural Attenuation* (Ecology 2005), under the MTCA rule, "naphthalenes" are the total of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. Results of the 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene analyses (as available) were used to calculate total naphthalenes concentrations, which are presented in tables for soil and groundwater analytical results. Total naphthalenes were calculated by summing the individual naphthalenes concentrations. If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected, then one half the lowest method reporting limit was used as the total concentration. A total naphthalenes result is also presented based on detected analyte results only.

Ecology policies and procedures for implementing WAC 173-340-708(8)(e) in the MTCA rule requires that mixtures of cPAHs be considered a single hazardous substance (total cPAH) when establishing and determining compliance with cleanup levels. [*Evaluating the Human Health Toxicity of Carcinogenic PAHs (cPAHs) Using Toxicity Equivalency Factors (TEFs) Implementation Memorandum #10*, Ecology, 20 April 2015.] Results of the cPAH compounds [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene] were used to calculate total cPAH concentrations using the Toxicity Equivalency Factor (TEF) summation method. Calculated total cPAH concentrations (also referred to as the total toxic equivalent concentration "Total TEQ") are presented in tables for soil and groundwater analytical results. Total cPAHs are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual cPAH concentrations by a TEF and summing the adjusted concentrations. If an individual chemical was not detected, a value of one-half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration. A Total cPAH calculated result is also presented based on detected analyte results only. Table 2 includes the TEFs for individual cPAHs and the applicable soil or groundwater cleanup level for benzo(a)pyrene is provided as the cleanup level for total cPAH.

2.2.4.2 Laboratory Analytical Deviations from Work Plan

In January 2017, KJ learned that nearly half of the samples submitted to ESC in August, October, and November 2016 were inadvertently prepared using the SGC method prior to analyzing the samples for DRO and ORO by NWTPH-Dx. As specified in the RIWP (Section 3.6), samples submitted for analysis by NWTPH-Dx were to be prepared without SGC. A total of 42 of 95 samples collected during that time period were affected (including primary and field duplicate samples), including one oil nodule sample collected from the surface of the Columbia River in August 2016; 17 soil samples collected in August, October, or November 2016; five RGW samples collected in August 2016; and 19 groundwater monitoring well samples collected in November 2016. In accordance with the RIWP, eight soil samples collected in October 2016 were analyzed by NWTPH-Dx with and without SGC. Ecology was notified by BNSF of this issue by telephone on 17 January 2017 [Shane DeGross (BNSF), personal communications to John Mefford (Ecology)].

A preliminary data summary for RI samples collected in August, October, and November 2016 was prepared by KJ for BNSF and was subsequently submitted for Ecology's review on

14 February 2017 (KJ 2017). Results were presented in tabulated form for the analyses performed and in map figures for soil and groundwater samples analyzed by NWTPH-Dx (with and without SGC) for TPH as DRO and ORO. The data summary included a discussion of the DRO and ORO results for samples prepared with and without SGC, comparison to applicable MTCA cleanup levels, and summaries of corrective measures taken by project staff and ESC to consistently analyze samples using the intended methods.

Ecology stated in their response letter dated 3 March 2017 that "BNSF will adhere to the sampling and analysis protocol as established in the RI Work Plan and will perform resampling and analyses" (Ecology 2017a).

Soil and groundwater RI sample results for DRO and ORO (with or without SGC preparation), have provided information beneficial for characterizing the site, delineating the distribution of affected areas, and identifying data gaps that were identified in the RIWP Addendum, and supporting the development of remedial alternatives.

RIWP Addendum field activities completed in August 2018 included several soil boring and groundwater sampling locations in the vicinity of the former Engine House/Machine Shop and a former Repair Shop, near which one or more sampling locations in 2016 had samples inadvertently prepared with SGC. The additional locations under the RIWP Addendum were included to further characterize the nature and extent of site-related constituents in these data gap areas. Rather than resampling previous locations where laboratory deviations occurred, a limited number of soil and groundwater samples near the previous locations were analyzed by NWTPH-Dx with and without SGC preparation to further evaluate previously collected data. In addition, the ongoing groundwater monitoring program (performed quarterly or semiannually in accordance with the RIWP and RIWP Addendum) includes submitting select groundwater samples for NWTPH-Dx analysis with and without SGC preparation.

2.2.5 Sampling and Monitoring

2.2.5.1 Soil Sampling

During the RI, 83 soil borings were advanced across the site, and 30 borings were completed as monitoring wells. Figure 25 (main part of site) and Figure 26 (eastern part of site) show the locations of borings advanced during the RI. Characteristics of soil borings B-16-01 through B-16-24 and B-18-01 through B-18-30 (borings not completed as permanent wells) are provided in Table 5.

Field work including advancing soil borings and installing monitoring wells in accordance with the RIWP was performed between 1 and 12 August 2016, and 11 October and 3 November 2016. Field work including advancing soil borings and installing monitoring wells in accordance with the RIWP Addendum was performed between 30 July and 21 August 2018.

A Geoprobe^{TM} direct-push drilling rig operated by Holt Services, Inc. of Edgewood, Washington (Holt), was used to advance 64 borings (B-16-04 through B-16-24; B-18-01 through B-18-30; WMW-19 through WMW-24; WMW-26 through WMW-32). The direct-push rig was also used to advance pilot holes for six deep monitoring wells (RMD-1 through RMD-6). Pilot holes were advanced to determine depth to bedrock, well screen placement, and for collection of soil samples. A Terra Sonic 150 CC drilling rig operated by Holt was used to advance 20 borings and wells (B-16-01 through B-16-03; WMW-12 through WMW-18; RMD-1 through RMD-6; OHM-1 through OHM-4). The sonic rig was also used to complete one boring where the direct-push drilling rig encountered refusal (B-18-18).

Prior to performing drilling activities, the following activities were conducted:

- BNSF and KJ conducted site walks to observe proposed boring and well installation locations and to identify visible ground surface level or overhead obstructions and adjust proposed locations after conferring with Ecology.
    - Several locations in 2018 were relocated distances of approximately 5 to 20 feet based on ground surface or overhead obstructions including: B-18-01, B-18-02, B-18-05, B-18-06, B-18-08, B-18-14, B-18-15, B-18-18, B-18-19, B-18-20, WMW-28, and WMW-29.
    - Proposed shallow monitoring well WMW-25 was not installed in 2018, following receipt of Ecology's approval on 19 July 2018 during a progress update meeting between Ecology and BNSF and its consultant KJ. The well could not be installed due to its planned proximity to the mainline tracks and other siding tracks.
- Coordinating with the Washington Utility Notification Center (public property only).
- Coordinating with BNSF trades (electrical, signal, water, etc.) regarding utilities at proposed sampling locations.
- Coordinating with a private utility locator to identify possible underground lines on private property.
- Advancing the upper approximately 6 feet of each soil boring using an air-knife vacuum truck operated by Holt to assess the possible presence of underground utilities or interferences (2018 only).

Soil borings (some completed as monitoring wells) were advanced in the following locations, in general accordance with the RIWP and RIWP Addendum. In some cases, borings and/or monitoring wells were installed to address more than one identified data gap area. Refer to Tables 7 and 8 for further details.

- Former Power House / former Oil Appurtenances: OHM-1 through OHM-4
- Shallow Transect Wells along River: WMW-14 through WMW-23
- Shallow Wells Upland: WMW-12, WMW-13, and WMW-24 through WMW-32
- Former Power House Deep Riverside Wells: RMD-1 through RMD-6
- Vadose Zone Boring (near LIF locations TG-CR-04, TG-CR-4.5, and TG-CR-5): B-16-01

- Potential Submerged Diesel NAPL: B-16-02 and B-16-03
- Former Transformer Storage Area: B-16-04 and B-16-05
- Former 30,000-barrel AST Area: B-16-06, B-16-07, and B-16-08
- Former Repair Shop (West): B-16-09, B-18-17, and B-18-18
- Former Repair Shop (East) and former Turntable: B-16-10, B-16-11, B-18-22, and WMW-29
- Former Wash Rack / North of former Wash Rack: B-16-12, WMW-24, and B-18-23
- Former Oil House (East of former Signal Office): B-16-13, B-16-14, and WMW-30
- Former Oil House and 1,000-gallon Gasoline UST: B-16-15, B-16-16, and WMW-32
- Former 5,000-gallon Oil UST (East of the Depot): B-16-17 and WMW-31
- Former Engine House/Machine Shop Area: B-16-12, B-16-18 through B-16-24, B-18-01 through B-18-11, WMW-26
- Former Oil Drain Lines associated with the former Engine House, former Oil Sump, and former Oil/Water Separator: B-18-12 through B-18-18, WMW-27
- Former Oil Drain Lines and former Water Supply Wells: B-18-14 adjacent to Well #3 and B-18-18 adjacent to Well #2
- Former Oil/Water Separator and former Pump House #2: B-18-19 through B-18-21
- Former Boiler House and Maintenance Shop: B-18-24 and B-18-25
- Former Septic Tanks and Septic Drain Field: B-18-26 through B-18-30.

Continuous soil cores were collected from each boring location for lithologic identification, field screening, and collection of soil samples for laboratory analysis. The lithology in each boring was logged by or under the supervision of a KJ WA State Licensed Geologist in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) [ASTM International (ASTM) D2488]. Soil boring logs are included as Appendix C. Soil from each borehole was screened in the field for the presence of petroleum hydrocarbons using a combination of visual and olfactory observations, including sheen testing and headspace screening for VOCs using a PID. Table 3 provides a summary petroleum hydrocarbon field screening results.

Soil samples retained for laboratory analyses were collected from each soil boring directly from the core using either Terra Core samplers for VOCs and GRO analyses, by hand using a clean set of nitrile gloves, or using a clean trowel, and placed directly into laboratory-supplied containers. Shallow soil samples (e.g., 2.0 to 2.5 feet bgs) were collected from a clean, stainless steel hand auger after an air knife was used to advance the boring to approximately 2 feet bgs. Soil from the hand auger sample was subsampled for laboratory analyses and field screening. Soil samples were immediately labeled with the sample identification (ID) and date and time of collection and placed in a cooler with ice for delivery to the analytical laboratory under standard chain-of-custody protocol. Soil samples were analyzed by one or more of the following analyses in accordance with the RIWP and RIWP Addendum: GRO, DRO, ORO, PAHs, SVOCs, BTEX, VOCs (including BTEX), RCRA 8 metals, and PCBs. As required by Ecology, select soil samples collected in 2016 and 2018 were analyzed for DRO and ORO by NWTPH-Dx with and without SGC sample preparation. Table 7 summarizes soil samples collected and analyses performed during the RI.

2.2.5.2 Reconnaissance Groundwater Sampling

In accordance with the RIWP and RIWP Addendum, RGW samples were collected from 44 soil borings:

- 2016 RGW samples from borings B-16-09 through B-16-24
- 2018 RGW samples from borings B-18-01 through B-18-19; B-18-21 through B-18-24; B-18-26 through B-18-30.

RGW samples were collected in 2016 and 2018 using a ¾-inch temporary polyvinyl chloride (PVC) well screen installed within the direct-push drilling rods. Once the temporary well was placed, the drilling rods were removed to expose the screened interval to the surrounding formation. Screen sections were selected in the field by the KJ geologist as either 5 or 10 feet long, depending on the saturated conditions and soil types observed at each boring location. While consistent with the 2016 RI work, the use of this method in 2018 was a deviation from the RIWP Addendum (KJ 2018) which specified using pre-packed slotted casing for collecting RGW samples. The temporary well installation method used both years achieved the objective of collecting screening level quality groundwater data. Figure 27 (main part of site) and Figure 28 (eastern part of site) show the RGW locations, and Table 8 provides the approximate screened intervals from which samples were collected.

In accordance with the RIWP, RGW samples were collected from soil boring B-16-24 at two depth intervals, one at the water table (10 to 15 feet bgs) and one at the top of bedrock surface (25 to 30 feet bgs). The RIWP included collecting a groundwater sample from one soil boring in the former Transformer Storage Area (i.e. borings B-16-04 and B-16-05) only if the soil sample results from either of the borings were above 1 milligrams per kilogram (mg/kg). Because PCBs were not reported above laboratory reporting limits in soil samples collected from soil borings B-16-04 and B-16-05 (Table B1, Appendix B), RGW samples were not collected at soil boring locations B-16-04 and B-16-05.

Two soil borings were advanced to the north (B-18-20) and south (B-18-19) of the former Oil/Water Separator. Soil samples for laboratory analysis were collected from each boring. Field observations (visual, olfactory, PID, and sheen tests) did not indicate impacts in either of the two soil borings; therefore, in accordance with the RIWP Addendum, a RGW sample was only collected from the soil boring closer to Columbia River, B-18-19. Field observations are presented in the soil boring logs included in Appendix C.

RGW samples were collected with a peristaltic pump using low-flow methodology and dedicated polyethylene tubing. Groundwater was purged from each borehole for approximately 30 minutes prior to sample collection to reduce turbidity. Groundwater field parameters, including temperature, pH, specific conductance, dissolved oxygen (DO), and oxidation-reduction potential (ORP) were recorded at each location prior to sample collection where there was sufficient groundwater recharge (2018 only). Each RGW sample was collected in laboratory-provided containers, labeled with the sample ID, date, and time of collection, and placed into and an ice-filled cooler for delivery to the analytical laboratory under standard chain-of-custody protocol. RGW samples were submitted for laboratory analyses in accordance with the respective RIWP or RIWP Addendum, with the exception of samples inadvertently analyzed by NWTPH-Dx with SGC. Table 8 summarizes groundwater samples collected and analyses performed during the RI. As required by Ecology, select RGW samples collected in 2018 (B-8-01, B-18-06, B-18-11, B-18-17, and B-18-23) were analyzed for DRO and ORO by NWTPH-Dx with and without SGC sample preparation.

Drilling rods and reusable sampling equipment were cleaned between borings using a detergent wash, followed by a water rinse. Soil cuttings and water were retained in 55-gallon drums for characterization and offsite disposal.

2.2.5.3 Monitoring Well Installation

Well construction information is presented in Table 6. Wells were constructed using either a direct-push rig (wells WMW-19 through WMW-24, and WMW-26 through WMW-32) equipped with a 3-inch-diameter core barrel and disposable drive point, or the sonic rig equipped with a 6-inch (wells WMW-12 through WMW-18, and RMD-1 through RMD-6) or 9-inch (OHM-1 through OHM-4) diameter core barrel. Figure 27 (main part of site) and Figure 28 (eastern part of site) show the locations of monitoring wells.

Shallow monitoring wells WMW-12 through WMW-18 and deep wells RMD-1 through RMD-6 were completed using a combination of 2-inch-diameter schedule 40 PVC solid and 0.010-inch (shallow wells) or 0.020-inch (deep wells) machine-slotted casing. Shallow wells (WMW-12 through WMW-18) were completed using 15 feet of slotted casing; and the annulus around the perforated pipe was backfilled with 10/20 silica sand. Deep wells (RMD-1 through RMD-6) were completed with either 15 or 20 feet of slotted casing, with the annulus around the perforated casing being backfilled with 10/20 silica sand. Shallow wells WMW-19 through WMW-24, and WMW-26 through WMW-32 were completed using 10 feet of pre-packed slotted casing with 10/20 silica sand.

Wells OHM-1, OHM-2, and OHM-3 were completed using 4-inch-diameter schedule 40 PVC solid and pre-packed 0.040-inch machine-slotted casing. Well OHM-4 and the original OHM-3 (referred to herein as “OHM-3R”) were completed using 4-inch-diameter type 304 stainless steel solid casing and 0.040-inch wire-wrapped screen. Following installation of well OHM-3R using stainless steel wire-wrapped screen, the well filled in immediately with sand. After unsuccessful attempts to remove the sand, OHM-3 was installed adjacent to OHM-3R. The larger slot size for the OHM wells (0.040-inch) compared to other site wells (0.010-inch and 0.020-inch) was to allow for high viscosity NAPL (if present) to enter the well without excessive capillary resistance. The construction of wells OHM-1, OHM-2, and OHM-3 using PVC was a deviation from the work plan, which specified stainless steel construction [KJ 2016 (revised 2017)]. The change to PVC prepacked wells was made to allow for filter pack placement in heaving sand conditions.

OHM wells were completed with variable screen lengths: 65-foot (OHM-1), 35-foot (OHM-2), 25-foot (OHM-3), or 5-foot (OHM-4). In pre-packed wells (WMW-19 through WMW-32, and OHM-1 through OHM-3), additional silica sand was poured around the pre-pack screen once the casing and screen section were placed, until the sand extended approximately 1 foot above the top of the screen.

The annulus surrounding the well casing was backfilled with 3/8-inch hydrated bentonite chips from the top of the filter pack to within approximately 1 foot of the ground surface. Wells were finished to match existing grade with an 8-inch traffic-rated flush-mounted monument set in concrete.

Monitoring wells were developed after completion using a combination of surging with a surge block and pumping with a submersible pump to remove fine-grained sediments from the filter pack and well casing. Wells were alternately surged and pumped until the purge water was generally free of visible turbidity. Well development water was containerized in 55-gallon steel drums and stored onsite for characterization and offsite disposal.

2.2.5.4 Monitoring Well and Soil Boring Survey

Monitoring wells and soil borings installed during the RI activities were surveyed by KPG, Inc. of Tacoma, Washington, a Washington licensed surveyor, to determine their vertical elevation (ground surface and/or top of casing elevations) (using NAVD88 datum) and horizontal position (using Washington State Plane Coordinates, NAD 83/91) to the nearest 0.01 foot. Wells and soil borings installed in 2016 and 2018 were surveyed on 12 December 2016 and 28 August 2018, respectively. Survey data for soil borings installed in 2016 and 2018 are provided in Table 5. Survey data for current monitoring wells are provided in Table 6.

2.2.5.5 Groundwater and LNAPL Level Gauging

Groundwater and LNAPL (if present) levels were measured in site groundwater monitoring wells on a semiannual basis prior to 2017 and on a quarterly basis in 2017 and 2018. In 2015 and 2016, groundwater and LNAPL levels in wells WMW-7 and WMW-8 were also measured on an approximately monthly basis to assess the performance of the bioventing system discussed in Section 2.2. An oil/water interface probe was used to measure the depth to groundwater below top of the PVC well casing (btoc) and to check for the presence and apparent thickness of LNAPL during each monitoring event. Groundwater elevations and LNAPL thickness data are summarized in Table 9 for WMW and RMD series wells. The groundwater elevation in wells with observable LNAPL has been corrected to reflect the equivalent potentiometric elevation for water without LNAPL using the specific gravity of the LNAPL. A specific gravity value of 0.85 was used for LNAPL detected in the Maintenance Shop area (vicinity of wells WMW-7 and WMW-8).

Prior to January 2016, LNAPL was frequently detected in wells WMW-7 and WMW-8. With the exception of a single detection of LNAPL in WMW-8 in November 2016, an apparent LNAPL thickness greater than 0.01-foot has not been measured in either well since that time. The reduction in apparent LNAPL thicknesses in these wells is attributable to the performance of the bioventing system in the vicinity of wells WMW-7 and WMW-8, as well as natural source zone depletion.

Figure 29 presents groundwater level and LNAPL thickness (if present) measurement trend charts for monitoring wells WMW-7 and WMW-8 and OHM series wells (OHM-1 through OHM-4) (see next section) at the site.

2.2.5.6 OHM Well LNAPL Monitoring

Apparent LNAPL thickness monitoring has been performed in the OHM wells since December 2016. LNAPL monitoring in the OHM wells was performed approximately monthly between February 2017 and December 2017 and on a quarterly basis in 2018. Black, viscous LNAPL has been observed in wells OHM-1, OHM-2, and OHM-3. LNAPL has not observed in OHM-4; however, an observed LNAPL sheen was present in this well in February, March, and April 2017.

Depth to LNAPL was measured in the OHM wells from the top of the PVC or stainless steel well casing using an oil/water interface probe. To protect the interface probe from interference from the LNAPL present in these wells and allow detection of the oil/water interface, the sensor of the probe was encased in frozen distilled water, using dry ice, prior to measurement. The ice-encased probe was lowered through the LNAPL and placed in contact with the bottom of the well casing. The probe was left in place approximately 30 minutes to allow the ice to melt. The probe was then slowly withdrawn from the well. An audible signal indicated the transition from groundwater to LNAPL, and the depth of the interface was recorded.

OHM monitoring data are provided in Table 10. The groundwater elevation in wells with observable LNAPL has been corrected to reflect the equivalent potentiometric elevation for water without LNAPL using the specific gravity (average of 0.96 for OHM wells) of the LNAPL. Ranges of apparent LNAPL thickness measurements are summarized below for wells OHM-1, OHM-2, and OHM-3:

- OHM-1: 2.32 feet (December 2016) to 36.95 feet (July 2019)
- OHM-2: 1.28 feet (March 2017) to 13.99 feet (July 2019)
- OHM-3: 0.31 foot (March 2017) to 12.17 feet (August 2018).

Apparent LNAPL thicknesses in wells OHM-1 and OHM-2 generally increased since the installation of the wells through July 2019 as shown on Figure 29. LNAPL thickness had been increasing through August 2018 in well OHM-3 as well. The maximum apparent LNAPL thickness in well OHM-4 was 0.01 foot in December 2016. LNAPL (either a sheen or measured thickness) has not been observed in well OHM-4 since April 2017.

2.2.5.7 LNAPL Properties and Mobility Sampling

In accordance with the RIWP, attempts were made to collect LNAPL samples from each of the OHM wells for analysis of fluid properties that influence mobility and possible migration pathways, including:

- Dynamic viscosity by ASTM D445, fluid density by ASTM D1481, and specific gravity by API RP40, each at three temperatures [70, 100, and 130 degrees Fahrenheit (°F)].

- Surface tension and interfacial tensions [three phase pairs; oil/water, oil/air, and water/air (at ambient temperature)] by the DuNuoy Method ASTM D971.

LNAPL samples were collected from wells OHM-1 and OHM-3 on 17 November 2016 and from well OHM-2 on 27 February 2017 and submitted to PTS for analysis. Samples were collected using decontaminated field equipment lowered into the well and transferred into laboratory-supplied containers. LNAPL samples were shipped to the laboratory at ambient temperatures per laboratory standard procedures (Appendix D2). Once received by PTS, the LNAPL samples were stored under ambient conditions until analyses were performed, which are typically at temperatures from 70°F and above. In accordance with Ecology's 22 April 2020 comments to the Draft RI Report, collection of LNAPL samples in the future, if it occurs, will include recording temperature of the LNAPL at the time of collection. A sufficient volume of LNAPL has not accumulated in well OHM-4 since its installation in 2016 to allow for collection of an LNAPL sample for fluid properties analysis.

During the sampling efforts, soil cores from each well boring (OHM-1 from 52.5 to 55 feet bgs; OHM-2 from 38 to 40 feet bgs, OHM-3 from 28.5 to 31 feet bgs, and OHM-4 from 23 to 25 feet bgs) were collected, preserved by freezing with dry ice, and submitted to PTS for mobility analyses including:

- API RP40 Dean-Stark Method for initial pore fluid saturations, total porosity, air-filled porosity, grain density, dry bulk density and moisture content

- Air/water drainage capillarity, air permeability, and hydraulic conductivity

- Free product mobility testing, residual saturation estimation, and effective porosity.

The results for the 2013 and 2016/2017 LNAPL properties testing and soil core testing are presented in Section 2.3. PTS laboratory results are included in Appendix D.

LNAPL samples were also collected in 2019 for chemical laboratory analyses (May and July) and physical analyses (July) in association with feasibility study related field activities. Chemical laboratory analyses were as follows:

- LNAPL samples were collected from wells OHM-1 and OHM-3 on 6 May 2019 for chemical analyses including metals (RCRA 8 plus copper, nickel, and zinc), PCBs, NWTPH-Dx without SGC, and VOCs.

- LNAPL samples were collected on 22 July 2019 from wells OHM-1, OHM-2, and OHM-3 for chemical analyses including NWTPH-Dx without SGC and EPH.

LNAPL samples (from wells OHM-1 and OHM-3) and groundwater samples (from wells OHM-2 and OHM-3) were collected on 22 July 2019 for physical properties including:

- Dynamic viscosity by ASTM D445, fluid density by ASTM D1481, and specific gravity by API RP40, each at three temperatures (70, 100, and 130°F).

- Interfacial tensions [three phase pairs; oil/water, oil/air, and water/air (at ambient temperature)] by the DuNuoy Method ASTM D971.

Surface tension and interfacial tension analyses for the oil/water and water/air phase pairs were performed in 2016 using laboratory tap water. Samples collected in 2019 for surface and interfacial tension analyses included groundwater samples collected from the OHM wells such that the analyses would be representative of site conditions. The groundwater sample from well OHM-2 was used for the oil/water and water/air interfacial tension tests for well OHM-1. The groundwater samples from wells OHM-2 and OHM-3 were collected from beneath the LNAPL layers (approximately 14 feet in OHM-2 and 8 feet in OHM-3) in each well from depths of approximately 25 feet bgs and 20 feet bgs, respectively. Attempts to collect a groundwater sample from beneath the LNAPL layer in well OHM-1 (approximately 37 feet) were unsuccessful. Groundwater from well OHM-2 was collected to be representative of the groundwater in OHM-1; the wells are approximately 35 feet apart.

LNAPL samples for physical properties analyses were collected using decontaminated field equipment lowered into the well and transferred into laboratory-supplied containers. Groundwater samples were collected using a peristaltic pump and new, clean tubing from below the LNAPL/water interface in wells OHM-2 and OHM-3. LNAPL samples for chemical analyses were placed in an ice-filled cooler for transportation under chain-of-custody protocol to the analytical laboratory. Chemical laboratory analytical reports and data validation reports for LNAPL samples are included in Appendix E and Appendix F, respectively. LNAPL and groundwater samples for physical properties testing were shipped to PTS laboratory at ambient temperatures per laboratory standard procedures (Appendix D2).

In association with feasibility study activities, LNAPL transmissivity testing was conducted on OHM wells with measurable LNAPL thickness (OHM-1, OHM-2, and OHM-3) in accordance with the *LNAPL Transmissivity, Bioventing Respirometry and NSZD Testing Work Plan* (2019 Work Plan) (KJ 2019). A measurable LNAPL thickness greater than 0.01 foot has not been observed in OHM-4. LNAPL thicknesses measured in wells OHM-1, OHM-2, and OHM-3 prior to LNAPL transmissivity testing are included in Table 10.

Between 22 and 23 July 2019 LNAPL was removed from wells OHM-1, OHM-2, and OHM-3 using high vacuum extraction techniques: a stinger tube, connected via flexible hose to a mobile vacuum truck at the surface was lowered into the well until it was submerged beneath the LNAPL surface. The vacuum truck operated at each well until LNAPL was no longer observed through the flexible hose. The volume of total fluids (including LNAPL and water) recovered from each well was estimated based on fluid levels in the vacuum truck. Approximately 40 gallons of fluid were recovered from well OHM-1, approximately 15 gallons were recovered from well OHM-2, and approximately 18 gallons were recovered from well OHM-3. LNAPL and water recovered from the wells during high vacuum extraction activities was collected in the vacuum truck and transported offsite on 23 July 2019 to the Chemical Waste Management (CWM) Facility in Arlington, Oregon, under a uniform hazardous waste manifest.

Following LNAPL removal, initial fluid and LNAPL recharge into each well was monitored using a level logging pressure transducer to record the potentiometric surface and an oil/water interface probe to gauge the depth to the top of the fluid column. The pressure transducers were suspended in each well below the initial LNAPL/groundwater interface. Depth to LNAPL/air and LNAPL/water interfaces were measured with an oil/water interface probe intermittently while field personnel were on site, at increasing time intervals following LNAPL removal through September 2019. Results of the LNAPL transmissivity testing are discussed in Section 2.3.3.4 and will be included in the FS.

2.2.5.8 Groundwater Sampling

Groundwater sampling was conducted during 19 monitoring events between 2003 and 2015, and 13 monitoring events between November 2016 and November 2019. During RI monitoring events (November 2016 through November 2019), groundwater samples were collected from shallow river transect wells (WMW-14 through WMW-18) on a quarterly basis, and from other site wells (WMW-1, WMW-3, WMW-5, WMW-7 through 18, and RMD-1 through RMD-4) on a semiannual basis. Additional shallow (WMW-19 through WMW-24, and WMW-26 through WMW-32) and deep (RMD-5 and RMD-6) monitoring wells installed in August 2018 were first sampled during the second 2018 semiannual event. Dates and numbers of wells sampled during the 19 monitoring events conducted prior to 2016 are summarized in Table 1A. The following monitoring events have occurred since November 2016:

- 15 to 17 November 2016 (18 wells)
- 27 January 2017 (five wells)
- 17 to 18 April 2017 (18 wells)
- 18 to 20 September 2017 (18 wells)
- 28 to 30 November 2017 (five wells)
- 27 to 28 February 2018 (five wells)
- 24 to 26 April 2018 (18 wells)
- 21 to 31 August 2018 (32 wells)
- 5 to 7 November 2018 (18 wells)
- 28 February to 1 March 2019 (18 wells)
- 7 to 9 May 2019 (32 wells)
- 19 to 22 August 2019 (32 wells)
- 12 to 14 November 2019 (18 wells)

Groundwater elevations were measured in site wells prior to sampling during each of the monitoring events between January 2017 and November 2019.

Groundwater was sampled from each well using low-flow purging and sampling techniques (Puls and Barcelona 1996) where possible, with the pump inlet (tubing) set at the middle of the water column within the screened interval. The samples collected with these sampling techniques do not represent flow-averaged conditions of the screened interval. A peristaltic pump was used to purge groundwater prior to collecting groundwater samples. Wells were purged until groundwater field parameters, including temperature, pH, specific conductance, DO, ORP, and turbidity stabilized. Groundwater purge and sample forms from each RI groundwater monitoring event are included in Appendix G. Groundwater samples were not collected from monitoring wells containing measurable LNAPL or if LNAPL was observed during purging (e.g., LNAPL sheen in purge water).

Following purging, groundwater samples were collected in laboratory-supplied containers. Samples were labeled with the sample name, date, and time, and placed in an ice-filled cooler for transportation under chain-of-custody protocol to the analytical laboratory. Laboratory analytical methods are described in Section 2.2.4.

In general, groundwater samples were analyzed for GRO, DRO, ORO, and BTEX, but additional analyses varied by location. In accordance with the RIWP and RIWP Addendum, select groundwater samples were analyzed for MNA parameters, dissolved and total metals (one or more of arsenic, lead, or all RCRA 8 metals), VOCs, SVOCs, and PAHs. Table 8 summarizes samples collected and analyses performed for groundwater samples. Further details about the groundwater sampling performed under the RIWP and RIWP Addendum are described below.

RIWP Groundwater Sample Analyses. In accordance with the RIWP, chemical analyses of groundwater samples for monitoring wells installed prior to and during 2016 included:

- Semiannual sampling of shallow monitoring wells WMW-1, WMW-3, WMW-5, and WMW-7 through WMW-13 for GRO, DRO, ORO, BTEX compounds, total and dissolved lead, and MNA parameters.

- Semiannual sampling of deep monitoring wells RMD-1 through RMD-4 for GRO, DRO, ORO, BTEX compounds, PAHs, total and dissolved lead, and MNA parameters.

- Quarterly sampling of the five shallow transect wells (WMW-14 through WMW-18) for 1 year for GRO, DRO and ORO, BTEX compounds, MNA parameters, and total and dissolved lead. Quarterly sampling of these wells has continued through 2018 with implementation of RIWP Addendum activities.

- Samples from wells WMW-17 and WMW-18 included total and dissolved arsenic analysis during the first event, and subsequent sampling events since both dissolved and total arsenic were reported in samples above the arsenic (total) CUL.

- Samples from wells WMW-12, WMW-13, WMW-16, and WMW-18 were analyzed for compounds commonly found in creosote mixtures, including: naphthalene, ortho-, meta-, and para-cresol (o-, m-, and p-cresol, respectively) (also known as 2-methylphenol and 3&4-methylphenol); and PAH compounds that are typically associated with creosote.

In a letter sent 22 August 2017 to Ecology, BNSF requested Ecology's approval to proposed changes to the groundwater sampling program including removing the following chemicals from future events: PAHs in wells WMW-12, WMW-13, WMW-17, and WMW-18; total and dissolved lead, GRO and BTEX compounds; and o-, m-, and p-cresol (2-, 3-, and 4-methylphenol) in wells WMW-12, WMW-13, WMW-16, and WMW-18. BNSF proposed to continue sampling DRO and ORO without SGC, MNA parameters, PAHs in the RMD series wells and WMW-16 (for remainder of 2017) and total and dissolved arsenic in WMW-17 and WMW-18.

On 9 November 2017, a conference call was held between Ecology, BNSF, and KJ to discuss modifications to the groundwater monitoring programs summarized in BNSF's 22 August 2017 letter sent to Ecology. Prior to the call, on 8 November 2017, BNSF sent a table to Ecology summarizing groundwater monitoring results for the period November 2016 through September 2017.

On 16 November 2017, Ecology sent a response letter to BNSF outlining approved modifications to the groundwater monitoring program including eliminating the following: PAHs in wells WMW-12, WMW-13, WMW-17, and WMW-18; total and dissolved lead; GRO in site wells except WMW-16 and WMW-17; BTEX; and o-, m-, and p-cresol in applicable wells. Ecology required that well WMW-16 be sampled for PAHs for an additional three events before further evaluation, and that comparison data be collected for NWTPH-Dx with and without SGC as a sample preparation method for a select number of groundwater wells.

RIWP Addendum Groundwater Sample Analyses. In accordance with the RIWP Addendum, chemical analyses of groundwater samples for monitoring wells installed in 2018 included:

- One year of quarterly monitoring of shallow wells WMW-24 and WMW-26 through WMW-32 for DRO and ORO (without SGC), VOCs, and MNA parameters.
- One year of quarterly monitoring of shallow river transect wells WMW-19 through WMW-23 for DRO and ORO (without SGC), BTEX compounds, and MNA parameters.
- One year of semiannual monitoring (typically during April and September) of deep monitoring wells RMD-5 and RMD-6 for DRO and ORO (with and without SGC), BTEX compounds, PAHs, and MNA parameters.
- During the first high and low groundwater monitoring events (April 2019 for high and August 2018 for low groundwater levels), samples for the following additional analyses were collected:
  - Groundwater samples from the shallow and deep wells installed in 2018 (WMW-19 through WMW-24, WMW-26 through WMW-32, RMD-5, and RMD-6) were analyzed for PAHs, total and dissolved lead (WMW-19 and RMD-5), and total and dissolved RCRA 8 metals (WMW-20 through WMW-24, WMW-26 through WMW-32, and RMD-6). Groundwater samples from well WMW-32 were analyzed for GRO.
  - Groundwater samples from the following wells were analyzed by NWTPH-Dx with and without SGC: Shallow wells WMW-3, WMW-5, WMW-9, WMW-14, WMW-16, WMW-18, WMW-21, WMW-22, WMW-26, and WMW-30; and Deep wells RMD-1, RMD-2, RMD-4, RMD-5, and RMD-6.

The RIWP Addendum outlined conditions for the elimination of one or more of the additional analyses listed above (i.e., total and/or dissolved metals, PAHs, GRO, and NWTPH-Dx with SGC). A request to modify the groundwater monitoring program frequency to semiannual sampling along with a reduction in laboratory analyses was submitted to Ecology on 18 February 2020. A subsequent request to include additional geochemical parameters to further refine the uplands conceptual site model (CSM) was submitted to Ecology on 20 May 2020. On 22 May 2020, Ecology denied BNSF's proposed modifications to the groundwater monitoring program. Groundwater monitoring at the site is continuing in accordance with the 16 November 2017 Ecology-approved modifications to the RIWP and the RIWP Addendum.

2.2.5.9 Control of Investigation-Derived Wastes (IDW)

IDW generated during this investigation was containerized pending receipt of analytical results. IDW included purge water from groundwater monitoring well development and sampling, soil cuttings from boreholes (when produced), and decontamination wastes. These materials were placed in U.S. Department of Transportation (DOT)-approved 55-gallon drums and temporarily stored onsite. Each drum was labeled to identify its contents and the date and origin/location of the IDW.

Disposal of the IDW was managed by KJ on behalf of BNSF. Handling and disposal procedures followed by KJ personnel and its subcontractors are described in the SOGs presented in Appendix B of the RIWP.

IDW generated during the August through November 2016 RI field activities was transported and disposed offsite by NRC Environmental Services of Portland, Oregon. Soil IDW was disposed offsite at the Wasco County Landfill, in The Dalles, Oregon, and liquid IDW was disposed offsite at Thermo Fluids in Clackamas, Oregon. IDW generated in 2017 through 2019 has been transported and disposed offsite by Clearwater Environmental Services, Inc. of Wilsonville, Oregon. IDW (soil and solidified liquid IDW) was disposed at the Waste Management landfill facility in Hillsboro, Oregon. LNAPL and water recovered from OHM wells in July 2019 was disposed of at the Chemical Waste Management (CWM) Facility in Arlington, Oregon.

2.2.5.10 Bank Inspections

Beginning in December 2013, inspections of the nearshore Columbia River surface from the bank were conducted at a minimum frequency of once per month. Monthly monitoring of the nearshore river surface was written into the Agreed Order to continue until otherwise directed by Ecology. On 11 March 2019, Ecology approved reducing the frequency of bank inspections from monthly to “when field personnel are on site for environmental monitoring activities.” During implementation of investigative and interim remedial activities on the site, bank inspections were conducted more frequently. Inspections included the stretch of the berm between the Wishram wastewater treatment plant outfall to the west and the former Pump House #2 location to the east (refer to Figure 2). A log of observations and photographs were maintained for each event. When sheen and/or LNAPL droplets were observed in the Columbia River during bank inspections, their presence and location were noted and observations were reported to Ecology by telephone call and/or electronic mail. Bank inspection observations are provided in Table 11.

After an observation of oil sheen or oil droplets, bank inspections were conducted on a daily basis (during normal work days) until no oil sheen or oil droplets were observed. As described in the following section, on nine occasions since August 2016, a sample of the oil sheen, oil droplet, and/or tar-like oil nodule was collected for characterization.

Meteorological conditions were monitored for anticipated precipitation events in order to perform bank inspections following substantial storm events. The 2-year 24-hour Precipitation Event total ranges 1.0 to 1.5 inches for the southern portion of Klickitat County, Washington, near Wishram, Washington, and Columbia Gorge Regional Airport, Dallesport, Washington, (obtained from the Washington State Department of Transportation website: (http://www.wsdot.wa.gov/publications/fulltext/Hydraulics/Wa24hrIspoluvials.pdf). In an email to Ecology on 15 May 2017, KJ proposed using the lower end of that range, 1.0 inch, as minimum criteria for a substantial storm event. Ecology approved these criteria by email on 19 May 2017.

Precipitation data was downloaded from a weather station at Columbia Gorge Regional Airport (The Dalles Airport in Dallesport, Washington, https://www.wunderground.com/US/WA/KDLS.html) on the State of Washington side of the

Columbia River for the period beginning 1 January 2013 through present 31 December 2018. In that time period, daily totals of greater than 1 inch were recorded on the following dates:

- 1 December 2013: 1.19 inches
- 17 January 2015: 1.33 inches
- 7 December 2015: 1.64 inches
- 17 December 2015: 1.32 inches.

Bank inspections were performed on 16 and 17 December 2015. No sheen was observed on the river either day. Despite attempts to coincide bank inspection events with predicted rainfall events, this is the only occurrence to date of a bank inspection following a substantial rainfall event. Daily precipitation totals are included in Table 11.

Oil sheen and/or oil droplets were most commonly observed during summer months (e.g., June through August) and early fall (e.g., October), on warmer days (temperatures above 70 degrees Fahrenheit), with light to no wind and calm surface water conditions. Oil sheen/droplets were typically observed in small circular areas (e.g., 3 to 12 inches in diameter) or thin stretched areas (e.g., 6- to 12-inch wide by several feet long), intermittently between location of wells WMW-16 or WMW-17 (occasionally further west near WMW-15) and extending east toward the former Pump House #2 concrete pad location.

Oil sheen/droplets were also observed further offshore. During the nearshore inundated lands investigation described in Section 2.2.8.2, oil sheen and oil droplets were observed on the surface of the Columbia River from the field investigation boat in June 2018. During sediment core collection in August 2018, oil sheen was observed approximately 130 feet south from the site shoreline, an area not observable from the bank. The boat crew observed that sheen appeared to originate farther offshore from the southeast and was being pushed toward the site shoreline by prevailing winds. A similar observation was made from the bank; oil sheen samples were collected on 8 August 2018 from areas of sheen that appeared to be moving on the water surface from the west to the east toward the former Pump House #2 concrete pad.

2.2.5.11 Oil Nodule/Oil-Droplet Sampling

One tar-like oil nodule sample observed along the rip/rap bank and multiple samples of oil sheen and/or oil droplets were collected when observed during nine bank monitoring events (4 August 2016, 12 August 2016, 13 October 2016, 14 October 2016, 2 August 2017, 3 August 2017, 20 September 2017, 7 August 2018, and 8 August 2018). Samples were collected either directly into laboratory-supplied bottles, or into a clean container that was then decanted into laboratory-supplied bottles. The bottles were labeled and placed into a chilled cooler for transfer to the laboratory under standard chain-of-custody protocol. Samples were submitted for the following analyses, in order of priority, if enough volume was present (number of samples analyzed shown in parentheses):

- Diesel and oil-range petroleum hydrocarbons using the NWTPH-Dx Method (seven samples)

- EPH using Ecology Methods (two samples)
- PAHs using EPA Method 8270 (two samples)
- VOCs using EPA Method 8260 (two samples).

Due to an error in sample receipt logging by the laboratory, the 4 August 2016 oil sheen sample was analyzed for VOCs first; insufficient sample was available to perform other analyses. The tar-like oil nodule sample collected on 12 August 2016 was inadvertently analyzed by NWTPH-Dx with SGC preparation (see Section 2.2.4.1). The other oil sheen and oil droplet samples submitted for the NWTPH-Dx were analyzed without SGC preparation.

2.2.5.12 QA/QC Analyses

QA/QC samples were collected in general accordance with the SAP/QAPP (KJ 2016). Field duplicate samples were collected as described in the SAP/QAPP, with the approximate frequency listed below:

- Soil: One duplicate for every 20 soil samples analyzed.
- Groundwater: One duplicate per batch of samples. One matrix spike/matrix spike duplicate (MS/MSD) sample per batch of samples.

Duplicate samples were collected at the same time as the related original samples. Duplicates were assigned unique names (distinct from the original sample name) and submitted “blind” to the analytical laboratory for analysis using the same methods as the original samples. Duplicate sample data are presented on the analytical data summary tables (Appendix B, Tables B1 through B3) for comparison with the original data.

Laboratory-prepared trip blanks were included with every shipment of VOC samples. Trip blanks were submitted for VOC analysis using the same methods as the soil and water samples.

Field or rinsate blank samples were collected once a week during drilling activities by pouring laboratory-prepared water over cleaned equipment that was to be reused. Laboratory-supplied bottles were filled using this method, and samples were shipped to the analytical laboratory under standard chain-of-custody protocol.

2.2.6 Site Geology

The site lies on the northern bank of the Columbia River. Prior to damming of the river in 1957 (The Dalles Dam), significant erosion and deposition of sediments occurred along the Columbia River associated with seasonal flow conditions. Construction of the Wishram Railyard started in the early 1900s through a series of large-scale earthmoving activities. Based on available information, the majority of subsurface soils beneath the site (primarily sand) were imported from other areas along the Columbia River (Grande 1992; Austin and Dill 1996).

Field observations suggest three separate fill episodes occurred at the site, the dates of which are unknown. Geological data are presented on Figure 9 and Figures 17 through 24. An interpreted bedrock elevation map is included as Figure 9. Geological cross sections are included as Figures 18 through 24; Figure 17 is a plan view map illustrating cross section locations. The generalized geologic cross sections show only broad distinctions in lithology; similar geologic materials are grouped together for display purposes, and details of depositional environments are described herein. The cross sections also display elevation range in which groundwater is typically encountered, presence or absence of potential residual LNAPL or mobile LNAPL based on the 2013 LIF investigation and LNAPL mobility testing, and the presence (vertical and horizontal) of dissolved phase petroleum hydrocarbons (namely DRO and ORO) in groundwater.

Fill episode 1 occurs from 20 to 33 feet below berm surface, and from 15 to 28 feet below railyard surface [approximately 157 to 144 feet above mean sea level (amsl)] and consists of poorly graded sand and gravel. Sand in fill episode 1 contains a mixture of fluvial and eolian deposits, as evaluated by sieve analysis and microscopy. Fill episode 1 is overlain by an unconformity of greenish gray poorly graded sand with silt (seen in borings B-18-26, B-18-27, B-18-29, and B-18-30). Fill episode 2 overlies fill episode 1, occurring from 5 to 20 feet below berm surface, and from 0 to 15 feet below railyard surface. Similar to episode 1, fill episode 2 consists of poorly graded fluvial and eolian sand and gravel. The upper 0 to 3 feet of this unit consists of quarried gravel fill used as a road base and work surface for the railyard. Within fill episode 2, a continuous lens of well-graded gravel with silt and sand occurs in borings and wells along the western portion of the berm (i.e., RMD-1 through RMD-6, WMW-14 through WMW-16, WMW-18 through WMW-20) from approximately 7 to 20 feet below berm surface (approximately 170 to 157 feet amsl) (Figures 28, 29, and 33). Fill episode 3 (berm fill) occurs 0 to 5 feet below berm surface and consists of poorly graded sand with rounded to angular gravel, cobbles, boulders, and silt. The surface of the southern side of the berm, along the Columbia River, is protected with basalt rip rap.

Native, *in situ* sands and silts are generally present below 33 feet below berm surface, 28 feet below railyard surface, as indicated by fine bedding planes and normal grading patterns in geologic materials. Soils consist of interbedded poorly graded sand and sandy silt/silty sand in a normal grading pattern. In some areas, silt lenses are clayey with high plasticity (i.e., RMD-4, B-18-18). Sieve analysis and microscopy suggest that *in situ* fluvial deposits are present from 33 to 43 feet below berm surface (144 to 134 feet amsl), *in situ* eolian deposits are present from 43 to 45 feet below berm surface (134 to 132 feet amsl), and *in situ* fluvial deposits are again present from 45 to 69 feet below berm surface (132 to 108 feet amsl) (Jacobs 2018). Finely bedded and normal graded deposits were observed below approximately 35 feet bgs (i.e., RMD-6 log). Cross bedding was not observed in the cores at a macro scale. Eolian origin was determined by observation of dominantly light minerals (feldspar and quartz) with lesser dark minerals (such as magnetite, hematite, augite, and hornblende), and minor mica. Mica grains were similar in size and had rounded edges, which is typical of eolian environments (Jacobs 2018).

In boring B-18-18, a buried soil with structure and fine rootlets was present from 69 to 70 feet below berm surface (108 to 107 feet amsl). A 1- to 3-foot-thick discontinuous lens of poorly sorted (well graded) sand with rounded gravel was observed in borings RMD-3 and RMD-4 (Figures 23 and 24) overlying a bedrock topographic low.

Basalt and tachylyte bedrock was encountered at varying depths across the site, generally at shallower depths in the upland areas and deeper depths near the river (Figures 18, 19, 21, 22, and 23). The interpreted bedrock elevation map (Figure 9) is based on LIF boring refusal depths and observations of basalt bedrock encountered in soil borings.

Based on available references and surrounding geologic outcroppings, bedrock at the site is composed of flood basalts of the Columbia River Plateau. Many of the geologic intraflow structures typical of flood basalts are exposed in outcrops near the site, including: 1) thick competent columnar basalt, 2) narrow hackly fanning columns, and 3) vesicular (gas bubble entrained) zones (Lindholm and Vaccaro 1988). Basalt fragments have been recovered from the terminus of a number of borings advanced to refusal, and as such, it is inferred that the bedrock is composed of flood basalts with similar intraflow structures as observed in the nearby outcroppings and as documented in the available literature.

2.2.7 Site Hydrogeology

Hydrogeologic conditions at the site are controlled by seasonal variation in groundwater recharge and short-term (hourly to daily) variations in the adjacent Columbia River stage. Daily oscillations in the Columbia River stage (typically 1 to 2 feet) occur due to variable discharge rates from The Dalles Dam, located downstream of the site. Both seasonal and daily stage variations can result in temporal reversals in the groundwater flow regime. During groundwater level monitoring events in site wells conducted prior to the RI, conditions of groundwater flowing toward the Columbia River and, during times of lower groundwater recharge, groundwater flowing away from the river toward the upland were observed.

Data logging pressure transducers previously recorded site groundwater levels near the river fluctuating with the river stage, indicating site groundwater is in direct hydraulic communication with the Columbia River. As with seasonal groundwater recharge, daily variations in the hydraulic gradient direction (either toward the river or toward the upland areas) have been observed due to varying river levels. The magnitude at which site groundwater responds to the changes in river stage dampens as a function of distance from the riverbank.

Evaluations of site hydrogeology performed during the RI included performing slug tests in 15 monitoring wells to estimate hydraulic conductivities at the site and performing continuous long-term (approximately 16 months) water level monitoring of the river stage (at three locations adjacent to the site) and groundwater levels in 15 monitoring wells using pressure transducers. Long term monitoring was used to evaluate temporal variations in hydraulic gradients and groundwater flow direction. Results of these field activities indicate the Columbia River is a losing stream for a majority of the year.

2.2.7.1 Slug Tests

Slug tests were performed on 15 groundwater monitoring wells to estimate hydraulic conductivity on the site. Both rising head and falling head slug tests were conducted as described below:

Falling Head Slug Tests: The falling head slug testing involved the insertion of a slug into the well that is screened below the water table. The slug was rapidly inserted into the water column in the well, causing the water column in the well to instantaneously rise. The amount of water level (head) change is defined as the instantaneous head. The water column will then "fall" to the static water level at a rate that is controlled by the hydraulic characteristics of the water-bearing formation and of the well itself. Falling head slug tests are not appropriate for wells screened across the water table (i.e., wells in which part of the screen is unsaturated and the screened interval is within the first water encountered).

Rising Head Slug Tests: Rising head slug testing requires submerging the slug under water in a well and allowing the water level to stabilize to static conditions. The slug is then rapidly withdrawn from the well. After the slug is withdrawn from the well, the instantaneous water level will be at a level that is lower than the static water level. The rate at which the water level recovers to static condition is controlled by the hydraulic characteristics of the water-bearing formation and of the well itself.

The water level displacement data were measured with pressure transducers. December 2016 slug tests were measured at 1-second intervals with a HOBO Water Level Logger model U20-001-04 pressure transducer. August 2018 slug tests were conducted using In-Situ LevelTroll 500 data loggers recording at 0.5-second intervals. The water level displacement was induced with a 1.5-inch-diameter solid well slug. The slug test was identified as complete when the water level recovered to approximately 90 to 95 percent of the pre-test static water level.

The results of slug tests conducted at the site are summarized in Table 12. Slug test data were analyzed with Aqtesolv processing software using standard solution methods for unconsolidated water-table aquifers. Estimated horizontal hydraulic conductivity values for the site wells ranged between 0.2 feet per day (ft/day) at well WMW-26 to 652.5 ft/day at well WMW-22. The site geometric mean hydraulic conductivity was 6.39 ft/day. Aqtesolv outputs for the slug test analyses are provided in Appendix J.

2.2.7.2 Transducer Data

Beginning in December 2016, HOBO Water Level Logger model U20-001-04 pressure transducers were suspended in 10 shallow monitoring wells (WMW-1, WMW-3, WMW-5, WMW-8, WMW-9, WMW-10, WMW-11, WMW-14, WMW-16, and WMW-18) to provide a long-term record of groundwater elevation on the site. A pressure transducer was also installed in one deep riverside well (RMD-2) to assess possible vertical gradients between the shallow portion (monitored with WMW-16) and the deeper portion of the saturated zone. Pressure transducers were also installed in the OHM wells (OHM-1 through OHM-4). Also in December 2016, three HOBO Water Level Logger model U20-001-04 pressure transducers were placed on the floor of the Columbia River adjacent to the site and immobilized with concrete blocks. Monitoring well and river transducers collected pressure data at 2-hour intervals. The transducers were recovered three times (July 2017, December 2017, and April 2018) during the course of monitoring to download and evaluate data. Water level monitoring was discontinued in April 2018 after recovering the transducers and downloading the final data set.

Transducer data are provided in Appendix K in the form of a hydrograph for each monitoring well or river location in which a transducer was installed. Appendix K also includes graphs of the hydraulic gradient calculated between each well and the river. The graphs are presented for north to south transects of wells (Hydraulic Gradient Transects 1, 2, and 3) as shown on Figure K-1. The hydraulic gradient (in feet per foot) was calculated as the transducer-measured groundwater elevation minus the river elevation (average of the three transducers installed in the river) divided by the distance from the well to the river. A negative hydraulic gradient value results when the river elevation is greater than the groundwater elevation, and implies water flowing away from the river (losing stream condition), while a positive value implies water flowing to the river (gaining stream condition).

2.2.7.3 Groundwater Flow Evaluation

Data collected from the pressure transducer study described in Section 2.3.4.2 were used to perform a quantitative analysis of groundwater flow direction on the site as a function of time. A one-dimensional linear model with a periodic boundary condition was employed to partially correct for the effects of lag and attenuation in groundwater-riparian interactions (Van Wikj and deVriew 1963). In this model, the complex river elevation behavior was approximated using a Fourier series. A detailed description of the analysis performed is included as Appendix L.

A Fourier series fit to the time-dependent average elevations calculated from the three river transducers from the data set spanning April 2017 through March 2018 is shown on Figure 30 for the first 100 days of that time period. The series was fit using 120 terms, effectively including perturbations with frequencies larger than approximately 3 days and excluding shorter “spikes” in the data. This represents the source term in the linear model of groundwater-riparian interaction.

Assuming an average hydraulic conductivity of 10 feet per day (ft/day) (based upon approximate agreement with slug test results as well as approximate visual matches to individual peaks and troughs in the time series data), a specific yield of 0.1, and an average aquifer saturated thickness of 40 feet, simulated groundwater elevations associated with the observed river elevations were compared with groundwater transducer data for the 10 wells in which transducers were installed. The comparison of modeled to measured groundwater elevation is shown for three wells at varying distances from the river on Figure 31A; results for the other eight wells are included in Appendix L. With the predicted values as a reference, higher-than-modeled groundwater elevations would imply net flow toward the river from a given monitoring well location, whereas lower-than-modeled observations would imply net flow away from the river.

The graph on Figure 31B illustrates the flux term for the three wells during the 1-year monitoring period at a 2-hour interval. Values below 0 indicate a losing stream condition, whereas values above 0 represent a gaining stream condition. The graph illustrates losing stream conditions between early July and mid-January; and gaining stream conditions between mid-April and early July. The condition is variable between mid-January and late February, after which it becomes weakly a losing stream until mid-April. The graphs also illustrate that there are consistent, short time span, fluctuations (i.e., reversals) in the losing/gaining condition throughout the year. An “integration under the curve” analysis, assessing both the frequency and magnitude of losing and gaining conditions indicates that losing stream conditions are present approximately 70 percent of the time in wells along the river berm. Additionally, analysis of the hydraulic head values calculated for each 2-hour event throughout the 1-year monitoring period indicates a net losing stream. This is also true when integrated in time, taking into account the magnitude of the gradient spikes.

Monthly averaged observed and modeled river and groundwater elevations are summarized in Tables 13A and 13B. The monthly average groundwater elevations, minus the corresponding monthly average river elevations across the monitoring well locations, are shown in Table 14A. By this data-only metric, negative numbers (green-shaded cells) imply flow away from the river, or a losing stream condition, whereas positive numbers (blue-shaded cells) imply a gaining stream condition. In comparison, average measured groundwater elevations, minus corresponding average modeled elevations, are shown in Table 14B. As noted, negative values, or lower-than-modeled groundwater elevations, imply a losing stream condition, whereas positive values, or high-than-modeled groundwater elevations, imply a gaining stream condition.

The approaches summarized in Tables 14A and 14B indicate a losing stream condition during the summer and fall months for the 10 wells, and a gaining stream condition in the spring months for a majority of the wells. Between the river and shallow transect wells along the river berm (WMW-14, WMW-16, and WMW-18), a losing river condition was encountered during 10 of 12 months (approximately 83 percent of time). In wells WMW-1, WMW-9, WMW-10, and WMW-11, located further upland from the river, a losing river condition was encountered between 9 and 12 months of the year. With increased distance from the river, the range between losing and gaining conditions dampens, with the river exhibiting a losing condition between 3 (WMW-5) and 7 (WMW-8) months of the year.

Overall, throughout the monitored area and over the 16-month period, a losing condition was encountered more often than a gaining one. Example average groundwater elevation distributions for implied gaining conditions (June) and losing conditions (November) are shown on Figure 32 (monthly average groundwater elevation maps for April 2017 through March 2018 are provided in Appendix M). Groundwater flow direction is towards the river in June (gaining stream condition), and away from the river in November (losing stream condition). With the inclusion of the river transducer water elevation data and locations, the overall reversal of flow directions, as suggested by Tables 14A and 14B, is apparent on Figure 32.

2.2.7.4 Vertical Gradients Evaluation

The four sets of paired shallow and deep wells installed in 2016 and the two sets of paired wells provided by the installation of RMD-5, RMD-6, and WMW-20 in 2018 were used to assess the vertical groundwater hydraulic head gradient. Small vertical gradients were measured in each well pairing during groundwater gauging events between November 2016 and November 2018 (Table 15). Vertical groundwater gradients ranged from -0.0051 feet per foot (ft/ft) to 0.0127 ft/ft (with positive values denoting an upward gradient and negative values denoting a downward gradient). The direction of the groundwater gradient for each well pair varied between gauging events; however, RMD-1/WMW-15, RMD-3/WMW-17, and RMD-4/WMW-18 most frequently displayed upward gradients. RMD-2/WMW-16 displayed downward gradients more frequently than upward. Review of daily average groundwater levels in wells RMD-2 and WMW-16 based on transducer data indicated a similar trend, with downward gradients displayed approximately 60 percent of the time (294 out of 499 days). RMD-5/WMW-14 and RMD-6/WMW-20 have each been gauged twice and have displayed downward and upward gradients with equal frequency to date.

2.2.8 Other Site Information

This section summarizes other site information not described in previous sections.

2.2.8.1 Former Water Supply Wells

Three water supply wells were installed on railyard property between 1918 and 1930 to provide water for railyard operations, as well as domestic use in Wishram, Washington. The approximate locations of former water supply wells Well #1, Well #2, and Well #3 are shown on Figure 3. Known well construction information from historical railway documentation and correspondence and Piper (1932) is summarized in Table 16. Using approximate location measurements/distances from former features identified in Piper (1932) and available station maps for the site, former water supply wells Well #2 and Well #3 were located at the site on 11 July 2017. The location of Well #1 could not be visually confirmed as that area of the site was covered by dense vegetation and was not accessible; therefore, a more aggressive approach was selected to attempt to assess the disposition of this well as described below.

In accordance with the RIWP Addendum, a condition assessment was conducted for each former water supply well. The assessment included visually inspecting the interior condition and fill material (if present) inside each well to the extent practicable and evaluating whether or not the well had been suitably decommissioned. The condition assessments and summaries of additional RI-related activities for each well are discussed in the following sections.

2.2.8.1.1 Well #1

Condition Assessment. Former water supply Well #1 was reportedly abandoned on 20 December 1928, according to historical railroad documents. On 20 September 2017, attempts were made to locate the former well by clearing the local area of blackberry bushes and debris, to the extent possible, with hand tools to expose the ground surface. A visual survey was performed of the cleared area to identify the location of the well. Amongst what appeared to be concrete footings of former structures was an area mounded with concrete within which were observed possible mounting bolts. The area coincided with the approximate location of former water supply Well #1. In accordance with the RIWP Addendum, this area of mounded concrete, as well as surrounding area was further investigated in 2018.

On 20 September 2018, an area of approximately 30 feet long (west to east) by 20 feet wide (north to south) by depths ranging from 2 to 3 feet bgs was excavated with a track-mounted excavator in the vicinity of a former pump house and approximate location of the former well. The excavated area included soil, blackberry bushes, grasses, assorted concrete debris (broken up pieces of concrete footings, slabs, etc.), and metallic debris. A mounded area with concrete and large bolts was also broken up and cleared. No evidence of Well #1 was observed in the excavated area. The excavation was backfilled with excavated materials and the surface compacted with the excavator bucket.

An area of approximately 10 feet long (north to south) by 6 feet wide (west to east) near a suspected former utility pole, based on a historical aerial photograph from 1951, was also excavated to a depth of approximately 4 feet bgs. This area was approximately 30 feet west of the suspected Well #1 location. A concrete footing for a 3-foot-diameter metal pipe structure was exposed; however, no evidence of Well #1 was observed.

The approximate extents of the two excavation areas are shown on Figure 33. A description of the field activities and photograph log is included in Appendix N.

Based on these multiple unsuccessful attempts to locate former water supply Well #1, it is assumed that the well casing for the former well is no longer present.

The Central Regional Office Well Construction Coordinator stated in email correspondence dated 3 June 2020 that Well #1 falls into a “legal grey area” with regards to Ecology’s decommissioning requirements, as the well was installed and decommissioned in 1928, prior to promulgation of Minimum Functional Standards for Construction and Maintenance of Wells (WAC 173-160) in 1973. The means by which Well #1 was decommissioned in 1928 was not described in the historical railroad documents (A.F.E. 4928). As the former well has not been located at the site, it is not possible to determine whether the method used in 1928 would meet the requirements of WAC 173-160-381 for decommissioning a well.

Regarding the former water supply wells acting as potential conduits to bedrock, wells can only act as short-circuits across confining units if the wells are screened above and below the confining unit. The three water wells were reportedly constructed with a continuous solid conductor casing seated and sealed into bedrock. This type of construction would eliminate the potential for cross-contamination even when the well is not pumping. SP&S historical documents, including the well construction log and 16 January 1926 correspondence, indicate that the construction of Well #1 was complicated by sand entering the drill hole at multiple depths (e.g., 79 to 92 feet bgs, 107 feet bgs, and 176 feet bgs), resulting in the well casing being crooked at several depths and not being properly seated in the first bedrock encountered at 92 feet bgs. Sand entering the well, combined with the crooked well casing limiting the proper operation and depth to which pump rods could be set, limited water production from the well and resulted in decommissioning Well #1 and replacing it with Wells #2 and #3. No well construction or water production issues were reported in the historical documents for Wells #2 and #3.

Soil and groundwater samples were collected and multiple LIF borings advanced in the immediate vicinity of the former Well #1 location as represented on historical drawings. These data do not indicate impacts below 7 feet bgs (depth above inferred groundwater table in the 1920s and in the present). Groundwater samples from well RMD-3, located south of Well #1 and screened 45 to 65 feet bgs (just above the bedrock contact) do not report constituents of concern above applicable MTCA Method A or B CULs. Though historical documents indicated improper seating of the solid casing in bedrock, based on the absence of impacts in the vicinity of the well, former water supply Well #1 does not appear to be a conduit to the bedrock zone.

<u>Previous Environmental Investigation.</u> The nature and extent of potential impacts to soil and groundwater near former water supply Well #1 have been investigated previously through sampling a former monitoring well (WMW-2) and advancing soil borings (MWD-3 and B-12-10) and TarGOST LIF borings (TG-G04, TG-G05, TG-CR-05, TG-CR-5.5, and TG-CR06/G06). Based on available historical drawings (see Appendix A), TarGOST LIF borings TG-CR-05 and TG-CR-5.5 were advanced on the western and eastern sides of the location of former water supply Well #1, respectively (Figure 8).

Monitoring well WMW-2, formerly located near the former Power House (Figure 7), was installed in September 2003 and decommissioned in 2005 during an independent remedial action including the excavation and removal of petroleum-containing soil, debris, and concrete (KJ 2007). During excavation activities, it was discovered that the well screen of WMW-2 had been constructed within a mass of oily timbers and within a few inches of the outside of the concrete walls of the former Oil Sump. Groundwater samples collected in 2003 and 2004 from well WMW-2 contained DRO and/or ORO, benzene, total cPAHs, and total arsenic at concentrations above MTCA Method A CULs, though given how the well was constructed and the age of the data, current groundwater conditions in this area are represented by nearby shallow well WMW-17 and deep well RMD-3. Groundwater samples collected from well WMW-17 (between November 2016 and November 2019) have reported DRO, ORO, and total and dissolved arsenic above respective CULs. Samples collected from well RMD-3 have been below respective CULs for site-related constituents since September 2017.

Approximately 250 tons of petroleum-impacted soil were removed from the former Oil Sump and an additional approximately 700 tons of soil were removed from the area near the former Power House and disposed of at the Roosevelt Landfill. Sixty pounds of ORC were mixed into the base of the excavation (mixing with petroleum-stained soil and soil that collapsed from the sidewalls) and the excavated area was backfilled and compacted (KJ 2007).

Petroleum hydrocarbon-like sheen and/or LNAPL were visually observed in soil boring MWD-3 (located 24 feet north of the Well #1 location) from approximately 39 to 50 feet bgs. DRO and ORO concentrations were reported above MTCA Method A CULs in soil samples collected from MWD-3 at 39 feet bgs and 42.5 feet bgs, but below CULs in a sample from 69.5 feet bgs. There were no petroleum hydrocarbon impacts observed in soil boring B-12-10 (located 6 feet north of Well #1); BTEX, GRO, and DRO were not detected in the soil samples collected from the boring and ORO was reported at a concentration below the MTCA Method A CUL in the sample collected from 40 feet bgs. Refer to Transect C to C’ (Figure 19) for inferred extents of lateral and vertical petroleum hydrocarbon impacts (or absence thereof) in these borings, as well as TG-G05 and TG-CR-05 discussed below.

The 20 September 2018 excavation area near a suspected former utility pole also coincided with the location of LIF boring TG-G04 (Figures 8 and 33). The LIF log indicated potential residual LNAPL at depths of approximately 1 to 3 feet bgs (maximum LIF response of 53.4 %RE) and no impacts below to the total boring depth of 52 feet. However, no petroleum hydrocarbon impacts were observed in the excavated area to 4 feet bgs.

The LIF logs do not show potential hydrocarbon impacts in TG-G05 (15 feet north, 66.7 feet total depth) or TG-CR-5.5 (7.5 feet east, 63.5 feet total depth), below approximately 7 feet bgs in TG-CR-05 (7.5 feet west, 51.76 feet total depth), and below 13 feet bgs in TG-CR06/G06 (22 feet east, 89.66 feet total depth) (see Figures 13, 14, and 19).

2.2.8.1.2 Wells #2 and #3

Condition Assessment. Well #2 was video logged using a Well-Vu downhole camera on 17 October 2018. The steel casing began at ground surface and appeared to be intact from ground surface to the total depth of the well at 51.5 feet bgs. The video showed no evidence that the well is screened between ground surface and 51.5 feet bgs. According to available well construction information presented in Table 16, Well #2 was installed with solid casing to a depth of 75 feet bgs. Light brown, potentially microbial buildup was present on the interior of the well casing from the top of water at approximately 11 feet bgs to the bottom of the well, and the buildup appeared to thicken at 45.5 feet bgs. The bottom of the well appeared to be a solid, flat surface at 51.5 feet bgs.

The steel casing of Well #3 was found to have been cutoff (prior to 2017) at the surface of the concrete pad in which the well was set. According to available well construction information presented in Table 16, Well #3 was installed with solid casing to a depth of 38.6 feet bgs. The steel casing appeared to be filled in with sand and gravel. Hand tools were used to remove this material from the casing of Well #3 to the extent practicable and found that the well is filled with sand and gravel to at least 2 feet bgs.

BNSF is working with Ecology's Well Construction Coordinator for the Central Regional Office to properly decommission former water supply Well #2 and Well #3. Notice of intent to decommission the wells will be provided to Ecology in accordance with requirements in WAC 173-160. Information regarding the decommissioning of Well #2 and Well #3, including a work plan and subsequent completion summary, will be provided under separate cover to the Toxics Cleanup Program (TCP) Central Regional Office.

Environmental Investigation. Two soil borings advanced in August 2018, B-18-14 and B-18-18, were located in close proximity to former water supply Wells #3 and #2, respectively, and advanced to the top of bedrock to assess potential impacts to soil and groundwater in the vicinity of these wells. Soil and RGW samples from each boring were submitted for laboratory analysis of DRO, ORO, PAHs, VOCs, and RCRA 8 metals. Lithology and field observations for borings B-18-14 and B-18-18 are projected approximately 35 feet from the north onto Transect H to H' (East) on Figure 24.

Soil boring B-18-18 (close to Well #2), met bedrock refusal at a total depth of 68 feet bgs which was similar to the 75 feet bgs reported contact with basalt bedrock in the available well construction information of Well #2. The boring was drilled partially with the direct push rig to a depth of 45 feet bgs and finished with sonic to refusal depth. Field screening of continuous soil cores did not indicate potential petroleum hydrocarbon-like impacts for the entire boring.

Five soil samples were collected, at depths of 1.5 to 2.0, 14.0 to 14.5, 47.0 to 47.5, 52.5 to 53.0, and 67.5 to 68.0 feet bgs. The shallow sample (1.5 to 2.0 feet bgs) contained ORO, toluene, xylenes, and metals including arsenic, barium, chromium, lead, and mercury below respective MTCA CULs, and individual PAHs and total cPAH above applicable CULs. ORO, toluene, xylenes, arsenic, and mercury were not present in the deeper samples. Total cPAHs in the 14.0 to 14.5 feet bgs sample were the only reported analytes above the MTCA CUL. No analytes were reported above applicable MTCA CULs in the three deepest soil samples, nor were any petroleum hydrocarbons reported in those samples.

An RGW sample was collected from a temporary well screen set at 10 to 20 feet bgs in boring B-18-18. Dissolved arsenic and ORO were reported at concentrations above respective MTCA CULs. DRO, naphthalene, and dissolved barium and lead and were reported at concentrations below MTCA CULs.

Soil boring B-18-14 (close to Well #3), met bedrock refusal at a total depth of 27 feet bgs, which was similar to the 28 feet bgs reported contact with basalt bedrock in the available well construction information of Well #3. Petroleum hydrocarbons were not observed during field screening of continuous soil cores throughout the boring. Three soil samples were collected from the boring at the following depths: 2.0 to 2.5 feet bgs, 9.5 to 10.0 feet bgs, and 26.0 to 26.5 feet bgs. No site-related constituents were reported in the soil samples at concentrations above applicable MTCA CULs. Chemicals reported above reporting limits included barium, chromium, and lead in each sample and xylenes and seven PAH compounds in the 2.0 to 2.5 feet bgs sample. An RGW sample was collected from a temporary well screen set at 10 to 15 feet bgs. Chemicals reported above laboratory reporting limits included dissolved arsenic and barium, ORO, and naphthalene. Dissolved arsenic was reported at a concentration (7.57 µg/L) above the CUL for (total) arsenic of 5 µg/L.

2018 RI field activities indicated potentially-impacted shallow soil in both soil borings (predominantly petroleum hydrocarbons and metals) and relatively low-level reported concentrations of dissolved arsenic and ORO (B-18-18 only) above CULs in shallow groundwater. However, results do not indicate impacts to the basalt aquifer in the vicinity of either former water supply wells Well #2 and #3.

Results from both soil borings included reported concentrations of petroleum hydrocarbons and metals in shallow soil samples, including some results above applicable MTCA CULs in samples from B-18-18. However, no petroleum hydrocarbons were observed during field screening or reported in laboratory analytical results in deeper soil samples including samples collected at the bedrock contact in both borings. Dissolved phase analytes reported in water table groundwater samples, including low level dissolved arsenic in both RGW samples and ORO (B-18-18 only) slightly above respective CULs, were similar to those observed in neighboring wells and soil borings installed as part of the RI (see Section 2.3).

2.2.8.1.3 Wellhead Protection Zones

A desktop study of public water supply (PWS) wells in the vicinity of the site was conducted to evaluate whether the three on-site water supply wells could potentially impact local drinking water quality. Public water system records were obtained from Ecology's Well Report Viewer and Klickitat County Public Utility District (PUD) and are included in Appendix O.

Three active and one inactive public water supply (PWS) wells were identified in the vicinity of the site. Until 2017, two wells known as the Upper and Lower Wells provided drinking water for Wishram, Washington. The Lower Well was constructed in October 1993; well construction records for the Upper Well are not available in the Ecology Well Report database. Due to declining capacity in the Upper Well, a new PWS well was constructed in 2017 to provide an additional water source. A fourth well, constructed in 1968 and known as the Coffield Well, serves as an emergency water source.

Wellhead protection zones are established around groundwater-supplied drinking water sources in order to help plan for and protect drinking water resources. According to the Washington State Department of Health (DOH), all Group A (providing service to 15 or more service connections, or 25 or more people per day for 60 or more days per year) public water systems that use wells or springs as a source of water must have a wellhead protection program, which should include a susceptibility assessment, a delineated wellhead protection area for each well or spring, and inventory of all potential contamination within the wellhead protection area, contingency plans for drinking water sources and emergency response, and documentation and distribution of the wellhead area and inventory to required entities (DOH 2010). The active PWS wells in the Wishram area each provides approximately 200 service connections.

The DOH identifies wellhead protection zones for the four PWS wells described above. The wellhead protection zones are based on the estimated travel time of groundwater to the well intake, and estimated 6-month, 1-year, 5-year, and 10-year travel time thresholds are shown. Wellhead protection zone locations were obtained from the DOH Source Water Protection Program GIS mapping tool. Locations of Wishram PWS wells and wellhead protection zones are shown on Figure 34.

The outer extent of the 10-year travel time zones for the Upper Well and the Coffield Well are over 1 mile from the site. The outer extent of 10-year travel time zone for the Lower Well is approximately 100 feet north of the site. Northern and eastern portions of the site are included in the 5-year and 10-year travel time zones for the well installed in 2017, which is located directly northeast of Wishram High School, approximately 700 feet from the site. However, the three onsite water supply wells are not included in the wellhead protection zones for PWS wells.

The well log for the Wishram PWS well constructed in 2017 indicates that this well is screened from 423 to 448 feet bgs (approximately -185 to -210 feet amsl), primarily in fractured basalt. The well log indicates basalt bedrock from 57 to 227 feet bgs (approximately 181 to 11 feet amsl) and siltstone from 272 to 430 feet bgs (approximately -34 to -292 feet amsl). The static water level in this well is 85 feet bgs, indicating that the well is screened in a confined aquifer. The basalt bedrock and siltstone described in the well log form the confining layer between the aquifer in which the water supply well is completed and the shallow groundwater encountered in onsite monitoring wells. However, available information for the former onsite water supply wells suggest that these three wells were completed as unscreened open holes at approximately the same elevation as the screened interval of the 2017 municipal water supply well. As such, the onsite water supply wells are likely completed in the same aquifer as the local municipal water supply.

As a Group A public water system (a system with more than 14 connections or that serves 25 or more individuals for 60 or more days per year), Klickitat PUD is required to regularly collect samples of Wishram water system source water and analyze for a suite of constituents including select VOCs and metals. Published results from 2014 to 2018 indicate that regulated VOCs other than chlorination byproducts have not been detected in Wishram drinking water. Neither arsenic nor barium have been detected above their respective drinking water Maximum Contaminant Levels (MCLs) or MTCA Method A CULs (Klickitat PUD 2019).

2.2.8.2 Outfalls and Underdrain

2.2.8.2.1 Pump House #1

The 1959 Existing and Proposed Sewers and Disposal System drawing (revised 1961) included in Appendix A shows proposed storm and sanitary sewer lines from the town of Wishram crossing beneath the railyard and connecting directly to Pump House #1. Pump House #1 is visible in a 1957 U.S. Army Corps of Engineering (ACOE) aerial photograph on the berm. Two different 4-inch discharge lines are proposed in the drawing to be connected from the former Wash and Locker Room (located to the south of the former Engine House) to the pipes discharging to Pump House #1. An existing untreated water mainline is also connected to Pump House #1. The drawing includes “Design Criteria” to account for existing population (single-family dwellings, a hotel, a restaurant, the depot), automatic washers, and infiltration.

The drawing shows a discharge line from Pump House #1 to the Columbia River; and a proposed discharge from Pump House #1 to the leach field located immediately to the north and east. If the proposed sewers and disposal systems were installed as designed, then the waste from the former Wash and Locker Room would have been discharged to the leach field and not the river. Total lead was reported at a concentration of 4,530 µg/L in a reconnaissance groundwater sample from B-18-23 located within the former Wash and Locker Room. Dissolved lead from the same location was reported at a concentration of 6.29 µg/L, and dissolved lead was not found at concentrations that warranted further investigation in the vicinity of the leach field (below laboratory reporting limits and/or CULs in samples from five RGW sampling locations).

2.2.8.2.2 Pump House #2

A 4-foot by 4-foot concrete box culvert extended from north to south beneath the railyard (first appears in a 1917 blueprint) with an outfall to the Columbia River. Early blueprints and station plats (included in Appendix A) show sewer connection lines from houses in Wishram, north of the railyard, to the culvert along with roof drains and sewer drains from the railyard Storehouse and Engine House. Maps/blueprints between approximately 1917 and 1959 pre-date existence of the concrete pad currently visible at the railyard that was called “Pump House #2” in the 1959 Existing and Proposed Sewers and Disposal System drawing. Pump House #2 is visible in a 1957 ACOE aerial photograph.

The 1959 Existing and Proposed Sewers and Disposal System drawing (revised 1961) shows a sewer line from the town of Wishram crossing beneath the railyard and connecting directly to Pump House #2. A discharge line from the Storehouse is also connected to the sanitary sewer line.

The 1960/1975 Station Map shows the box culvert cut off just north of the railyard and replaced with a subsurface line (corrugated metal) that connects to Pump House #2. The concrete box culvert is currently inaccessible (buried below the berm to the south, and walled off with concrete at the north junction of the newer corrugated line) therefore the box culvert was not assessed or sampled.

Site-related constituents were not reported above applicable CULs in soil samples collected from soil borings advanced in the uplands near (but not within) the underdrain and the rerouted portion of the underdrain [e.g., WSB-04-15 (also near a former gasoline/oil UST), WSB-04-12, B-12-6, B-12-9, and B-18-21].

2.2.8.2.3 Engine House Drain

The 1959 Existing and Proposed Sewers and Disposal System drawing (revised 1961) shows an “Oil Drain” from the Engine House which appears to have previously discharged directly to the river, is connected to a sump pump (cutting off the direct discharge) which pumps fluid to an oil/water separator, then discharges through a 12-inch concrete pipe to a location near the 4-foot by 4-foot concrete box culvert. A sediment investigation of near the outfall of the former oil drain is ongoing.

2.2.8.3 Inundated Lands Investigation

In accordance with the Nearshore Sediment Initial Investigation Work Plan (Nearshore IIWP) (CH2M 2018), a nearshore investigation was conducted to investigate the potential presence, and, if present, to evaluate the nature and extent of NAPL in the inundated lands to the south of the railyard. Nearshore investigation activities were completed in June and August 2018.

Rigid "Darts" composed of PAH-adsorbing media were deployed to screen Columbia River sediment in nearshore areas for the presence of NAPL in accordance with the Nearshore IIWP. Thirty Darts were advanced between 1.5 and 6.0 feet below sediment surface (bss) across the initial nearshore study area at a spacing of approximately 20 to 30 feet. In addition, five surface sediment grab samples and one sediment core were collected from nearshore locations within the initial study area, as well as at an upstream background location.

Figure 35 shows locations of Darts deployed and sediment samples collected during the nearshore and offshore investigation. The fluorescence responses associated with the Darts deployed within the initial study area were notably low and not indicative of the presence of NAPL, and no visual, olfactory, or PID evidence of NAPL or petroleum-related impacts were encountered within the samples collected from the nearshore area. With one exception (location D200, Figure 35), sediment samples submitted for laboratory analysis did not contain DRO, ORO, and PAH concentrations above applicable Sediment Cleanup Objectives (SCOs).

During nearshore sample collection activities, observation of sheens farther from shore than previously reported prompted a sheen survey to assess the outboard extent of the sheens. Seven sediment cores were advanced in the area from where the sheen appeared to be originating. At four of the seven offshore sediment sample locations (G200, G260, J260, and F360, Figure 35), a 2- to 3.5-foot interval of fill material with visible evidence of NAPL and organic debris was observed starting at approximately 0.5 to 2.5 feet below the sediment surface (bss). Mobility testing, performed on the most heavily NAPL-impacted intervals associated with the fill, indicate that NAPL is hydraulically immobile, which is consistent with its highly viscous and tacky appearance. A sample collected from location J260 contained DRO and ORO concentrations above applicable SCOs.

Observations indicate that the surface sheens observed at the site are driven by ebullition in areas of the submerged NAPL-affected fill layer identified in sediment sample locations away from the shoreline (Figure 35). The presence and abundance of sheens is a function of the organics present, the depth of NAPL bss, the temperature of the sediments, the height of the overlying water column (river stage), and other factors. Once at the surface of the water, the distribution of the sheens is dictated by a combination of the river currents and wind direction. While the general location of the submerged NAPL and the extent of affected surface sediments exceeding criteria has been identified, additional data are needed to refine these extents.

2.3 Field and Laboratory Results

This section summarizes the field observations and analytical laboratory results for the soil and groundwater samples collected from the site, as well as oil sheen/droplet samples collected from the surface of the Columbia River during RI field activities.

2.3.1 Quality Analyses

Soil and groundwater samples collected for QA/QC purposes (Section 2.2.5.12) were submitted for laboratory analyses in accordance with the SAP/QAPP (KJ 2016). QA/QC samples included field duplicates, trip blanks, MS/MSD samples, and rinsate blanks. Field duplicate samples were compared to parent samples to evaluate analytical precision, field precision and sampling bias, and sample homogeneity. When volatile analyses (GRO, BTEX, and/or VOC) were requested, a trip blank was shipped with samples and analyzed by the laboratory for potential bias from ambient conditions.

Data received from analytical laboratories were reviewed and validated by KJ, including laboratory QA/QC analyses such as method blanks (MB), surrogate recovery, laboratory control samples (LCS), matrix spikes (MS), and matrix spike duplicates (MSD). Analytical laboratory reports and chain-of-custody documentation are provided in Appendix E. Data validation findings indicate the analytical data are appropriate for their intended use. Data validation reports are provided in Appendix F. Changes in reporting of analytical results associated with data validation findings (e.g., non-detect changes due to detection in method blanks) are incorporated into results tables (Tables 18, 20, and 22).

The total number of samples submitted for laboratory analysis, as listed in the following sections does not include duplicate samples. The number of duplicates collected for each site media is listed in Section 2.3.1.6.

2.3.2 Field Screening Observations

Soil cores were field screened for the presence of petroleum hydrocarbons using a combination of visual and olfactory observations, including sheen testing and headspace screening for VOCs using a PID. Observations of sheen or odor were recorded on soil boring logs, and sheen was qualitatively characterized as weak, moderate, or heavy. When visible LNAPL was present on the soil core, a description of the LNAPL was included on the soil boring logs and in some cases, the LNAPL was qualitatively characterized as residual or drainable. Drainable LNAPL on soil cores was often described as black or dark brown viscous material, and residual LNAPL was typically characterized by black or dark brown staining on soil cores accompanied by heavy sheen, petroleum-like odor, and elevated PID readings. Field screening observations are summarized in Table 3. A spatial summary of field observations of potential petroleum hydrocarbon impacts is provided on Figures A1 through A4 in Appendix A for unsaturated and saturated zones in the Main Area of the site (Figures A1 and A2) and in the East Area of the site (Figures A3 and A4). Field screening observations were not available for soil borings (#1 through #14) advanced in 2002 by RMCAT in the vicinity of the former Boiler House.

In the Main Area, unsaturated zone soil impacts (from ground surface to groundwater at approximately 10 to 14 feet bgs) were observed in a limited number of soil borings west of the Maintenance Shop, former fueling / underground fuel piping areas south of the mainline tracks, and near the former Power House. In the saturated zone, there were more frequent observations of potential petroleum hydrocarbon impacts, but again only in the same areas (west of the Maintenance Shop, former fueling / underground fuel piping areas south of the mainline tracks, and by the former Power House). No potential petroleum hydrocarbon-impacted soil was observed in the unsaturated or saturated zones to the west of the former fueling areas/former Power House nor in the vicinity of the former Engine House/Machine Shop and extending south to the berm (Figures A1 and A2). Also, no potential petroleum hydrocarbon impacts were observed in soil borings in the eastern portions of the site near the two former Oil Houses and former Septic Tanks and Drainage Field (Figures A3 and A4).

Field observations indicate that site soils consist of unconsolidated, fine to medium grained, poorly graded sands with variable amounts of silt. The surface of the railyard is covered in quarried gravel, extending up to 2 feet bgs in some areas of the site. The berm on the southern border of the site adjacent to the Columbia River is armored with a rip rap surface on the southern side, and consists of fine to medium grained, poorly graded sands with varying amounts of silt similar to the yard fill. A lens of well-graded gravel with silt and sand was observed in several borings on the berm between 7 and 20 feet bgs. Localized silt lenses were present in several borings, often within native soils below 28 to 33 feet bgs. Bedrock was encountered at varying depths across the site, generally shallower in the upland areas and deeper towards the river (Figure 9).

2.3.3 Laboratory Results

Laboratory analytical results for soil and groundwater samples collected previously (2002 through 2015) and during implementation of RIWP and RIWP Addendum field activities (2016 through 2018) are presented in multiple forms. Comprehensive results tables for soil and groundwater (RGW and monitoring well) samples collected from the site are presented in Appendix B.

- The soil results in Table B1 of Appendix B include samples collected from soil borings advanced between 2002 and 2018 and confirmation samples collected from excavations performed in 2002, 2005, 2007, and 2010. Confirmation soil samples collected from excavations in 2002, 2005, 2007, and 2010 are included at the end of Table B1. Similarly, soil samples collected from soil borings in areas that were subsequently excavated are identified in table notes and separated from samples collected from other areas, as the soil represented by these results was removed and disposed as part of the interim actions.

- The groundwater results tables in Appendix B include samples collected as RGW samples in 2004, 2012, 2014, 2016, and 2018 (Table B2) and from monitoring wells between 2003 and 2018 (Table B3).

A summary of analytes (number of samples, number of field duplicates, detection counts, results above cleanup levels, detection ranges, etc.) reported in one or more samples above the respective laboratory reporting limit is provided in Table 17 for soil samples, Table 19 for RGW samples, and Tables 21A and 21B for monitoring well groundwater samples. Tables 17, 19, and 21A, and 21B also provide a summary of analytes with one or more sample result above the lowest applicable screening level or CUL. Counts of samples in Table 17 include soil samples in areas not subsequently excavated plus confirmation soil samples. The Draft RI Report (KJ 2019) had not included the confirmation soil samples; however, in some areas these samples provide useful data to define the nature and extent of current impacts. In some cases, chemicals without results above respective laboratory reporting limits are shown as they represented potential data gaps addressed during the RI, including lists of individual cPAH compounds and cresol compounds for groundwater samples. Groundwater sample results from monitoring wells are further subdivided into two groups, samples collected between 2003 and 2011 (Table 21A) and samples collected between 2012 and 2019 (Table 21B). The break in monitoring well groundwater sample results is to align with the more recent (2012, 2014, 2016, and 2018) RGW sample results.

Laboratory results reported for site-related constituents, including arsenic and lead, BTEX, GRO, DRO, ORO, Total TPH-Dx, and PAHs are summarized in Table 18 (soil), Table 20 (RGW), and Table 22 (monitoring well groundwater). Water quality field parameter data and natural attenuation parameter data, as applicable, are included in the tables for groundwater samples. Table 23 presents a summary of total and dissolved metals results in reported for RGW samples and samples from monitoring wells. Results from LNAPL fluid sampling for physical properties and from soil core analyses are presented in Tables 24 and 25. Results from LNAPL fluid samples collected in 2019 for chemical analyses are presented in Table 26. Sampling results for oil sheen / oil droplet samples collected from the surface of the Columbia River are presented in Table 27.

Laboratory results for selected chemicals, including PCBs, GRO, DRO and ORO, Total TPH-Dx, and arsenic and other RCRA metals are also presented for soil and groundwater samples in a series of maps on Figures 36 through 61. Soil results are presented for the unsaturated depth zone [ground surface to approximately 10 to 14 feet bgs (upland versus along the berm)] and saturated depth zone separately. The maps are arranged to present soil and groundwater data for the Main (western) site area followed by the East site area.

PCB results for soil, groundwater and LNAPL samples are presented on Figure 36. GRO results for soil and groundwater are presented on Figures 37 to 40. DRO, ORO, and Total TPH-Dx results for soil and groundwater are presented on Figures 41 through 47 for the Main Area and on Figures 48 through 54 for the East Area. Arsenic and other RCRA metals results for soil and groundwater are summarized on Figures 55 through 58 for the Main Area and on Figures 59 through 61 for the East Area.

Groundwater sampling results are presented for the most recently available comprehensive data sets possible for groundwater samples collected from RGW locations and monitoring wells. These typically include results, as available, for RGW samples collected in January 2012, July 2014, August 2016, and August 2018 and monitoring well groundwater samples collected in August 2018. Results from the August 2019 groundwater sampling event are also presented for Total TPH-Dx for monitoring well samples (Figures 47 and 54). DRO and ORO results are also presented in concentration trend graphs (with groundwater elevations) in map format in Appendix M for wells located in the Main Area (excludes wells WMW-31 and WMW-32).

2.3.3.1 Soil Laboratory Results

A total of 362 soil samples and seven field duplicate samples were collected from 166 soil borings advanced on site between 2002 and 2018. These totals do not include 13 soil samples that were collected from nine soil borings advanced at locations where soil was subsequently excavated during interim remedial actions. These counts do include 71 soil excavation confirmation samples collected between 2002 and 2010 (see Table B1, Appendix B). Soil boring locations are illustrated on Figures 7 and 8 (2002 through 2014) and Figures 25 and 26

(2016 through 2018). Soil samples were analyzed for one or more of the following constituents, depending on the objectives for the boring:

- DRO and ORO (and calculated Total TPH-Dx)
- GRO
- BTEX/VOCs
- SVOCs and PAHs
- Metals (RCRA 8 and individual analytes)
- EPH
- PCBs.

Analyses performed for each soil sample and corresponding results are summarized in Table B1 (Appendix B).

All results for PCBs analysis were below laboratory reporting limits. Soil samples collected between 2004 and 2018 for PCBs analysis included five samples from three borings near the former Transformer Storage Area (WSB-04-25, B-16-04, and B-16-05), two excavation confirmation samples from petroleum-impacted areas (FIEXC-N-8 and PH-1-10), and one sample east of the former Engine House (Figure 36). The former Transformer Storage Area had been identified as a data gap for PCBs in soil in the RIWP.

Constituents reported above their respective laboratory reporting limits in at least one sample are summarized below and in Table 18.

<u>DRO, ORO, and Total TPH-Dx</u>. As the primary constituent of interest at the site, based on the former refueling operations at the site with oil and diesel fuels, the majority of soil samples collected between 2002 and 2018 included laboratory analysis for DRO and ORO (and calculated Total TPH-Dx). The data summary below includes sample results from excavation confirmation soil samples but does not include soil samples collected from sample depths that were subsequently excavated in 2002, 2005, 2007, or 2010.

<u>DRO</u> results are as follows:

- DRO was reported above the laboratory reporting limit in 19 of 138 samples prepared without SGC, and in 123 of 236 samples prepared with SGC.
- DRO was reported above the MTCA Method A CUL of 2,000 mg/kg in four samples without SGC and 65 samples with SGC.
- The highest reported concentration of DRO in a sample prepared without SGC was 65,000 mg/kg (boring B-12-4 at 40 feet bgs) (a co-located sample analyzed with SGC reported 45,000 mg/kg). Petroleum-like odor and sheen were observed in the

continuous soil cores from which the sample was collected (Table 4). The highest reported concentration in a sample prepared with SGC was 60,600 mg/kg (excavation sample E-15 at 14.5 feet bgs). Sample E-15 was collected from the base of the east excavation sidewall following removal of the 30,000-gallon heating oil UST in 2002 (KJ 2003).

ORO results are as follows:

- ORO was reported above the laboratory reporting limit in 21 out of 138 samples prepared without SGC and in 103 out of 236 samples prepared using SGC.

- ORO was reported above the MTCA Method A CUL of 2,000 mg/kg in three samples without SGC and 59 samples with SGC.

- The highest reported concentration of ORO in a sample analyzed without SGC was 67,000 mg/kg (boring B-12-4 at 40 feet bgs) (a co-located sample analyzed with SGC reported 53,000 mg/kg). The highest reported concentration of ORO in a sample analyzed with SGC was 71,000 mg/kg (boring B-12-2 at 12 feet bgs). The B-12-2 sampling interval at 12 feet bgs contained black stained, oily tar-like fill material (some woody material and other debris) with a petroleum-like odor (KJ 2012).

Total TPH-Dx results are as follows:

- Calculated Total TPH-Dx results were reported in 26 of 138 samples prepared without SGC, and in 130 of 236 samples prepared with SGC.

- Total TPH-Dx was reported above the MTCA Method A CUL of 2,000 mg/kg in six samples without SGC and 73 samples with SGC.

- The highest reported concentration of Total TPH-Dx in a sample prepared without SGC was 132,000 mg/kg (boring B-12-4 at 40 feet bgs). The Total TPH-Dx concentration in the sample prepared with SGC was 98,000 mg/kg. The highest reported concentration in a sample prepared with SGC was 113,000 mg/kg (borings #9 at 12 feet bgs and B-12-11 at 35 feet bgs).

NWTPH-Dx with and without SGC: results are as follows:

Nineteen soil samples collected in 2012 (two samples), 2016 (seven samples) or 2018 (10 samples) were analyzed by method NWTPH-Dx both with and without SGC preparation.

Reported concentrations of DRO, ORO, and Total TPH-Dx in the two 2012 samples (borings B-12-2 and B-12-4 at 40 feet bgs) were above the MTCA Method A CUL for analyses with and without SGC. Petroleum odor and sheen were observed in soil cores from both borings; both borings were advanced within the inferred extent of submerged LNAPL (Figure 13). In the sample from B-12-2, the results with and without SGC were approximately equal for DRO, ORO, and Total TPH-Dx. In the sample from B-12-4, the DRO, ORO, and Total TPH-Dx results without SGC averaged approximately 1.3 times higher than the results reported with SGC.

The results for the samples collected in 2016 and 2018 for DRO, ORO, and Total TPH-Dx were below the MTCA Method A CUL.

- DRO results were below the laboratory reporting limit with and without SGC in 13 soil samples. In the four soil samples with reported DRO concentrations, the results without SGC ranged between 1.2 and 3.4 times higher than the concentration reported with SGC.

- ORO results were below the laboratory reporting limit with and without SGC in 11 soil samples. In one sample (B-18-06 at 2.0 to 2.5 feet bgs), the result without SGC was below the reporting limit (< 108 mg/kg) while the result with SGC was reported above the reporting limit at a concentration of 84.3 mg/kg. In the five soil samples with reported ORO concentrations, the results without SGC ranged between 1.1 and 2.8 times higher than the concentration reported with SGC.

DRO/ORO and Total TPH-Dx results for soil samples are presented for the unsaturated and saturated zones on Figures 41 and 42, respectively for the Main Area of the site and on Figures 48 and 49 for the East Area. Similar to the field screening observations (Figures A1 to A4), DRO, ORO, and/or Total TPH-Dx concentration results above MTCA Method A CULs are predominantly located in the vicinity of the Maintenance Shop/former Boiler House, areas of former fueling and former underground oil piping south of the mainline tracks, and in the vicinity of the former Power House.

GRO was analyzed in 53 soil samples using the NWTPH-Gx method. Results are summarized below:

- GRO was reported above the laboratory reporting limit in 19 of 53 samples.

- GRO was reported above the MTCA Method A CUL of 30 mg/kg in 12 samples.

- The highest reported concentration of GRO was 1,300 mg/kg in the samples collected at 13 feet bgs from soil boring B-12-3 and 40 feet bgs from soil boring B-12-04 (Table 17).

GRO concentrations above the CUL were reported in six samples collected at depths ranging from 11 to 14 feet bgs from soil borings T-1, T-2, T-3, and T-4 and excavation confirmation samples M-9-14 and M-10-14. These borings and samples were located to the south of a former pump house foundation (removed in 2005) and to the west and north of two former 500-gallon gasoline USTs (southwest of the Maintenance Shop). Review by the analytical laboratory of the chromatograms for the NWTPH-Dx and NWTPH-Gx samples from the T-# series borings indicated that diesel-range hydrocarbons detected in the NWPTH-Dx analysis appeared to be weathered diesel and that gasoline-range hydrocarbons detected in the NWTPH-Gx analysis also appeared to be from a diesel source (KJ 2010).

GRO concentrations above the CUL were also reported in soil borings B-12-1, B-12-2 (two samples), B-12-3, B-12-4, and B-12-11 (located near a former gasoline storage tank and the former Power House). GRO results in soil samples from borings B-12-1, B-12-2, B-12-3, and B-12-4 are "B" qualified, indicating blank contamination from the laboratory. In soil samples from B-12-1, B-12-2, B-12-4, and B-12-11 analyzed for both GRO and DRO/ORO, DRO/ORO results are much higher (e.g., B-12-3-13 sample contained combined TPH-Dx of 98,000 mg/kg) than GRO results. The laboratory reports from the 2012 borings indicate that the results in the #2 Diesel range (samples B-12-4-40, B-12-3-13, B-12-2-40, B-12-2-12, B-12-1-32, and B-12-2-55) are due to a possible combination of heavily weathered/degraded diesel fuel, a mineral/transformer oil range product, motor oil, and/or possible biogenic interference. [Note: PCBs were not reported above laboratory reporting limits in soil (PH-1-10) and LNAPL (OHM-1 and OHM-3) samples collected near borings B-12-2, B-12-4 and B-12-11, indicating that transformer oil range product was not a source of the #2 Diesel range impacts]. The laboratory report referenced a possible gasoline presence in sample B-12-2-40, indicating the results of this sample were likely due primarily to a complex mixture of a gasoline/kerosene range product, weathered diesel fuel, a mineral/transformer oil range product, or motor oil, but there were no references in the laboratory report to gasoline presence in other samples. The laboratory-described mixtures of diesel, mineral oil range, and motor oil are consistent with the mixtures of diesel and/or oil/Bunker C fuels observed in adjacent LIF borings.

<u>PAHs</u>***:*** A total of 154 soil samples were submitted for analysis of one or more PAH compounds. Eighteen PAHs were reported at concentrations above their respective laboratory reporting limits in one or more soil samples.

Ecology policies and procedures for implementing WAC 173-340-708(8)(e) in the MTCA rule requires that mixtures of cPAHs be considered a single hazardous substance (e.g., Total cPAH) when establishing and determining compliance with cleanup levels. According to Ecology (2016), under the MTCA rule naphthalenes is the total of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.

PAHs and Total cPAH were reported at concentrations above their applicable MTCA Method A CULs in one or more samples as summarized below:

- Four out of 137 samples contained a reported concentration of 1-methylnaphthalene above the MTCA Method B for Cancer CUL of 34 mg/kg. The maximum reported concentration was 260 mg/kg from boring TG-D1 at 12 feet bgs.

- One out of 147 samples contained a reported concentration of 2-methylnaphthalene above the MTCA Method B for Non-Cancer CUL of 320 mg/kg. The reported concentration was 410 mg/kg from boring TG-D1 at 12 feet bgs.

- Four out of 154 samples (analyzed by EPA Method 8270 and/or EPA Method 8270-SIM) contained reported concentrations of naphthalene above the MTCA Method A CUL of 5 mg/kg. Naphthalene was also analyzed by EPA Method 8260, with one out of 121 samples reporting a concentration above the CUL: 19.7 mg/kg in B-18-24 at 13.5 to 14.0 feet bgs (result by EPA Method 8270-SIM was 19.1 mg/kg). The highest reported concentration for naphthalene by any analytical method was 23.8 mg/kg from soil boring WSB-2 at 14 feet bgs. Total TPH-Dx concentrations were also above CULs in the samples from B-18-24 and WSB-2 which reported the highest total naphthalenes results.

- Seven out of 154 samples contained calculated concentrations of total naphthalene above the MTCA Method A CUL of 5 mg/kg. The highest calculated concentration was

679 mg/kg from boring TG-D1 at 12 feet bgs. (Total TPH-Dx in this sample was also elevated above its CUL, at a calculated concentration of 53,000 mg/kg.)

- Five out of 154 samples contained reported concentrations of benzo(a)pyrene above the MTCA Method A CUL of 0.1 mg/kg. The highest reported concentration was 3.07 mg/kg from boring B-18-18 at 1.5 to 2.0 feet bgs. Benzo(a)pyrene was reported below the CUL or below laboratory reporting limits in four samples collected at deeper depth intervals in boring B-18-18.

- Twelve out of 154 samples contained calculated Total cPAH concentrations above the MTCA Method A CUL of 0.1 mg/kg. The highest calculated Total cPAH concentration was 4.25 mg/kg from boring B-18-18 at 1.5 to 2.0 feet bgs. Total cPAH concentrations were below laboratory reporting limits in the three deepest samples form boring B-18-18.

<u>SVOCs</u> were analyzed in seven soil samples using EPA Method 8270. Other than the PAH compounds discussed above, SVOCs (including 2-methylphenol and 3&4-methylphenol) were not reported above their respective laboratory method reporting limits.

<u>VOCs/BTEX</u>: A total of 122 soil samples were submitted for VOC analysis using the EPA 8260 method. Excluding naphthalene (discussed above) and BTEX compounds, 15 VOCs were reported at concentrations above their respective laboratory reporting limits. No VOCs were reported at concentrations above their applicable MTCA A or B CULs. Methylene chloride was not reported at concentrations above the laboratory reporting limit in any soil samples, but the reporting limits, which ranged from 0.00537 mg/kg to 0.636 mg/kg, were above the MTCA Method A CUL (0.02 mg/kg) for 108 out of 122 samples.

BTEX compounds were analyzed in 177 soil samples, with each compound reported above its respective laboratory reporting limit in one or more samples. Benzene was reported at concentrations above its applicable MTCA Method A CUL (0.03 mg/kg) in two samples. The highest concentration of benzene (0.14 J mg/kg) was reported in boring B-12-11 at 35 feet bgs. Toluene, ethylbenzene, and total xylenes were not reported at concentrations above their respective MTCA Method A CULs.

<u>One or more of the RCRA 8 Metals</u> were analyzed in up to 126 soil samples. Soil sample results for metals were compared to MTCA Method A or B CULs and screened against default soil concentrations protective of groundwater obtained from MTCA Equation 747-1. MTCA Method A CULs, which are protective of groundwater for drinking water use, were available for arsenic, cadmium, chromium, lead, and mercury. MTCA Method B Non-Cancer CULs, which are protective of direct contact and ingestion, were available for barium, selenium, and silver. Barium, selenium, and silver results were also screened against default concentrations for protection of groundwater (i.e., leaching) in the vadose zone or in the saturated zone based on sample depth and range of saturated conditions at the site. CULs and screening levels were obtained from Ecology’s CLARC master data table, updated in January 2020. Results for metals in soil are shown on Figures 55 and 59 for arsenic in the Main and East Areas, respectively, and on Figure 56 for other RCRA metals (excluding arsenic) in the Main Area.

Laboratory results indicate that, other than lead, RCRA metals were commonly reported at concentrations representative of background conditions and did not exceed their respective MTCA Method A CULs.

Arsenic was reported at concentrations below its MTCA Method A CUL of 20 mg/kg in 29 soil samples (Figures 55 and 59). Arsenic was not reported above its CUL in any of the 121 samples analyzed.

Lead was reported at concentrations below its MTCA Method A CUL of 250 mg/kg in 125 soil samples and above its MTCA Method A CUL in one soil sample (387 mg/kg; soil boring WSB-2-8 at 8 feet bgs) (Figure 56). Lead was not reported above the CUL in soil samples collected from 2 to 2.5 feet bgs and 9.5 to 10 feet bgs from boring B-18-25, located adjacent to the 2003 WSB-2 location.

Barium was reported at concentrations below its MTCA Method B CUL of 16,000 mg/kg in the 121 soil samples collected. Barium was reported at concentrations above its screening levels for protection of groundwater in the vadose zone in two samples and in the saturated zone in 11 samples. These results are presented on Figure 56, along with comments regarding corresponding groundwater samples collected from RGW locations or nearby monitoring wells. Barium has not been reported in groundwater at concentrations above its MTCA Method B CUL in samples collected from the same boring or adjacent monitoring wells to soil samples above the leaching screening levels.

EPH analysis was performed for 10 soil samples collected in 2013. Each soil sample contained one or more EPH compounds reported above laboratory reporting limits. All EPH compounds were reported above the laboratory reporting limit in one or more samples except C8-C10 aromatics. There are no MTCA cleanup standards for EPH compounds. C21-C34 aliphatics and C21-C34 aromatics generally contained the highest reported concentrations among the EPH compounds. Concentrations of C21-C34 aliphatics ranged from 400 mg/kg in sample TG-F2 to 17,000 mg/kg in samples TG-A6 and TG-F6. Concentrations of C21-C34 aromatics ranged from 350 mg/kg in sample TG-F2 to 16,000 mg/kg in sample TG-A6.

2.3.3.2 Soil Sample Field and Laboratory Results Summary

The former Transformer Storage Area had been identified as a data gap in the RIWP as a location where PCBs may have been present in soils. Soil PCB results were below laboratory reporting limits in the soil samples collected in 2004 and 2016 from the former Transformer Storage Area and other areas of the site as shown on Figure 36, as well as other media (groundwater and LNAPL samples). Based on these results, the data gap has been addressed and PCBs are not site-related constituents.

Visible LNAPL was observed in soil cores collected from borings OHM-1 through OHM-4, MWD-2, MWD-3, B-12-1, B-12-2, B-12-4, B-12-7, B-12-8, B-12-11, B-12-12, B-12-13, and WMW-6. Figures 11 through 16 illustrate the inferred extent of potentially mobile LNAPL beneath the site, based on field observations, LIF results, and observations of LNAPL in monitoring wells. Interpreted diesel-like LNAPL from the LIF results was predominantly observed in the shallow water table zone to the south of the former Fueling Island. Interpreted oil-like LNAPL was predominantly observed in the submerged zone in the vicinity of former underground fuel oil supply piping and the former Oil Trough and former Oil Sump.

Samples for laboratory analysis were often, but not always, collected from soil boring locations with field screening observations of potential petroleum hydrocarbon and/or LNAPL impacts. The highest reported concentrations of DRO, ORO and Total TPH-Dx with or without SGC came from borings B-12-2, B-12-11, B-12-12, and OHM-2-34 (Figures 43 and 44), which were each advanced within the inferred submerged LNAPL extent (Figure 16).

In areas outside of the inferred LNAPL extent, Total TPH-Dx concentrations above the MTCA Method A CUL were reported in 11 samples collected along the bottom of the sidewalls from the excavation of a former heating oil UST in 2002. As described in Section 2.1, sidewall confirmation samples from approximately 14.5 to 15.5 feet bgs (Table B1) indicated that an approximately 1.5-foot thick layer of soil (from approximately 14.5 to the top of bedrock at 16 feet bgs) containing TPH-Dx concentrations above the MTCA Method A CULs remained in place just above the bedrock contact to the north, east, and south of the excavated area.

Most soil samples with DRO, ORO, and/or Total TPH-Dx reported concentrations above the MTCA Method A CUL were collected in the vicinity of the former Bunker fuel/oil pipelines in the center of the western part of the site (near or within the inferred lateral extent of submerged LNAPL), south of the mainline tracks. Results above the CUL occurred both above and below the water table, though potential petroleum hydrocarbon impacts / LNAPL observations were typically encountered below the water table. Other localized results above the CUL for DRO and/or ORO were in the northwestern part of the site near the former Pump House (diesel fuel), Maintenance Shop and former Boiler House; between the former Power House and northern side of the berm in shallow (less than 10 feet bgs) soil; and in shallow soil in one boring (B-18-03 at 2.0 to 2.5 feet bgs) on the northern edge of the former Engine House (Figures 41 through 44). There were no DRO, ORO or Total TPH-Dx results above CULs in the eastern part of the site (Figures 48 through 51).

Total cPAH results above CULs occurred in twelve samples from 11 borings. Boring locations with exceedances of cPAHs include north and west of the Maintenance Shop, on the berm in the Main Site Area and East Area, in the vicinity of the former oil pipelines, and east of the former Engine House. cPAHs were reported in samples collected from both above and below the water table, between 1.5 feet bgs (B-18-18) and 48 feet bgs (TG-D6-48).

Concentrations of benzene were above the CUL in two samples. The two samples, collected at 12 feet bgs (B-12-2) and 35 feet bgs (B-12-11), were from borings located in the center of the site near the former bunker/oil fuel pipelines.

Barium was reported at concentrations above leaching to groundwater screening levels but not above its MTCA Method B CUL. Barium concentrations reported in groundwater samples collected from the same borings (e.g., as RGW samples) or from adjacent monitoring wells were below the groundwater MTCA Method B CUL for barium, indicating that barium is not leaching from soil to groundwater in these areas.

Lead was reported at a concentration above its MTCA Method A CUL in one sample, collected at 8 feet bgs in boring WSB-2 in 2003, but below its CUL in a sample from 14 feet bgs. Samples collected at 2 to 2.5 feet bgs and 9.5 to 10 feet bgs from boring B-18-25 in 2018 reported concentrations of lead below its CUL.

Laboratory results indicate that the site-related constituents in soil include DRO, ORO, Total TPH-Dx, PAHs (cPAHs and naphthalenes), GRO, benzene, and lead based on one or more sample results above respective MTCA Method A CULs. DRO and ORO represent the primary soil site-related constituents based on their frequency of detection and magnitude of concentrations above the MTCA Method A CULs. Total cPAH and total naphthalenes were reported at concentrations above their respective MTCA Method A CULs in 7.8 and 4.5 percent of the samples analyzed, respectively; however, cPAHs and naphthalenes appear to be associated with DRO/ORO, as the same samples contained elevated concentrations of DRO/ORO. GRO was reported at concentrations above its MTCA Method A CUL in 12 out of 53 samples (23 percent) with elevated GRO results appearing to be localized near a former pump house (diesel fuel) and two former 500-gallon gasoline USTs (west of the Maintenance Shop) north of the mainline tracks and the former Power House on the southern side. Benzene (two samples) and lead (one sample) were reported at concentrations above their MTCA Method A CULs; however, based on their relative frequency of detections above the MTCA Method A CUL (1.1 percent for benzene and 0.8 percent for lead), these are minor site-related constituents.

2.3.3.3 Groundwater Laboratory Results

Groundwater sample locations, collection methods, and analyses are described in Section 2.2.5.2 and Section 2.2.5.8.

Table 19 summarizes laboratory results for chemical constituents reported above laboratory reporting limits in at least one RGW sample collected between 2004 and 2018. Laboratory results for individual RGW samples are presented in Table 20.

Tables 21A and 21B summarize laboratory results for chemical constituents reported above laboratory reporting limits in at least one monitoring well groundwater sample collected between 2003 and 2011 (Table 21A) and between 2012 and 2018 (Table 21B). Laboratory results for individual monitoring well groundwater samples collected between 2003 and 2019 are summarized in Table 22. Laboratory results for total and dissolved metals in RGW samples and samples from monitoring wells are summarized in Table 23.

2.3.3.3.1 Reconnaissance Groundwater (RGW) Sample Results

A total of 66 RGW samples and three field duplicate samples were collected from 62 soil boring locations between 2004 and 2018. The locations of RGW samples collected during the RI are shown on Figure 27 (Main Area) and Figure 28 (East Area). Constituent concentrations reported in RGW results are expected to be biased high because of the inherent elevated turbidity (relative to samples from monitoring wells). As such, the purpose of collecting RGW samples was to provide a screening-level assessment of groundwater conditions to further investigate the nature and extent of site-related constituents. RGW sampling results are summarized below.

DRO, ORO, and Total TPH-Dx were analyzed in 40 samples without SGC and in 28 samples with SGC preparation. The summary below includes RGW sample results from 2004, 2012, 2014, 2016, and 2018 (Tables 19 and 20). RGW sample results from 2012, 2014, 2016, and 2018 are presented on Figures 45 and 46 (Main Area) and Figures 52 and 53 (East Area).

DRO results are as follows:

- DRO concentrations were reported above the reporting limit in 25 samples prepared without SGC, and in 16 samples prepared using SGC.

- DRO concentrations were reported above the MTCA Method A CUL of 500 µg/L in four samples prepared without SGC, and in 11 samples prepared using SGC.

- The highest reported DRO concentration in samples prepared without SGC was 38,900 µg/L (boring B-18-24). Sheen was observed in the sample container for the sample from B-18-24; therefore, this result was expected to be elevated. In the saturated interval of this boring from which the RGW sample was collected, petroleum-like odor and sheen were observed in the soil cores and a DRO concentration of 9,070 mg/kg was reported in a soil sample from 13 to 14 feet bgs (see Section 2.3.3.1). The highest reported DRO concentration in samples prepared using SGC was 22,000 µg/L (boring MWD-1-35). Petroleum-like odor and sheen were observed in the continuous soil cores in the depth interval from which the RGW sample was collected in boring MWD-1.

<u>ORO</u> results are as follows:

- ORO concentrations were reported above the laboratory reporting limit in 24 samples prepared without SGC, and in 15 samples prepared using SGC.

- ORO concentrations were reported above the MTCA Method A CUL of 500 µg/L in 10 samples prepared without SGC, and in nine samples prepared using SGC.

- The highest reported ORO concentration in samples prepared without SGC was 9,270 µg/L (boring B-18-24). As stated above, sheen was observed in the sample container for the sample from B-18-24. The highest reported ORO concentration in samples prepared using SGC was 4,400 µg/L (boring MWD-1-20). Petroleum-like odor and sheen were observed in the continuous soil cores in the depth interval from which the RGW sample was collected in boring MWD-1; visible or drainable LNAPL was not observed in the soil core.

<u>Total TPH-Dx</u> results are as follows:

- Calculated Total TPH-Dx results were reported in 30 samples prepared without SGC, and in 16 samples prepared with SGC.

- Total TPH-Dx concentrations were reported above the MTCA Method A CUL of 500 µg/L in 20 samples prepared without SGC, and in 13 samples prepared using SGC.

- The highest reported Total TPH-Dx concentration in samples prepared without SGC was 48,200 µg/L (boring B-18-24). The highest reported Total TPH-Dx concentration in samples prepared using SGC was 23,800 µg/L (boring MWD-1-35).

As requested by Ecology, select RGW samples collected in 2018 (B-18-01, B-18-06, B-18-11, B-18-17, and B-18-23) in the vicinity of the former Engine House/Machine Shop were analyzed for DRO and ORO by NWTPH-Dx with and without SGC sample preparation. DRO and ORO results were below reporting limits in the five RGW samples submitted for NWTPH-Dx analysis with SGC preparation. DRO and ORO were reported above their respective reporting limits in three RGW samples (two samples in common) and below in two samples without SGC. Two of the reported ORO results (RGW samples from B-18-06 and B-18-11) without SGC were above the MTCA Method A CUL. Calculated Total TPH-Dx concentrations were above the MTCA Method A CUL in three samples (B-18-06, B-18-11, and B-18-17). As shown on Figure 45, the RGW samples collected in 2018 and analyzed by NWTPH-Dx without SGC confirmed the extent of dissolved phase DRO/ORO impacts found in the 2016 RGW samples which were analyzed by a combination of NWTPH-Dx with and without SGC.

GRO was analyzed in 32 samples and was reported at concentrations above the laboratory reporting limit in nine samples. GRO was not reported at a concentration above the MTCA Method A CUL of 800 µg/L in any RGW sample.

PAHs were analyzed in 47 samples (naphthalene in 49 samples). Sixteen PAH compounds analyzed were reported above their respective laboratory reporting limit in one or more samples. Three PAH compounds (1-methylnaphthalene, 2-methylnaphthalene, and naphthalene), total naphthalenes, and Total cPAH were reported at concentrations above their respective CULs in up to two samples.

- Two samples contained reported concentrations of 1-methylnaphthalene above the MTCA Method B for Cancer CUL of 1.51 µg/L. The concentrations were 27.0 µg/L from boring B-16-20 and 47.1 µg/L from boring B-18-24.

- Two samples contained reported concentrations of 2-methylnaphthalene above the MTCA Method B for Non Cancer CUL of 32 µg/L. The concentrations were 43.5 µg/L from boring B-16-20 and47.4 µg/L from boring B-18-24.

- One sample contained a reported concentration of naphthalene above the MTCA Method A CUL of 160 µg/L. The concentration was 268 µg/L from boring B-16-20.

- One sample contained a calculated concentration of total naphthalene above the MTCA Method A CUL of 160 µg/L. The concentration was 339 µg/L from boring B-16-20. The calculated total naphthalene concentration for the RGW sample from boring B-18-24 (116 µg/L) was below the CUL.

- One sample contained a calculated concentration of Total cPAH above the MTCA Method A CUL of 0.1 µg/L. The concentration was 0.13 µg/L from boring B-16-20.

SVOCs analyzed by EPA Method 8270 (without SIM) were analyzed in two RGW samples (MWD-1-35 and MWD-2-33). Excluding PAHs (addressed above), SVOCs including cresol compounds were not reported above their respective laboratory reporting limits.

PCBs were analyzed by EPA Method 8082 in one RGW sample (WSB-04-25) located to the east of the former Transformer Storage Area (Figure 36). Similar to the soil sample collected from this boring (see Section 2.3.3.1), PCBs were not reported above their respective laboratory reporting limits in the RGW sample.

VOCs/BTEX. A total of 46 RGW samples were submitted for analysis of VOCs. Excluding naphthalene (addressed above under PAHs), five VOCs were reported at concentrations above their respective laboratory reporting limits but not above their respective MTCA Method A CULs.

BTEX compounds were analyzed in 59 RGW samples, with one or more individual compounds reported above their respective laboratory reporting limit in up to six samples. BTEX compounds were not reported at concentrations above their respective MTCA Method A CULs.

Total and dissolved metals were analyzed in 18 and 45 samples, respectively, for one or more metals. Total metals results are not necessarily representative of site conditions due to the inherent elevated turbidity of RGW samples collected from temporary monitoring wells. Total and dissolved arsenic, total and dissolved barium, total cadmium, total and dissolved chromium (total), total and dissolved lead, dissolved selenium, and total mercury were reported at concentrations above their respective laboratory reporting limits in one or more samples. Metals reported above their respective MTCA Method A CULs were as follows:

- Dissolved arsenic was reported at concentrations above the CUL of 5 µg/L in 14 samples. The highest reported concentration of dissolved arsenic was 15.5 µg/L from boring B-18-17. Total arsenic was reported at concentrations above the CUL in 10 samples (one collected in 2004 and nine collected in 2016); the highest reported concentration was 151 µg/L from boring B-16-10. Dissolved arsenic results were below laboratory reporting limits (10 µg/L by EPA Method 6020) in the 10 samples collected in 2016 that reported total arsenic above its CUL.

- Total barium was reported above the MTCA Method CUL of 3,200 in two samples at concentrations up to 8,620 µg/L from B-16-10. No samples analyzed for dissolved barium reported concentrations above the CUL.

- Total cadmium was reported at concentrations above the MTCA Method A CUL of 5 µg/L in three samples. The highest reported concentration of total cadmium was 19.3 µg/L from B-16-10. No samples analyzed for dissolved cadmium reported concentrations above the laboratory reporting limit or the CUL.

- Total chromium (total) was reported at concentrations above the MTCA Method A CUL of 100 µg/L in four samples; dissolved chromium (total) was not reported above laboratory reporting limits in these four samples. The highest reported total chromium concentration was 854 µg/L from B-16-10. No samples analyzed for dissolved chromium reported concentrations above the CUL. There are no known or potential sources of hexavalent chromium at the site.

- Total lead was reported at concentrations above the MTCA Method A CUL of 15 µg/L in 14 samples. The highest reported concentration of total lead was 4,530 µg/L from B-16-23; the dissolved lead concentration in this sample was 6.29 µg/L. No samples analyzed for dissolved lead reported concentrations above the CUL.

The disparity between the dissolved and total arsenic, barium, cadmium, chromium, and lead results from 2016 RGW samples is attributed to the turbidity of the sample collected from the temporary well versus a permanent, developed monitoring well. (Temporary wells were purged until the water appeared relatively clear, though field water quality measurements, such as turbidity, were not measured). For this reason, RGW samples collected in 2018 were only analyzed for dissolved metals. Figures 57 and 60 present total and dissolved arsenic results for RGW and monitoring well groundwater samples. Figures 58 and 61 present total and dissolved results for the other RCRA metals (excluding arsenic) for RGW and monitoring well groundwater samples.

2.3.3.3.2 Reconnaissance Groundwater Results Summary

RGW samples identified DRO, ORO, Total TPH-Dx, Total cPAH, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, total naphthalenes, and total and dissolved arsenic above MTCA Method A CULs. While total barium, cadmium, chromium, and lead were also reported above their respective MTCA Method A CULs in RGW samples from 2004 and 2016, these metals are not considered constituents of concern based on RGW results alone, as RGW sample results tend to be biased high in total metals. As discussed further in Section 2.3.3.3.5, total barium (with one exception), cadmium, chromium, and lead have not been reported above their respective MTCA CULs in groundwater samples from monitoring wells.

DRO and ORO were identified in more than 50 percent of the RGW samples collected with maximum concentrations above their respective CULs by 1 to 2 orders of magnitude. PAHs and Total cPAH were reported above their respective CULs infrequently (less than 5 percent of the samples). Total and dissolved arsenic were reported at concentrations above its CUL in 59 and 32 percent, respectively, of the samples collected. The maximum concentrations of dissolved and total arsenic were approximately 3 and 30 times higher, respectively, than its CUL. The difference between total and dissolved arsenic concentrations in RGW samples is attributed to the turbidity of the sample collected from the temporary well versus a permanent, developed monitoring well. Arsenic in the groundwater dissolved phase is influenced by site geochemistry in areas where carbon sources from TPH or the presence of the former Septic Drainage Field contribute to reducing conditions.

DRO/ORO and Total TPH-Dx results are shown for RGW sample results on Figures 45 and 46 (Main Area) and Figures 52 and 53 (East Area). The highest concentrations of DRO, ORO, and Total TPH-Dx were reported in samples collected from boring B-18-24. This boring is located in the northwestern part of the site, west of the Maintenance Shop. Other concentrations of DRO, ORO, and/or Total TPH-Dx above CULs were reported in samples collected from borings generally located in the center of the former Engine House area and along the former oil pipeline in the southern portion of the site (former Power House area). LNAPL sheen was observed in the RGW sample collected from boring B-18-24. RGW samples collected from the East Area of the site did not contain DRO or ORO at concentrations that exceeded MTCA Method A CULs. Calculated Total TPH-Dx results (sum of DRO and ORO) were above the MTCA CUL in RGW samples from borings B-18-26, B-18-28, and B-18-30 in the East Area.

The highest concentrations of PAHs (including Total cPAH and naphthalenes) were reported in the RGW sample collected from boring B-16-20, located on the eastern side of the former Engine House area. PAHs were not reported in samples collected from boring B-18-08, located approximately 10 feet to the southwest of boring B-16-20. Elevated concentrations of DRO, ORO, Total TPH-Dx and PAHs above applicable MTCA CULs were reported in the RGW sample collected from boring B-18-24 (located west of the Maintenance Shop).

Arsenic was most frequently reported above its CUL in RGW samples collected from borings located in the southern part of the site, near the Columbia River. Samples collected from borings along the former Oil Drain contained arsenic concentrations above its CUL, as well as samples collected from borings in the former Septic Drainage Field (eastern part of the site) and select borings in the center of the site. Petroleum hydrocarbons in the vicinity of former fuel oil infrastructure and residual organics in the former Septic Drainage Field are contributing to geochemical conditions (creating reducing conditions) that, along with other groundwater properties, may result in elevated dissolved arsenic concentrations. Most RGW samples collected from borings in the former Engine House area and in areas north of the mainline tracks contained concentrations of arsenic below the CUL and/or the laboratory reporting limit. Refer to Section 2.3.3.3.6 for further discussion of geochemical conditions affecting arsenic in groundwater, as well as use of dissolved metals results from RGW samples to evaluate nature and extent of dissolved phase impacts.

2.3.3.3.3 Monitoring Well Results

The following summarizes the laboratory results reported for the 335 groundwater samples (not including field duplicates) collected from 37 monitoring well locations during 32 monitoring events between 2003 and 2019. Groundwater sample results from 2012 to present are evaluated together to correspond with the timing of the most recent (since 2012) RGW samples collected at the site. Pre-2012 sample results are presented separately as they do not represent current site conditions.

2.3.3.3.4 Pre-2012 Groundwater Monitoring Results

Eleven monitoring events occurred between 2003 and 2011. Between two and seven wells were sampled during each event. Between 2003 and 2011, 44 groundwater samples (and nine duplicates) were collected. Wells WMW-1 through WMW-7 were present during this time period, though WMW-2 and WMW-6 were decommissioned in 2005 and WMW-4 was decommissioned in 2006 prior to BNSF re-grading the site.

<u>GRO</u> was analyzed in 39 samples and reported at concentrations above the laboratory reporting limit in 28 samples. GRO was reported in one sample at a concentration above its MTCA Method A CUL of 800 µg/L (1,790 µg/L, WMW-7, 16 April 2004). All subsequent samples for GRO from well WMW-7 were below the CUL.

<u>DRO and ORO</u> were analyzed in 44 samples using NWTPH-Dx with SGC preparation method for each sample prior to 2012.

DRO was reported above the laboratory reporting limit in 27 of 44 samples and was reported at concentrations above the MTCA Method A CUL of 500 µg/L in 20 of 44 samples. The highest reported DRO concentration was 5,960 µg/L (WMW-1 from 3 July 2007).

ORO was reported above the laboratory reporting limit in three of 44 samples. ORO was reported at concentrations above the MTCA Method A CUL of 500 µg/L in three samples. The highest reported ORO concentration was 2,450 µg/L (WMW-2 from 18 September 2003).

Calculated Total TPH-Dx concentrations were reported in 27 of 44 samples and were reported above the MTCA Method A CUL of 500 µg/L in the 27 samples. The highest calculated Total TPH-Dx concentration was 6,620 µg/L (WMW-2 from 18 September 2003).

<u>PAHs</u> were analyzed in 13 samples. Four compounds [acenaphthene, benzo(a)anthracene, chrysene, and fluorene] were reported at concentrations above their respective laboratory

reporting limits in one sample each but not above respective CULs. Calculated Total cPAH was reported at a concentration above its MTCA Method A CUL of 0.1 µg/L in one sample (0.186 µg/L in WMW-2 from 18 September 2003).

SVOCs (other than PAHs) were not analyzed in groundwater samples from monitoring wells prior to 2012.

BTEX compounds were analyzed in 43 samples. Benzene and toluene were reported above the laboratory reporting limit in three samples, ethylbenzene was reported in seven samples, and total xylenes were reported in six samples. Benzene was reported at concentrations above its MTCA Method A CUL of 5 µg/L in three samples from well WMW-2. The highest concentration of benzene reported was 17.4 µg/L in the sample collected from well WMW-2 on 15 April 2004. Ethylbenzene, toluene, and total xylenes were not reported at concentrations above their respective CULs.

Total metals were analyzed in seven samples. Arsenic, barium, chromium, and selenium were reported in at least one sample. Of the metals analyzed, only arsenic was reported above its CUL. Arsenic was reported above the CUL in five samples (twice in samples from WMW-2 and WMW-3 and once from WMW-5). The highest reported concentration of arsenic was 21.7 µg/L in the sample collected from well WMW-2 on 13 July 2004.

2.3.3.3.5 2012 to 2019 Groundwater Monitoring Results

Twenty-one monitoring events occurred between 2012 and 2019. Between five and 32 wells were sampled in each event. Between 2012 and 2019, 291 samples (and 43 field duplicates) were collected. Wells WMW-1, WMW-3, WMW-5, and WMW-7 through WMW-11 were present in 2012. Wells WMW-12 through WMW-18 and RMD-1 through RMD-4 were installed in October 2016, and wells WMW-19 through WMW-24, WMW-26 through WMW-32, RMD-5, and RMD-6 were installed in August 2018. Groundwater monitoring results for 2012 through 2019 are summarized below.

GRO was analyzed in 123 samples and reported above the laboratory reporting limit in 30 samples. The highest reported concentration of GRO was 420 µg/L in the sample collected from well WMW-8 on 13 March 2012. GRO was not reported above its MTCA Method A CUL of 800 µg/L.

DRO and ORO were analyzed in 216 samples without SGC, and in 127 samples with SGC (some samples were analyzed by both methods). Figure 45 (Main Area) and Figure 52 (East Area) present DRO and ORO (labeled “Diesel” and “Oil” in the figures) monitoring well groundwater sampling results from August 2018. DRO and ORO concentration trend graphs and hydrographs are presented in map format in Appendix M. Trend graphs are included for the period of record for shallow and deep wells located in the Main Area of the site (excludes wells WMW-31 and WMW-32) and with more than one groundwater sampling event (excludes wells RMD-5 and RMD-6). Calculated Total TPH-Dx results are presented on Figures 46 and 47 (Main Area) and Figures 53 and 54 (East Area) for August 2018 and August 2019 groundwater sampling events.

DRO results were as follows:

- DRO was reported above the laboratory reporting limit in 112 of the samples analyzed without SGC, and in 68 of the samples analyzed with SGC.

- Reported concentrations of DRO were above the MTCA Method A CUL of 500 µg/L in 84 samples analyzed without SGC, and the highest reported concentration was 28,600 µg/L from well WMW-16 on 30 November 2017.

- Reported concentrations of DRO were above the CUL in 52 samples analyzed with SGC, and the highest reported concentration was 21,100 µg/L in the duplicate sample collected from well WMW-16 on 30 November 2017.

ORO results were as follows:

- ORO was reported above the laboratory reporting limit in 148 samples analyzed without SGC, and in 59 samples analyzed with SGC.

- Reported concentrations of ORO were above the MTCA Method A CUL of 500 µg/L in 110 samples analyzed without SGC, and the highest reported concentration was 12,600 µg/L from well WMW-3 on 23 August 2018.

- Reported concentrations of ORO were above the MTCA Method A CUL of 500 µg/L in 45 samples analyzed with SGC, and the highest reported concentration was 8,300 µg/L from well WMW-3 on 5 November 2013.

Total TPH-Dx results were as follows:

- Calculated Total TPH-Dx results were reported in 148 samples prepared without SGC, and in 70 samples prepared with SGC.

- Total TPH-Dx concentrations were reported above the MTCA Method A CUL of 500 µg/L in 125 samples prepared without SGC, and in 65 samples prepared using SGC.

- The highest reported Total TPH-Dx concentration in samples prepared without SGC was 36,300 µg/L from well WMW-16 on 30 November 2017. The highest reported Total TPH-Dx concentration in samples prepared using SGC was 25,300 µg/L from well WMW-3 on 5 November 2013.

As requested by Ecology, one or more groundwater samples from the following wells have been analyzed by NWTPH-Dx with and without SGC (see Table 22B): Shallow wells WMW-3, WMW-5, WMW-9, WMW-14, WMW-16, WMW-18, WMW-21, WMW-22, WMW-26, and WMW-30; and Deep wells RMD-1, RMD-2, RMD-4, RMD-5, and RMD-6.

DRO and ORO were reported above the laboratory reporting limit in 15 samples that were analyzed both with and without SGC. In these samples, the DRO concentration reported without SGC was 1.7 times the concentration reported with SGC, on average. The ORO concentration reported without SGC was 2.8 times the concentration reported with SGC, on average. The higher decrease in concentrations of ORO results analyzed without SGC compared to those analyzed with SGC may be due to the removal of petroleum compounds containing sulfur when subjected to the cleanup procedure (Ecology 1997).

PAHs were analyzed in up to 100 samples (see Table 20B) for one or more PAHs, most often using EPA Method 8270-SIM. Samples analyzed using EPA Method 8270 without SIM are noted in results tables.

Ten PAH compounds were reported at concentrations above the laboratory reporting limit in one or more samples, and one of these, 1-methylnaphthalene, was reported at concentrations above its MTCA CUL.

- Ten out of 96 samples contained a reported concentration of 1-methylnaphthalene above the MTCA Method B for Cancer CUL of 1.5 µg/L. The maximum reported concentration was 15 µg/L in the WMW-16 sample collected on 7 November 2018.

- Three naphthalene compounds (1-Methylnaphthalene, 2-Methylnaphthalene, and naphthalene) were reported in one or more samples. Total naphthalene concentrations were not reported above the MTCA Method A CUL of 160 µg/L in any samples.

A single cPAH compound [dibenz(a,h)anthracene] was reported in the sample from WMW-30 on 29 August 2018; cPAHs were not reported above the laboratory reporting limit in the other 99 groundwater samples collected since 2012. The calculated Total cPAH value was 0.0421 µg/L in the sample from WMW-30. This value is below the MTCA Method A CUL of 0.1 µg/L.

SVOCs. From November 2016 to September 2017, SVOCs potentially associated with creosote from railroad ties (2-methylphenol and 3&4-methylphenol) were analyzed in samples from four monitoring wells (WMW-12, WMW-13, WMW-16 and WMW-18). Neither of these compounds was reported above the laboratory reporting limit. With Ecology's approval on 16 November 2017, analysis for 2-methylphenol and 3&4-methylphenol was discontinued in subsequent groundwater monitoring events. No other SVOCs were reported.

BTEX compounds were analyzed in 186 groundwater samples. Benzene was not reported above laboratory reporting limits. Ethylbenzene, toluene, and total xylenes were reported at concentrations above laboratory reporting limits in two (field duplicates), three, and three samples, respectively. BTEX compounds were not reported at concentrations above the applicable CULs.

Total and dissolved RCRA 8 metals were analyzed in 39 samples. Total and dissolved arsenic were analyzed in 26 additional samples, total and dissolved barium in one additional sample, and total and dissolved lead were analyzed in 63 additional samples. Natural attenuation parameters dissolved iron and dissolved manganese were analyzed in 261 and 234 samples, respectively. Analytes with reported concentrations above the laboratory reporting limit include total and dissolved arsenic, barium, chromium, lead, and selenium, as well as dissolved iron and manganese. Dissolved and total arsenic, total barium, dissolved iron, and dissolved manganese were reported at concentrations above the applicable CUL in one or more samples.

Total arsenic was reported above the laboratory reporting limit in 60 of 65 samples, and above its MTCA Method A CUL of 5 µg/L in 39 samples. Dissolved arsenic was reported above the laboratory reporting limit in 59 of 65 samples, and above its MTCA Method A CUL of 5 µg/L in 42 samples. The highest concentrations of total and dissolved arsenic reported were 35.5 and 37 µg/L, respectively, both reported in WMW-24 on 30 August 2018.

Total barium was reported above the laboratory reporting limit in 40 of 40 samples, and above its MTCA Method A CUL of 3,200 µg/L in one sample. The reported concentration of total barium in the 20 August 2019 sample from WMW-30 was 16,500 µg/L. Total barium concentrations in the three other samples collected from well WMW-30 ranged from 35.7 µg/L to 45.5 µg/L and site-wide total barium ranged from 15.9 µg/L to 160 µg/L. Therefore, the August 2019 result is anomalous. Dissolved barium results were below the CUL in the four samples collected from WMW-30, as well as the 36 other samples collected from site monitoring wells.

Based on the results for samples which were analyzed for both total and dissolved arsenic and with arsenic reported above the laboratory reporting limit (58 samples), the average ratio of total arsenic to dissolved arsenic was 1.02, indicating that the values for total and dissolved arsenic are very similar to each other and that arsenic is predominantly in the dissolved phase. This pattern is also true for barium (average ratio of 1.03, excluding the anomalous August 2019 results), chromium (average ratio 0.98), and selenium (1.03 for one sample).

2.3.3.3.6 Monitoring Well Results Summary

In general, the site-related constituents in monitoring well samples are DRO and ORO (and their sum as Total TPH-Dx), PAHs, and arsenic.

The highest reported concentrations of DRO, total cPAH, and arsenic in the pre-2012 groundwater monitoring results were from well WMW-2 (Figure 27). The highest total cPAH result in the sample from WMW-2 was the single result above its CUL in site monitoring wells since 2003. Benzene was also reported above the CUL in samples from well WMW-2. Well WMW-2 was decommissioned in 2005 after discovery that the well was screened within a mass of oily timbers. The area surrounding well WMW-2 was excavated in 2005 and data from this well are no longer representative of groundwater conditions in the area. The highest reported concentration of ORO in the pre-2012 groundwater monitoring results was from well WMW-1. Well WMW-1 is located in the southern portion of the site, north of the berm, near boring MWD-2. Field observations of boring MWD-2 indicated presence of petroleum hydrocarbon odor and sheen.

DRO, ORO, and Total TPH-Dx concentrations reported above the CULs from 2012 to 2019 typically occur in the southern portion of the site in the wells along the western portion of the berm, in wells on the west, center, and east of the former engine house, in wells in the center of the site near the former bunker fuel pipelines, and in wells west of the maintenance shop (Figures 45 to 47). DRO, ORO and Total TPH-Dx concentrations reported below the CULs in wells on the eastern portion of the berm (WMW-21, WMW-22, and WMW-23) through November 2019. LNAPL has been observed in wells OHM-1 through OHM-4, WMW-7, and WMW-8. A measurable apparent LNAPL thickness has not been observed in wells OHM-4, WMW-7 and WMW-8 since 2016. Wells OHM-1 through OHM-4 are not included in the groundwater sample collection program. Groundwater samples are typically not collected from monitoring wells if LNAPL is present. DRO and ORO have not been reported at concentrations above the CULs in wells in the northeastern part of the site.

Calculated total cPAH concentrations for samples collected between 2012 and 2019 were below the CUL. The only PAH reported above the laboratory reporting limit and above the CUL in the 2012 to 2019 results is 1-methylnaphthalene. The highest 1-methylnaphthalene concentration reported was from well WMW-16, which is located in the southern part of the site along the berm. Naphthalenes (the total of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene) were below the CUL in the monitoring well samples collected.

Monitoring wells with reported arsenic concentrations above MTCA Method A CULs are generally located in the southern and central part of the site (Figure 57), including along the berm, former Oil Drain lines and near the former Wash Rack. Concentrations of arsenic above the CUL have not been reported in wells in the northeastern part of the site (Figure 60). Total and dissolved metals results are discussed further in the next section.

2.3.3.3.7 Monitoring Well and RGW Results - Metals

As described in Section 2.3.3.3.1, RGW samples were collected in 2016 for total and dissolved metals analyses and in 2018 for dissolved metals analyses only, in accordance with the RIWP and RIWP Addendum, respectively. Groundwater samples collected from site monitoring wells for analysis of metals since November 2016 have included total and dissolved metals, in accordance with the two work plans. While compliance with applicable MTCA CULs for metals in groundwater is based on total metals results, results for dissolved metals are informative to evaluating the nature and extent of site-related constituents. Total metals analysis from temporary wells or grab groundwater samples are not necessarily representative of actual groundwater conditions, as discussed below.

Table 23 summarizes the metals results for groundwater samples collected from RGW and monitoring wells. Metals include RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) and iron and manganese. RGW locations and monitoring wells are organized in Table 23 by general railyard location (refer to Figures 2 through 5). The following information is summarized for each metal reported as total and/or dissolved (as available) from RGW and monitoring wells:

- Number of samples collected
- Number of results above method reporting limits
- Number of results above the applicable MTCA Method A or B CUL
- Maximum reported concentration (in micrograms per liter).

As presented above, the average ratio of total to dissolved for metals reported above laboratory reporting limits in samples collected from monitoring wells (arsenic, barium, chromium, and selenium) ranges from approximately 0.98 to 1.03, indicating that the detected metals are predominantly in the dissolved phase. In contrast, the average ratio of total to dissolved metals in the 2016 RGW samples were 19.5 for barium (17 samples), 2.3 for chromium (one sample) and 720 for lead (one sample). Dissolved arsenic, cadmium, and mercury were not reported above laboratory reporting limits.

As shown in Table 23, the ranges of dissolved metals concentrations in RGW and monitoring well samples are comparable, indicating that the dissolved metals concentrations in the RGW samples from 2016 and 2018 are representative of site conditions and therefore, provide necessary information for evaluating the nature and extent of metals concentrations in groundwater.

Groundwater results for total and dissolved metals for RGW and monitoring well samples are summarized on Figures 57 and 60 for arsenic and Figures 58 and 61 for the other RCRA metals. As previously discussed, arsenic is the only metal with total and dissolved results above its CUL in groundwater samples from monitoring wells. Total metals results for barium, cadmium, chromium, and/or lead in 15 2016 RGW samples were above respective CULs. However, dissolved metals results in the 2016 and 2018 RGW samples were below respective CULs for RCRA metals (excluding arsenic). On Figures 58 and 61, the RGW sample locations are labeled with sample name only if the results for one or more metals was above the applicable CUL; the monitoring wells with analyses of metals in groundwater samples are labeled.

As shown on Figures 57, 58, 60, and 61, with the exception of the former Septic Drainage Field Area, the RGW samples with total and/or dissolved metals CUL exceedances are generally within approximately 50 to 100 feet of a cross-gradient or downgradient monitoring well. These maps illustrate that the monitoring wells bound the lateral extent of the dissolved-phased constituents that exceeded applicable screening levels in RGW samples. Sampling results will be further evaluated in the FS and DCAP to determine whether additional monitoring wells are needed for compliance monitoring.

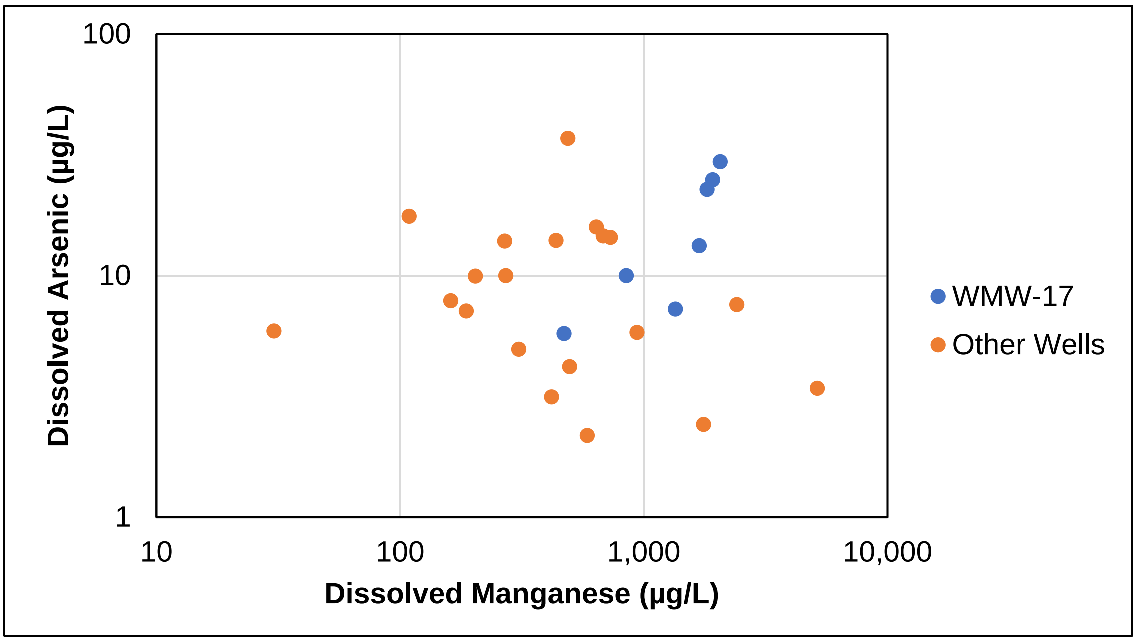
Dissolved arsenic concentrations in groundwater are typically influenced by complexation onto hydrous ferric oxide (HFO) mineral phases present as part of the aquifer mineral assemblage. As a result, the partitioning of arsenic between the aqueous and adsorbed states is influenced by three factors:

- Oxidation-reduction (redox conditions): Redox impacts are two-fold; the As(V) form of arsenic, which is encountered under oxic and sub-oxic conditions, exhibits a higher affinity for HFO complexation sites than does As(III), which is encountered under more reducing conditions. In addition, HFO mineral phases are less stable under reducing conditions, implying fewer available adsorption sites. Biodegradation of petroleum hydrocarbons (if present and occurring) will result in lowering redox conditions through the sequential consumption of oxygen and other terminal electron acceptors (TEAs) (nitrate, manganese, iron, sulfate, carbon).

- pH: HFO surfaces are electrically charged, with a positive charge associated with lower/acidic pH values and a negative charge associated with higher/alkaline pH values. Consequently, anionic species will tend to adsorb at lower pH values and cationic species at higher pH values. Arsenic generally forms oxyanionic complexes.

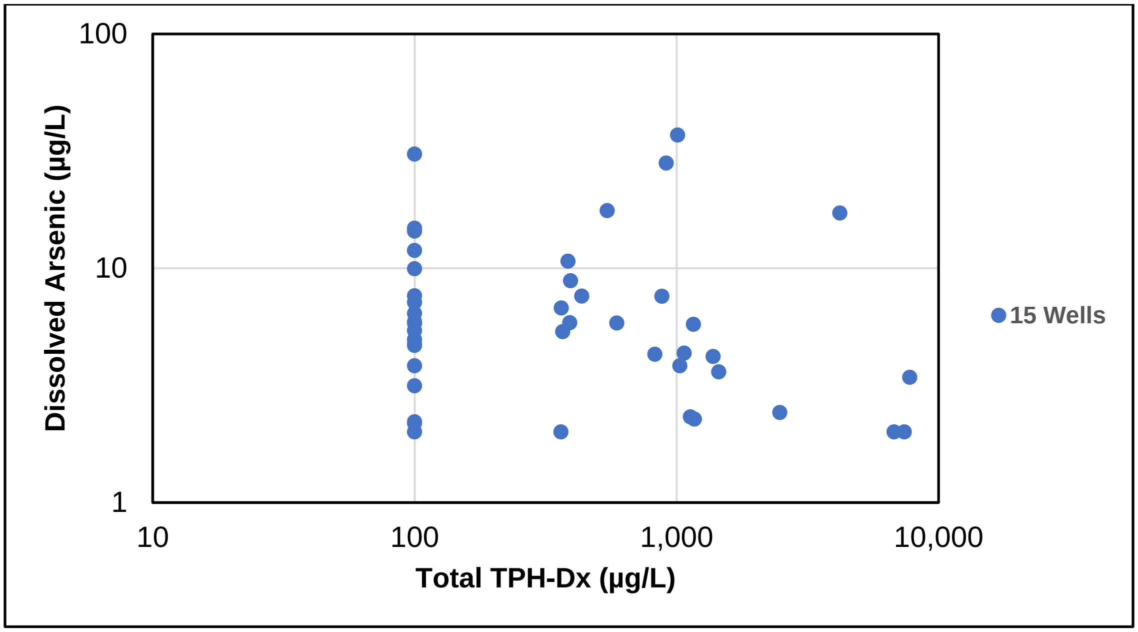
- Competition from other ionic complexes: Some anionic species will directly compete with arsenic for adsorption sites; this is particularly true of phosphate complexes. Depending on pH, elevated concentrations of phosphate will tend to displace adsorbed arsenic and therefore, impacting observed aqueous concentrations.

Existing groundwater monitoring data across the Site are insufficient to clearly associate dissolved arsenic concentrations with any of these specific geochemical effects. For example, dissolved arsenic concentrations across the site, as a whole, do not appear to correlate with dissolved manganese concentrations, with the latter serving as a proxy for local redox conditions (see inset figure below, Inset Figure 2.3.1). This is despite suggested localized correlations in the observation data (e.g., WMW-17), which may be specious.



Inset Figure 2.3.1. Dissolved arsenic and dissolved manganese concentrations co-detected in individual site groundwater samples, 2017-2018.

Similarly, dissolved arsenic concentrations do not appear to correlate with Total TPH-Dx concentrations for the 15 monitoring wells sampled for total and dissolved arsenic as part of the current groundwater monitoring program (see inset figure below, Inset Figure 2.3.2).



Inset Figure 2.3.2. Dissolved arsenic and Total TPH-Dx concentrations reported in individual site groundwater samples, August 2018, May 2019, and August 2019. Calculated Total TPH-Dx results below reporting limit shown as 100 µg/L.

Proposed modifications to the groundwater monitoring program submitted to Ecology on 18 February 2020, and amended via email on 20 May 2020, included analyses (e.g., cations and anions, natural attenuation parameters) to further evaluate geochemical conditions, as well as expand the monitoring well network being used to assess total and dissolved arsenic concentrations across the site. Per Ecology's email dated 22 May 2020, geochemical conditions influencing arsenic concentrations in groundwater will be further evaluated as part of FS or DCAP phases, once the additional monitoring program is approved.

2.3.3.3.8 Natural Attenuation Parameters Evaluation

From 2012 to 2019, natural attenuation parameters were analyzed in 261 groundwater samples from 34 wells. Natural attenuation parameters included nitrate/nitrite, ammonia, sulfate, sulfide, methane, and dissolved manganese and iron. Selected samples were not analyzed for dissolved metals. Field water quality parameters including temperature, pH, specific conductance, DO, ORP, and turbidity were monitored while purging wells prior to groundwater sample collection.

Aerobic hydrocarbon degradation processes are generally limited to the fringes of a dissolved-phase petroleum hydrocarbon footprint, where DO is present. In the absence of DO, anaerobic processes support biodegradation of petroleum hydrocarbons. Anaerobic processes use sequential terminal electron receptors (TEAs) such as nitrate, manganese, ferric iron, sulfate, and carbon dioxide. Concentration trends of TEAs associated with anaerobic biodegradation include decreases in nitrate and sulfate and increases in ammonia and sulfide, and increases in dissolved manganese, iron, methane, and alkalinity. Anaerobic conditions are also generally indicated by DO concentrations less than 1 milligram per liter (mg/L) and low to negative ORP.

Dissolved-phase petroleum hydrocarbons (DRO and ORO) are present in groundwater above applicable CULs in several areas beneath the site, including: the central area of the site near the former Power House and former Wrecker Shed, near the Maintenance Shop to the north of the mainline tracks, and near the former Engine House. In general, geochemical parameters and TEA concentrations in groundwater samples in each of these areas of the site follow the trends expected from biodegradation of petroleum hydrocarbons.

In the central dissolved-phase hydrocarbon area, aerobic groundwater conditions, as indicated by DO concentrations greater than 1 mg/L, are generally present around the edges of the dissolved-phase hydrocarbon extent (shallow wells WMW-05, WMW-10, WMW-12, WMW-13, and WMW-14) and anaerobic conditions are present within the dissolved-phase hydrocarbon extent (shallow wells WMW-15 through WMW-18, WMW-1, WMW-3, WMW-9, and WMW-11, and deep wells RMD-1 through RMD-4).

Of wells with anaerobic conditions, concentrations of natural attenuation parameters in wells towards the edges of the dissolved-phase area (WMW-9, WMW-11, WMW-18, WMW-19, and RMD-4) indicate that DO and nitrate are being utilized as TEAs, as indicated by concentrations of DO less than 1 mg/L and nitrate concentrations detected above the laboratory reporting limit but decreasing over time. Natural attenuation parameters in wells within the middle of the dissolved-phase plume (WMW-15 through WMW-17, WMW-1, WMW-3, and RMD-1 through RMD-3) show increases in dissolved manganese, dissolved iron, and methane compared to wells outside the area, indicating manganese, ferric iron, and carbon dioxide are being utilized as TEAs. Sulfate concentrations in some of these wells are below laboratory reporting limits (<5,000 µg/L) as well, indicating sulfate utilization as a TEA.

Anaerobic conditions are also present within the Maintenance Shop dissolved-phase hydrocarbon area (generally wells WMW-7 and WMW-8). These wells have not been sampled during the most recent groundwater sampling events due to the presence of a sheen on the water surface or in purge water. Historical results for natural attenuation parameters at wells within the dissolved-phase hydrocarbon area compared to wells outside of the dissolved-phase area indicate nitrate was generally low or not detected above laboratory reporting limits, while sulfate was still present above laboratory reporting limits. Not all previous samples were analyzed for metals or methane. Analytical results indicate that natural attenuation is occurring in the area, with the remaining nitrate, manganese, and iron as TEAs.

Dissolved-phase hydrocarbons are also present near the former Engine House (generally wells WMW-24, WMW-26, and WMW-29). Aerobic or slightly reducing conditions are present at wells WMW-24, WMW-26, WMW-28, and WMW-29. While DO was below 1 mg/L at WMW-24 during the November 2018 event, subsequent events indicate DO near or above 1 mg/L. Nitrate concentrations in WMW-24 samples were above 2,000 µg/L and dissolved manganese and iron concentrations were not elevated compared to surrounding wells, indicating that these are not generally used as TEAs in this area. At well WMW-26, DO concentrations were at or above 1 mg/L during 2018 and 2019 groundwater sampling events; however, when compared with well WMW-24, nitrate concentrations were generally lower. While aerobic conditions were measured at the well, geochemical parameters suggest that anaerobic biodegradation using manganese as a TEA may also be periodically occurring in the area. At well WMW-29, DO was generally above 1 mg/L indicating aerobic conditions. Nitrate was not reported above the laboratory reporting limit or was reported at low levels and manganese was reported at concentrations above 5 µg/L (the laboratory reporting limit); similar to well WMW-26, while DO was measured above 1 mg/L, geochemical parameters suggest that anaerobic biodegradation using nitrate and manganese as TEAs is occurring in the area.

Geochemical indicator sampling results and field parameters suggest that biodegradation of dissolved-phase hydrocarbons is occurring at the site. Utilization of TEAs within each dissolved-phase hydrocarbon area generally corresponds to expected conditions. Around the edges of the dissolved-phase hydrocarbon area, DO and nitrate are utilized as TEAs. Within the center of the dissolved-phase hydrocarbon area, manganese, ferric iron, and carbon dioxide are utilized as TEAs.

2.3.3.4 LNAPL Testing Results

This section describes the results from LNAPL fluid sampling and from soil core analyses. Results are presented in Tables 24 and 25 and on Figure 29. LNAPL properties were used to further develop the site conceptual model (Section 3) and to assess the distribution and recoverability of mobile NAPL in the subsurface. LNAPL samples were collected from TG-D4, OHM-1, OHM-2, and OHM-3 for physical properties analysis. Undisturbed soil core samples were collected for LNAPL mobility analysis from the following locations: TG-D6, TG-F2, TG-F6 (called D-6, F-2, and F-6, respectively, on chain-of-custody forms), OHM-1, OHM-2, OHM-3, and OHM-4.

2.3.3.4.1 Terminology

The following definitions are provided for clarification:

- **Equilibrium and Nonequilibrium Conditions**. Equilibrium conditions exist when the fluid levels in the well are representative of the water and LNAPL pressures in the formation for a specific point in time (i.e., steady state conditions). Nonequilibrium (i.e., transient) conditions exist after removal of LNAPL from a well while fluid levels in the well are still recovering or moving into the well from the formation.

- **LNAPL Mobility**. The potential for LNAPL to flow from one location to another under an existing gradient.

    - Immobile: LNAPL is present at or below residual saturation and cannot move.

    - Mobile: LNAPL is present above the residual saturation and can potentially move within the existing LNAPL body at a nominal rate, but the LNAPL plume footprint is not changing over time.

    - Migrating: LNAPL is present above the residual saturation and the LNAPL mass footprint is changing over time.

2.3.3.4.2 Fluid Physical Properties

The LNAPL fluid sampling program was designed to fill data gaps that existed in the CSM. LNAPL samples collected from OHM-1, OHM-2, and OHM-3 were analyzed for fluid physical properties including density, specific gravity, dynamic viscosity and surface tension and interfacial tensions between three phases (Air/LNAPL, Air/Water, and LNAPL/Water) as described in Section 2.2.5.7. An LNAPL sample was not collected from well OHM-4 due to insufficient LNAPL volume in the well. Site groundwater samples were collected in 2019 for fluid physical properties including density, specific gravity, and dynamic viscosity. Results for these analyses are presented in Table 24, along with those from an LNAPL sample and a groundwater sample collected in 2013 from a temporary well installed adjacent to LIF Location TG-D4 (Figure 8) and from 2019. Laboratory results for the LNAPL samples are included in Appendix D2.

Site groundwater density, specific gravity and dynamic viscosity were measured at temperatures ranging from 70°F to 130°F in 2019 (from 50°F to 130°F in 2013). At 70°F, groundwater density measurements ranged from 0.9964 (TG-D4) to 0.9982 (OHM-3) grams per cubic centimeter (g/cc), and the specific gravity measurements ranged from 0.9983 (OHM-2) to 0.9985 (TG-D4) (unitless). Dynamic viscosity measurements decreased with increasing temperature, for example, ranging from 1.37 centipoise (cP) for the TG-D4 sample at 50°F to 0.52 cP at 130°F.

LNAPL density, specific gravity, and dynamic viscosity were measured at temperatures ranging from 70°F to 130°F in 2016 (from 50°F to 130°F in 2013). At 70°F, density measurements ranged from 0.9494 (OHM-1) to 0.9708 (OHM-3) g/cc, and the specific gravity measurements ranged from 0.9496 (OHM-1) to 0.9728 (OHM-3) (unitless). As the maximum density measurement is less than that of water (1 g/cc), the NAPL is classified as an LNAPL. Dynamic viscosity measurements decreased with increasing temperature, for example, ranging from 7,210 cP for the TG-D4 sample at 50°F to 141 cP at 130°F. While the LNAPL density is less than water, the majority of LNAPL beneath the site is submerged below the water table because of its high viscosity at site temperatures and the rapid change in groundwater levels due to the increase in surface water elevation of the Columbia River after completion of The Dalles Dam.

2.3.3.4.3 Soil Core and LNAPL Mobility Analyses

Soil core sample analyses for initial pore fluid saturations, total porosity, air-filled porosity, grain density, dry bulk density, moisture content, air/water drainage capillarity, air permeability and hydraulic conductivity, grain size analysis, free product mobility testing, residual saturation estimation, and effective porosity are summarized in Table 25. Soil cores were collected from zones in which LNAPL was present throughout most of the core. The LNAPL tests were conducted to evaluate how site soil properties affect LNAPL mobility potential and provide data for evaluation of LNAPL remedial alternatives (to be addressed in the FS). Laboratory reports for the soil core analyses are included in Appendix D2.

As presented in the laboratory reports, several of the testing procedures performed included measurements of similar soil properties (e.g., moisture content, dry bulk density, total porosity, etc.) for different segments of the total soil cores submitted (ranged from 2- to 2.5-foot long soil cores). Grain size analysis classified the OHM-1 soil core as a gravel with silt and sand, while the other six cores (OHM-2, OHM-3, OHM-4, TG-D6, TG-F2, and TG-F6) were each classified as fine sand. The total porosity of the soil core from OHM-1 ranged between approximately 20 and 35 percent by bulk volume, between approximately 45 and 50 percent in the soil core from OHM-2, between approximately 40 and 50 percent in soil cores from OHM-3 and OHM-4, and between 45 and 55 percent in soil cores from TG-D6, TG-F2, and TG-F6.

Pore fluid extraction was completed to estimate LNAPL saturations in each core sample using the Dean-Stark Method (D425M). Results of the core analyses are provided in Table 25. The Dean-Stark analysis is a distillation extraction method of measuring fluid saturations. The sample is weighed prior to the test. NAPL and water fractions are vaporized by boiling toluene through the sample. The water is condensed and collected in a calibrated receiver. After water production stops, the sample is oven-dried and weighed. The LNAPL content is then estimated by gravimetric differences. The PTS laboratory report for the Dean-Stark analyses, including LNAPL and water saturations, is included in Appendix D2.

LNAPL Mobility Laboratory Testing. An LNAPL centrifuge test was performed on selected core samples to further asses residual saturation of the LNAPL in the soil core. Cores retrieved from the site were spun for 1 hour at a rate that simulates 1,000 times the gravitational (G) force; results are presented in Table 25. The volumes of LNAPL and water were measured and used in conjunction with the Dean-Stark analysis to calculate the in-situ and residual core plug saturations. The test provides *in situ* LNAPL saturation, porosity, and soil bulk density data (Table 25).

The centrifuge test was performed on the four soil cores collected in 2016, as well as three soil cores collected in 2013 during the LIF investigation. Table 25 presents a summary of the LNAPL removal results from the soil cores based on a percent difference comparison between initial and final LNAPL saturations.

A water drive test was conducted to evaluate mobility of the LNAPL under saturated conditions. Results from the centrifugal and water drive tests were used as input into the LNAPL distribution and recovery model (Section 2.3.3.4.4.). In general, test results indicate LNAPL in the soil core from OHM-4 is immobile (less than 1 percent removal in the centrifugal test). LNAPL in soil cores from OHM-1, OHM-2, and TG-D6 is mobile. LNAPL in the soil cores from OHM-3, TG-F2, and TG-F6 is potentially mobile (LNAPL reductions ranging between 4.2 percent and 9.5 percent in the centrifugal test). These qualitative conservative LNAPL mobility assessments (immobile, potentially mobile, mobile) are presented on Figure 29, which also includes trend charts for measured apparent LNAPL thicknesses for site monitoring wells.

The results from the centrifugal test were used to calculate residual LNAPL concentration values ($C_{res,soil}$) according to Brost et al., (2000). The calculated values ranged from 20,700 mg/kg (TG-F2) to 94,100 mg/kg (OHM-3). At a concentration in soil above the residual LNAPL concentration, LNAPL is potentially mobile. As described in Appendix D1, estimates of residual LNAPL concentrations for middle distillates (e.g., diesel) and fuel oils (e.g., Bunker C) in three soil types were compiled from literature sources for correlation analyses between Total TPH-Dx concentrations and LIF %RE response data. Literature values for middle distillates ranged from 6,500 to 34,000 mg/kg and for fuel oils ranged from 15,000 to 51,429 mg/kg. The calculated residual LNAPL concentrations fell within the general range of the literature values, though more on the higher side within the range of fuel oils, further supporting the identification of the submerged LNAPL as a Bunker C-like viscous oil.

Though visible LNAPL was observed in the soil boring for OHM-4 (Appendix C), the LNAPL mobility soil core testing results for OHM-4 as ‘immobile’ have been confirmed by absence of measurable apparent LNAPL thicknesses in the well since its installation in December 2016. The maximum apparent LNAPL thickness of 0.01 foot was measured on 13 December 2016. LNAPL has not been observed in well OHM-4 since April 2017 (Table 10). The inferred lateral extents of submerged oil and/or diesel impacts on Figure 29 (and Figures 11 to 16) is based on interpretation of LIF, soil borings, and LNAPL monitoring results and LNAPL mobility evaluation. The inferred LNAPL extent in the vicinity of LIF location E0-W25 has been reduced to the edge of well OHM-4 based on lack of LNAPL accumulating in the well and the LNAPL mobility testing results.

The LNAPL mobility soil core testing results for OHM-1, OHM-2, and OHM-3 have been confirmed by measured apparent LNAPL thicknesses up to approximately 37 feet (July 2019), 14 feet (July 2019), and 12 feet (August 2018), respectively in the three wells. The presence of measurable LNAPL in these wells indicates the LNAPL in the vicinity of each well is mobile. The apparent LNAPL thicknesses continued to increase in these wells since installation through July 2019 due to high viscosity of the LNAPL slowing entry into the well.

The mobile LNAPL interval represents the thickness of the formation where NAPL is present above residual saturation; however, the apparent LNAPL thickness gauged in a well is a factor of the high viscosity of the LNAPL, the amount of time for the submerged LNAPL to enter the well and travel to the surface and will change as the water table fluctuates. The apparent LNAPL thickness can be much larger than the mobile LNAPL interval in the formation.

The overall LNAPL body remains immobile due to the high viscosity and low connectivity of the LNAPL mass. This low connectivity of the LNAPL mass does not allow for a driving head to be created and the high viscosity slows potential movement even more.

2.3.3.4.4 Light Non-Aqueous Phase Liquid Data Analysis and Discussion

A key goal of the LNAPL investigation was to verify its distribution in the subsurface. The American Petroleum Institute (API) Light Non-Aqueous Phase Liquid Model Application created the LNAPL distribution and recovery model (LDRM) based on a formulation by Charbeneau (2003). The distribution part of the model is a tool designed to help visualize and understand the volume, and vertical distribution of LNAPL in the subsurface. The distribution model is also used as the basis for the LNAPL recovery model because recoverability is a function of saturation. The higher the saturation, the greater the recoverable volume and the more interconnected the pore network, and the higher the LNAPL mobility or LNAPL transmissivity.

The distribution model uses the van Genuchten (van Genuchten 1980) algorithm with capillary pressure (Charbeneau 2003) to predict the LNAPL saturation and the vertical distribution in the soil. This information was also used in the recovery model. There are two models available to predict the relative permeability of the LNAPL in the soil, the Burdine and the Maulem. In situations where finer grained soils exist, such as at the site, the Maulem model is more appropriate (Charbeneau 2003).

The model assumes homogeneity of the soil, vertical equilibrium of the LNAPL/groundwater system, a constant groundwater volume, and unconfined groundwater conditions. The equations used in the model are based on the assumptions stated and short-term seasonal changes are accounted for in the ranges provided. The API model assumes LNAPL exists at the water-table and calculates the LNAPL saturation profile based on water and LNAPL saturation. Because of the extent of submerged LNAPL at the site, the API distribution and recovery model may underestimate the total LNAPL volume; however, the model is still appropriate for calculating the LNAPL transmissivity and LNAPL discharge rate. The API workbooks used for calculating LNAPL transmissivity are not designed for modeling submerged LNAPL (intended for unconfined, confined, or perched conditions). An alternative method, constant rate discharge, was used to calibrate the LDRM.

Distribution Model Inputs. Soil cores were taken from OHM-1, OHM-2, and OHM-3. These cores were analyzed for porosity and grain size distribution. The values used for each modeled well location are presented in Table D2-1 in Appendix D2.

Fluid Input Parameters. Fluid parameters were input from fluid samples taken from wells OHM-1, OHM-2, and OHM-3. PTS analyzed these samples for density, viscosity, specific gravity, and interfacial tensions. These results were evaluated and used for the modeling effort. The LNAPL densities, viscosities, and all fluid interfacial tension data used for each of the models are presented in Table D2-1 in Appendix D2.

Capillary Pressure Data Analysis. The model requires van Genuchten parameters, "N" and "α," which are parameters that describe the capillarity potential (i.e., moisture retention) of a porous media. These parameters can be estimated by curve-fitting capillary pressure data taken from a water drainage pressure test. A capillary pressure curve was taken from one of the cores based on soil type, core photography results, and fluid gauging data. The resulting van Genuchten parameters from the samples were used for each well modeled. Values used in the model are presented in Table D2-1 in Appendix D2, and the capillary curve-fit parameter estimation is provided in Appendix D2.

The van Genuchten parameter, N, is related to the distribution of pore sizes within a given soil type. Typically, smaller N values will represent a soil with a wide range of pore sizes, whereas larger N values tend to represent well sorted materials. The "α" van Genuchten parameter is related to fluid and soil parameters. This value scales the pressure that an LNAPL requires to displace water from a pore space. The units of "α" are one over length (L^{-1}), so the smaller the alpha, the more capillary head a fluid would require to enter a given pore size of the soil.

The irreducible water saturation was also interpreted from the results of the capillary pressure data and centrifugal test performed following the capillary pressure analyses. The irreducible water saturation is described as the minimum water (wetting) phase saturation at high capillary pressures (Charbeneau 2003). The water saturation values correspond to the same sample from which the van Genuchten "N" and "α" values were taken (Appendix D2). The irreducible water saturation was estimated based on the capillary pressure curve for each well.

Residual Light Non-Aqueous Phase Liquid Saturation. The residual saturation of LNAPL from the soil core was used to calibrate the saturation curve in the LDRM. Because of the submerged volume of LNAPL and low mobility, the LNAPL has been slowly entering wells OHM-1, OHM-2, and OHM-3 since installation. Based on the LNAPL thickness measurements increasing over time, the LNAPL thickness has not reached equilibrium in the wells. Therefore, the model is not expected to accurately calculate recovery volumes. As a result, the analysis was limited to the distribution and mobility of the LNAPL.

Distribution Modeling. Three wells (OHM-1, OHM-2, and OHM-3) were modeled using the API distribution modeling effort.

Model Calibration. The LDRM model was calibrated using field data from the 2019 baildown test (Appendix D2). As the API workbooks typically used for calculating LNAPL transmissivity are designed for unconfined, confined or perched conditions, the methods are not completely accurate for a submerged LNAPL mass with submerged screens. An alternative method was used to calibrate the LDRM model. The baildown tests were conducted over a relatively long period of time with measurements up to 36 days after the initial removal. During this time the field data was able to measure a constant rate discharge from the formation into the well, which is similar to what would be expected during passive recovery. This constant rate discharge was used in the LDRM model as the expected recovery rate. Following calibration of the distribution models, transmissivity can be obtained by inputting the relative permeability calculated by the model and other parameters into the equation below:

$$T_o = \frac{K_w \rho_o \mu_w}{\mu_o \rho_w} k_{ro} b_o$$

Where:

T_o-LNAPL transmissivity

K_w-Hydraulic conductivity

ρ_o-Density of LNAPL

μ_o-Viscosity of LNAPL

ρ_w-Density of groundwater

μ_w-Viscosity of groundwater

k_{ro}-Relative permeability of LNAPL for a given saturation

b_o-Formation LNAPL thickness

Light Non-Aqueous Phase Liquid Distribution Model Results. The distribution model outputs include relative permeability, saturation profile, the specific volume of LNAPL within the formation, LNAPL transmissivity and LNAPL discharge rate. The LNAPL is not at equilibrium; therefore, the LNAPL transmissivity and discharge rate are considered the only accurate results from the model. The model calculated transmissivity values of 0.05, 0.01, and <0.001 square feet per day (ft^2/d) for OHM-1, OHM-2, and OHM-3, respectively. These transmissivity values correlated to the field data are less than the ITRC threshold for practicable passive NAPL recoverability of 0.8 ft^2/d.

These transmissivity values were used to model skimming recovery. The estimated recovery rate for OHM-1 was 0.43 gallons per day (gpd) compared to the constant rate discharge during the baildown test that ranged from 2.62 gpd on the first day to a 0.69 gpd average over the 28-day recovery period. The averaged recovery rate does not include the first day, which typically has high discharge rates from potential bore hole recharge. The LDRM predicted recovery rate of 0.43 gpd is less than the constant rate discharge observed during the baildown test, however, is to be expected over a longer period of time.

For OHM-2, the skimming model predicted a recovery rate of 0.05 gpd and the rate during the baildown test ranged from 1.44 gpd on the first day to an average of 0.32 gpd over 5 days. The model estimate was low compared to the baildown test for OHM-2 due to the lower percentage of LNAPL in the pore space and the low percentage of LNAPL removed during the centrifugal test. It is anticipated LNAPL removal via skimming will be slow from OHM-2.

For OHM-3, the skimming model predicted a very low recovery rate (0.01 gpd) and the rate during the baildown test ranged from 0.43 gallons on the first day to 0.14 gpd average over the course of the 37-day test. The low prediction is based on the larger porosity near OHM-3 of 0.502 pore ratio to 0.28 pore ratio of LNAPL, with less than half the pore volume filled with LNAPL, the LNAPL mobility is anticipated to be very low long-term at 0.01 gpd for skimming.

Light Non-Aqueous Phase Liquid Recovery Model Recoverability is defined as the recovery of appreciable amounts of LNAPL from the subsurface using technically practicable remediation systems. LNAPL recoverability is a function of its saturation in the soil. The recovery part of the API model by Charbeneau (2003) is a tool used to estimate the recoverability of LNAPL at specific points in time. LNAPL recoverability, or quantity of LNAPL recovered, is a more reliable endpoint criterion than apparent or measured LNAPL thickness in monitoring or recovery wells. Measured thicknesses alone are not sufficient data to represent LNAPL volume and mobility in the subsurface as observed based on core photography and site cross sections. Using results from the distribution part of the model, along with additional input parameters, the recovery model provides predictions of LNAPL recovery over time for various remediation technologies, including skimming, vacuum-enhanced skimming, and water-enhanced recovery.

Recovery Model input parameters in addition to the distribution model results are required for each of the recovery scenarios. These additional parameters include:

- Time of recovery
- Radius of capture
- LNAPL viscosity
- Hydraulic conductivity
- Radius of the well
- Radius of influence
- Screened interval above and below mean water level
- Wellhead suction pressure (for vacuum-enhanced recovery)
- Water recovery rate [for dual phase extraction (DPE) recovery].

Given the low estimated transmissivity and discharge rate, a long timeframe of 1,000 years was evaluated to demonstrate the minimal recovery that would be achieved through these technologies. After 1,000 years of skimming, 25 percent of the total LNAPL would be recovered from OHM-1 in a 60-foot radius, which is approximately 96 percent of the recoverable LNAPL. For the same time frame, only 11 percent of the total LNAPL would be recovered from OHM-2 in a 60-foot radius, which is approximately 22 percent of the recoverable LNAPL. For OHM-3, 0.3 percent of the total LNAPL would be removed which is approximately 43 percent of the recoverable LNAPL. The high viscosity results in low removal rates limiting the effectiveness of LNAPL recovery technologies.

2.3.3.4.5 LNAPL Chemical Laboratory Results

LNAPL samples were collected from OHM wells for chemical laboratory analyses in May 2019 (OHM-1 and OHM-3) and July 2019 (OHM-1, OHM-2, and OHM-3). Laboratory analytical results are summarized in Table 26. Metals (copper and/or nickel), DRO, ORO, fuel oil #6, EPH analytes, and select petroleum hydrocarbon VOCs (e.g., ethylbenzene, xylenes, naphthalene, and trimethylbenzenes) were reported above laboratory reporting limits in one or more of the LNAPL samples.

PCBs, arsenic, lead, and other metals were not reported above laboratory reporting limits in LNAPL samples collected from wells OHM-1 and OHM-3 in 2019, indicating that they are not a constituent of the site LNAPL (Table 26).

2.3.3.5 Oil Sheen/Oil Droplets

One tar-like oil nodule observed along the rip/rap bank and eight samples of oil sheen and/or oil droplets were collected from the surface of the Columbia River when observed during nine bank monitoring events between August 2016 and August 2018. Laboratory analytical results are summarized in Table 27. Laboratory analysis of oil sheen/LNAPL samples was consistently complicated by low sample volume available. Oil nodule and oil sheen/droplet samples have been analyzed for EPH twice, PAHs twice, TPH seven times, and VOCs twice.

EPH analytes were reported above the laboratory reporting limit in one of the two samples. Diesel-, oil-, motor oil-, and bunker C-range organics were reported at concentrations above the laboratory reporting limits in five of the seven samples analyzed (excluding the samples that contained sheen without a visible LNAPL droplet). These results indicate the oil sheen and oil droplets are comprised of petroleum hydrocarbons; however, their source is unknown.

VOCs have not been reported above laboratory reporting limits in samples containing oil sheen/oil droplets to date. PAHs have been detected at estimated concentrations below the laboratory reporting limit in one river LNAPL sample.

2.3.3.6 TPH Chromatograms Review

Chromatograms from the NWTPH-Dx analysis of the LNAPL (sheen and oil droplets) samples collected from the surface of the river are similar to standards of hydraulic oil, weathered Bunker C, and weathered diesel. The river LNAPL sample chromatograms appear similar to soil and groundwater samples collected from south of the tracks, but also may contain hydraulic oil, which was not observed in the upland samples.

Chromatograms from groundwater samples collected from wells along the berm appear to contain weathered diesel (e.g., WMW-16 sample from August 2018) or a mixture of weathered diesel and weathered Bunker C-like petroleum hydrocarbon impacts (e.g., RMD-2 sample from August 2018). Chromatograms from soil samples collected adjacent to LIF borings TG-CR-02 and TG-CR-03 (north of the berm) at the water table appeared similar to weathered/partially weathered diesel, which matches the interpretation of the residual LNAPL observed in the LIF logs for these locations.

Soil sample chromatograms from south of the tracks also appear similar to weathered diesel and weathered bunker C standards (e.g., LIF soil samples from August 2013 and OHM soil samples from August 2014). Chromatograms for LNAPL samples collected in 2019 from wells OHM-1 and OHM-3 appeared to contain weathered Bunker C, similar to soil samples from pilot borings for the wells. These observations are consistent with 2012 results. Soil sample results in the #2 Diesel and Motor Oil range from borings within the inferred mobile LNAPL extent south of the tracks (e.g., B-12-1, B-12-2, B-12-3, and B-12-4) were described in laboratory reports as due to a complex mixture of weathered/degraded diesel fuel, a mineral/transformer oil range product, motor oil, and/or possible biogenic interference (KJ 2012).

Soil and groundwater sample results from borings north of the tracks and near the former diesel fueling island appear more diesel-like. Review of the chromatograms for the NWTPH-Dx and NWTPH-Gx soil samples (T-# series borings) collected in 2010 around the Maintenance Shop indicated that diesel-range hydrocarbons detected in the NWPTH-Dx analysis appeared to be weathered diesel and that gasoline-range hydrocarbons detected in the NWTPH-Gx analysis appeared to be from a diesel source as well (KJ 2010). The laboratory report for RGW samples collected in 2012 from air sparge wells (AS-12-1, -2, and -3) north of the tracks and RGW samples RB1, RB2, RB3, and RB4 near the former diesel fueling island indicated that results in the #2 Diesel and Motor Oil ranges were due to either weathered/degraded diesel fuel or a mixture of heavily weathered/degraded diesel fuel and/or a mineral/transformer oil range product. The chromatogram for the November 2016 groundwater sample from well WMW-07 was similar to weathered diesel. Soil samples from boring B-18-24, located near a former pump house west of the Maintenance Shop, also appear to be a mixture of weathered/slightly weathered diesel fuel.

2.3.4 Terrestrial Ecological Evaluation

A Terrestrial Ecological Evaluation (TEE) was conducted to evaluate the potential impacts to terrestrial ecological receptors, in accordance with regulations published in WAC 173-340-7490 through 173-340-7494. The purpose of this TEE is to determine whether a release of hazardous chemicals at the site may cause potential adverse effects to terrestrial ecological receptors. The first step in the TEE process evaluates whether the site qualifies for a primary exclusion under WAC 173-340-7941. If the site does not qualify for a primary exclusion, the next steps in the tiered approach are used to evaluate whether the site qualifies for a simplified TEE under WAC 173-340-7942 or requires additional evaluation and a site-specific TEE under WAC 173-240-7943.

2.3.4.1 TEE Exclusion

The site was evaluated for the potential to pose a threat to terrestrial ecological receptors. To qualify for exclusion under the TEE process, the site must meet one of the four criteria below and described in WAC 173-340-7491:

1. **Point of Compliance.** All soil contamination is, or will be, at least 6 feet bgs (or alternative depth if approved by Ecology), and institutional controls are used to manage remaining contamination.

2. **Barriers to Exposure.** All contaminated soil is, or will be, covered by physical barriers (such as buildings or paved roads) that prevent exposure to plants and wildlife, and institutional controls are used to manage remaining contamination.

3. **Undeveloped Land.** There is less than 1.5 acres of contiguous undeveloped land on or within 500 feet of any area of the site.

4. **Background Concentrations.** Concentrations of hazardous substances in soil do not exceed natural background levels as described in WAC 173-340-200 and 173-340-709.

Site information and current and historical analytical data were evaluated below in the context of these four TEE exclusion criteria to determine whether the site qualifies for a TEE exclusion.

Point of Compliance Evaluation

Environmental investigations at the site have resulted in 362 soil samples from soil borings and excavation samples, including 101 samples within 6 feet of the ground surface. Only five of the 101 soil samples within 6 feet of the ground surface contain concentrations of one or more chemical constituents above their respective MTCA Method A CULs. These include:

- A sample collected at 4 feet bgs from 2014 boring OHM-3, located south of the mainline tracks, reported concentrations of DRO, ORO, and Total TPH-Dx (analyzed with SGC) above their respective CULs.

- A sample collected from 2.0 to 2.5 feet bgs in 2018 boring B-18-03, located north of the former Engine House, reported concentrations of ORO and Total TPH-Dx (analyzed without SGC) above the CUL.

- A sample collected from 1.5 to 2.0 feet bgs in 2018 boring B-18-18, located on the north side of the berm, reported Total cPAHs above the CUL.

- A sample collected from 2.0 to 2.5 feet bgs in 2018 boring B-18-30, located on the berm near the former Septic Drainage Field, reported Total cPAHs slightly above the CUL.

- A sample collected from 2.0 to 2.5 feet bgs in boring WMW-29, located east of the former Engine House, reported Total cPAHs slightly above the CUL.

Based on this information, the site does not meet the point of compliance criteria.

Barrier to Exposure Evaluation

The site, an active railyard, is zoned as “industrial park” by Klickitat County. The Uplands RI investigation area, spanning from the former fueling areas on the western side to the former Septic Drainage Field area to the east, represents an area of approximately 20.3 acres. Three land use/cover types exist onsite in the following estimated proportions:

- 2.6 acres covered by asphalt or other impervious structures (e.g., buildings)
- 16.5 acres covered by gravel (railroad tracks and surrounding corridor)
- 1.2 acres of sparsely vegetated unpaved areas (narrow berm).

The majority of the site presents a barrier to exposure and wildlife is unlikely to come into contact with contaminated soil due to limited site access, limited potential habitat areas within the site, and active industrial site uses except for the narrow sparsely vegetated berm along the southern edge of the site. While the site does not exclusively meet the barriers to exposure criteria, the soil impacts located within the berm habitat are greater than 6 feet bgs limiting contact with wildlife.

Undeveloped Land Evaluation

The site is zoned industrial with active industrial (railyard) activities, few vegetated areas, and does not contain undeveloped land greater than 1.5 acres. There is approximately 2.4 acres of contiguous undeveloped land to the northwest of the site, so the site does not meet the undeveloped land exclusion criteria. However, the habitat quality of the undeveloped land is considered low as it is generally inaccessible due steep topography. Though the site does not meet the undeveloped land criteria, it is not expected to present significant exposure to wildlife.

Background Concentrations Evaluation

Concentrations of site-related constituents in soil are above natural background levels. The site does not meet the background concentrations criteria.

The site does not qualify for exclusion based on the four criteria described above, though most of the site is an active industrial property with barriers to exposure for wildlife. Consequently, the site was evaluated using the simplified TEE process in accordance with WAC 173-340-7492 (Ecology 2007). The simplified TEE process is designed for addressing TEE risk at sites with limited quality habitat and limited potential for soil biota and terrestrial plants and animals to be exposed to hazardous substances. The site would not qualify for a site-specific TEE based on the four criteria outlined in WAC 173-340-7491. Even though a priority habitat for the golden eagle (*Aquila chrysaetos*), a threatened species in Washington State, is located approximately 350 feet northwest of the site, golden eagles have not been observed to live, feed, or breed at the site.

2.3.4.2 Simplified TEE

The simplified TEE procedure consists of three steps including: an evaluation of the extent of exposure (exposure analysis); evaluation of exposure pathways (pathway analysis); and chemical constituent analysis. The steps need not be followed in order and any one step may be used to determine that no further evaluation is necessary to conclude that the site does not pose a substantial threat of significant adverse effects to terrestrial ecological receptors.

The exposure analysis consists of evaluation of two criteria: total area of contamination (no further evaluation is required if the total surface area of impacted media is less than 350 square feet) and evaluation of the land use at the site and surrounding areas that would make substantial wildlife exposure unlikely.

Based on a review of existing analytical data, the surface area of impacted soil is greater than 350 square feet. The land use evaluation was conducted using Table 749-1 in WAC 173-340-7492, *Simplified Terrestrial Ecological Evaluation-Exposure Analysis Procedure*. The completed Table 749-1 is included in Appendix P. Using Table 749-1, the estimated area of contiguous undeveloped land on the site or within 500 feet of any area of the site is approximately 2.5 acres, which corresponds to a score of 9 points (Appendix P, Table 749-1 and Figure P-1). Land use designations for the site area were reviewed using the Washington State Land Use 2010 Geospatial Open Data Portal (http://geo.wa.gov/datasets/washington-state-land-use-2010/data?geometry=-120.986%2C45.657%2C-120.940%2C45.662). Much of the area to the north and northeast of the RI investigation areas was designated for ‘Household, single family units’, including the steep basalt cliffs present to the north of the site. The area to the northwest of the site was designated as ‘Undeveloped land’ in 2010. Since 2010, land at the base of the steep basalt cliffs to the northwest of the site has been developed via creation of dirt / gravel roads, earthwork, and removal of vegetation, as can be seen in a 2019 aerial photograph (Appendix P, Figure P-1).

If the sum of the remaining evaluation criteria, which include property type, habitat quality rating, likelihood of undeveloped land to attract wildlife, and presence of a specific list of chemical constituents is greater than 10, the simplified TEE may be ended. The site received a score of 3 for industrial property use. The site contains low quality habitat due to presence of early successional vegetation including weedy areas that have been cleared or disturbed recently, and was given a score of 3 in this category. The presence of undeveloped land to the north and west of the site could potentially attract wildlife; however, the habitat quality is considered low as the site is paved with gravel and surrounding areas are generally inaccessible due to the active rail lines and steep topography. Consequently, the site received a score of 1 for this category. Site-related constituents do not include those listed on Table 749-1, and the site was given a score of 4 in this category. The sum of the remaining evaluation criteria is 11, which is larger than the comparison value of 9 points in Table 749-1; consequently, the simplified evaluation is complete, and no further evaluation is necessary.

2.3.5 Petroleum Vapor Intrusion Evaluation

The petroleum vapor intrusion (PVI) pathway was assessed per Ecology’s Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (Ecology 2018b), Ecology Implementation Memo No. 14 (Ecology 2016a), Ecology Implementation Memo No. 18 (Ecology 2018a), and Ecology Implementation Memo No. 21 (Ecology 2018c).

Based on MTCA, the PVI pathway must be evaluated if TPH are present in soil at concentrations over 10,000 mg/kg. EPA guidance uses a screening value of 250 mg/kg (diesel or weathered gasoline) or greater to indicate that LNAPL, including residual and nonmobile LNAPL, is present and that vertical separation is needed between the impacted soil and overlying structures (Ecology 2018b; EPA 2015). Both of these conditions are met at the site.

The PVI pathway was initially assessed using the Modified Approach for Assessing the VI Pathway as outlined in Implementation Memo No. 14. The steps under this pathway are outlined below:

- Step 1: Confirm the release.
- Step 2: Determine if an immediate action is necessary.
- Step 3: Characterize the site and develop a conceptual site model.
- Step 4: Evaluate whether there are any contaminants besides petroleum.
- Step 5: Determine if there are precluding factors.
- Step 6: Determine if buildings are within the lateral inclusion zone.
- Step 7: Evaluate the vertical screening distances for buildings in the lateral inclusion zone.
- Step 8: If the vertical screening distance is not met, use the Tier I or Tier II assessment in Ecology's Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action.

Based on Implementation Memo No. 14, steps 1 through 4 have been completed. A release has been confirmed at the site, and none of the conditions as specified in Section 2.1 of Ecology's Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (Ecology 2018b) are met; therefore, immediate action was not necessary. Constituents of concern at the site that could be an issue for vapor intrusion are limited to petroleum, as confirmed by RI results.

Precluding factors (Step 5) that would justify a greater separation distance are not present at the site. The site is an established industrial property and future development is not planned or contemplated in the area of dissolved phase petroleum impacts to groundwater. Furthermore, the site is generally unpaved (primarily covered with compacted gravel) with limited preferential pathways in the extent of groundwater impacts. The constituents of concern at the site are petroleum hydrocarbons with no known additives; the additives 1,2-dibromoethane [ethylene dibromide (EDB)] and 1,2-dichloroethane (EDC) have not been reported above laboratory limits in 128 soil samples collected and analyzed for these constituents from the site (Table B1, Appendix B). Additionally, the primary hydrocarbon types present are weathered diesel and Bunker C oil which pose little or no vapor intrusion risk. None of the factors present at the site would preclude a screening using steps 6 and 7 of Implementation Memo No. 14.

A horizontal separation distance of 30 feet is appropriate for establishing the lateral inclusion zone for the site, per Implementation Memo No. 14 (Ecology 2016a) because the dissolved-phase plume extent is well-defined and stable. Only a few buildings are present at the site (Figure 2), and most are located on the northern side of the active railroad tracks, away from soil and dissolved-phase impacts. The only building located within 100 feet of a location with petroleum impacts to soil and/or groundwater is the Maintenance Shop, which is located approximately 44 feet east of well WMW-7 and approximately 25 feet from the understood edge of dissolved-phase impacts to groundwater (Figure 45). The Former Signal Office (Former Store House), which was located approximately 30 feet from well WMW-29, has been demolished, so this location was not retained for further screening. The Maintenance Shop was retained for vertical separation screening under Step 7.

Recommended vertical separation distances for soil, as outlined in Implementation Memo No. 14, are a 6-foot separation distance for concentrations of GRO less than or equal to 100 mg/kg (unweathered gasoline) or 250 mg/kg (weathered gasoline), concentrations of DRO less than or equal to 250 mg/kg, and concentrations of benzene less than or equal to 10 mg/kg. Concentrations greater than these vertical separation screening levels should utilize a vertical separation distance of 15 feet.

Soil samples have been collected from eight soil boring locations [WSB-1, WSB-2, and WSB-3 (2003), T-7 through T-10 (2010), and B-18-25 (2018)] and two soil excavation confirmation locations [M-2-8 and M-2-14 (2005)] within the 30-foot lateral inclusion zone around the Maintenance Shop. Locations T-7, T-8, T-9, and T-10 were collected directly adjacent to or beneath the Maintenance Shop. Analytical results from these samples are summarized in Table Q-1 and locations are shown on Figure Q-1. Soil was also sampled from boring WSB-04-07 (2004), but the area around this location was excavated in 2005.

Soil samples collected from 2003 boring WSB-2 indicate the past presence of petroleum hydrocarbons near the Maintenance Building. A bioventing system operated between June 2012 and July 2019 to address residual hydrocarbon in soil north and west of the Maintenance Building (Figure Q-1). The remedial effects of the bioventing system are indicated by soil results from boring B-18-25, which was advanced adjacent to the former WSB-2 location and did not contain concentrations of volatile constituents above 6-foot vertical separation screening levels or MTCA Method A CULs. The samples from B-18-25 are representative of current conditions in the WSB-2 area and indicate that a 6-foot vertical separation distance is appropriate, and met, in the Maintenance Shop area (Step 8).

None of the 13 soil samples collected at these locations (with current conditions represented by B-18-25 samples and not WSB-2) contained concentrations of DRO greater than 250 mg/kg. GRO (four samples) and benzene (13 samples) were not detected in soil samples from these borings (Table Q-1). Oil-range petroleum hydrocarbons were detected above the reporting limit in samples from WSB-1 at 10 feet bgs (359 mg/kg) and in the primary (276 mg/kg) but not field duplicate (< 117 mg/kg) sample from B-18-25 at 2 to 2.5 feet bgs. However, the less volatile oil-range hydrocarbons are not expected to pose a vapor intrusion issue.

A vertical separation distance of 6 feet is appropriate when concentrations of total petroleum hydrocarbons in groundwater are less than 30,000 µg/L and when concentrations of benzene are less than 5,000 µg/L. Well WMW-07 is the closest monitoring well to the Maintenance Shop, located approximately 44 feet to the west of the building (e.g., outside the lateral inclusion zone). The most recent groundwater sample from November 2016 from well WMW-07 contained DRO at a concentration of 1,350 µg/L, above the MTCA Method A CUL but below the vapor intrusion screening level for a 6-foot vertical separation distance. Results for GRO, BTEX, and ORO were either below MTCA Method A CULs or below laboratory reporting limits and were below vapor intrusion screening levels for a 6-foot vertical separation distance. Groundwater levels in the well have historically fluctuated from approximately 10.3 to 11.5 feet bgs. The edge of the dissolved-phase area is estimated to be approximately 25 feet from the edge of the Maintenance Shop. Water was observed in 2018 boring B-18-25, to the north of the Maintenance Shop, at a depth of approximately 11 feet bgs, but was not able to be sampled due to insufficient quantity of water. Boring logs from 2010 boring locations T-7 through T-10 indicate saturated soil was present at depths between 11 and 14.5 feet bgs. The vertical separation distance is met for groundwater (Step 8).

The Maintenance Shop can be removed from a PVI evaluation through lateral and vertical separation distances. Lines of evidence support PVI not being a risk in the Maintenance Shop and that further evaluation is not warranted.

2.4 RI Summary

The primary findings and conclusions of the RI performed in 2016 through 2018 at the BNSF Wishram site based on the current and historical investigations are summarized below. Additional information (based on the RI findings) regarding potential site-related constituent sources, migration, and potential exposure pathways is presented in Section 3.

- The site was initially developed as a railyard between 1910 and 1912. The primary historical use of the railyard was railcar switching, conducted on approximately 35 track spurs that extended from the far eastern end of the site to the former Engine House. Historically, locomotive fueling/watering and repairs occurred at Wishram. The primary current use of the railyard is railcar switching.

- Site investigation and interim remediation activities performed prior to the RI included excavation and offsite disposal of soil containing petroleum hydrocarbons (2002, 2005, 2007, and 2010), removal and offsite disposal of former USTs (2002 and 2005), collection of soil and/or groundwater samples (multiple events between 2002 and 2015), a LIF survey of the site (2013), and an investigation of LNAPL mobility in the vicinity of the former Power House (2014). A bioventing system operated at the site between June 2012 and July 2019 in the vicinity of the Maintenance Shop as an interim remedial measure.

- Field activities for the RI were substantially conducted at the site between August 2016 and November 2019 and included the advancement of soil borings and installation of groundwater monitoring wells; collection of soil, and groundwater samples; installation of oil head monitoring wells; collection of LNAPL samples for LNAPL mobility testing; monthly inspections of the Columbia River surface from the bank and collection of oil sheen/LNAPL samples from the surface of the river when present; and an evaluation of groundwater flow conditions beneath the site. A separate initial investigation of the presence and extent of NAPL impacts in the inundated lands bordering the site was also conducted and will be reported under separate cover. The results of the RI were used to develop the CSM for the site (Section 3).

- The primary constituents identified in the subsurface at the site, based on the 2016 to 2019 RI findings, include TPH-related compounds (primarily DRO and ORO, but also GRO in localized areas). Related to the TPH compounds, PAHs (reported in a small subset of samples above the applicable MTCA CULs), and total and dissolved arsenic in groundwater have been identified as exceeding their respective CULs.

- DRO and/or ORO concentrations above the MTCA Method A CULs in soils on the site were primarily reported in the vicinity of the Maintenance Shop north of the tracks, south and east of former diesel and oil fueling operations and in the vicinity of former underground pipes for oil, and in the vicinity of the former Power House south of the tracks. Concentrations of DRO and/or ORO above the MTCA Method A CUL were also reported in unsaturated (i.e., above the water table) soils at a single sample location in the footprint of the former Engine House/Machine Shop and three locations along the berm bordering the Columbia River south of the former Power House area. DRO and ORO impacts above the MTCA Method A CULs were not reported in soil east of the former Engine House/Machine Shop.

- Dissolved DRO and/or ORO concentrations above the MTCA Method A CULs in site groundwater (including RGW samples and samples from groundwater monitoring wells) were reported in the vicinity of the Maintenance Shop north of the tracks, near the former Fueling Island (for diesel), in the vicinity of former underground pipes for oil, and in the vicinity of the former Power House, the former Engine House/Machine Shop, and the former Oil House, as well as along the berm south of the Power House and the former Oil Water Separator. DRO and ORO concentrations above the MTCA Method A CULs were not reported in groundwater monitoring wells east of the former Oil House.

- GRO concentrations above the MTCA Method A CUL were reported in site soils but not groundwater. GRO concentrations above the MTCA Method A CUL were localized to the vicinity of two former 500-gallon Gasoline USTs (southwest of the Maintenance Shop) and the former Power House.

- Arsenic concentrations were reported above the MTCA Method A CUL in site groundwater but not soil. Total and dissolved arsenic concentrations above the MTCA Method A CUL were reported in groundwater samples collected from borings and monitoring wells along the berm bordering the Columbia River, as well as in the vicinity of the former Engine House/Machine Shop and the former Septic Drainage Field. Elevated arsenic concentrations are present primarily in areas where petroleum hydrocarbons in the western (Main) area and/or residual organics from the former Septic Drainage Field create reducing groundwater geochemistry, resulting in transformation of naturally occurring arsenic in soil to the dissolved phase.

- PAHs reported above their respective CULs in soil samples (as percent of samples collected) included 1-methylnaphthalene (4 percent), 2-methylnaphthalene (1 percent), naphthalene (4 percent), and total naphthalene (7 percent). PAHs reported above their respective CULs in groundwater samples (percent of samples collected) included 1-methylnaphthalene (9 percent), 2-methylnaphthalene (1 percent), naphthalene (1 percent), and total naphthalene (1 percent). Total cPAH was reported above its respective CULs in 12 percent of soil samples and 1 percent of groundwater samples. PAHs in groundwater at the site are co-located with elevated concentrations of DRO and/or ORO.

- An investigation of the nature and extent of petroleum hydrocarbon impacts in the inundated lands located to the south of the site is being conducted concurrently with the upland RI. Field activities for the initial investigation were completed in June and August 2018. Surface sediment grab samples and one sediment core collected from the area that Darts were deployed confirmed that neither ORO nor DRO were present in nearshore sediment at concentrations above applicable SCOs. Four sediment cores collected between approximately 40 and 130 feet south of the site berm shoreline contained a layer of debris-filled material with visible NAPL. This area is undergoing further investigation and results will be reported to Ecology under separate cover.

- A study of groundwater flow conditions on the site was performed based on 16 months of groundwater elevation data recorded using pressure transducers installed in select monitoring wells and the Columbia River. The results of this study suggest that a losing stream condition (i.e., net flux of water from the Columbia River to the site) occurs during the summer, fall, and winter months across the site, and a gaining stream condition (i.e., net flux of groundwater from the site to the Columbia River) occurs in the spring months for a majority of the wells. Overall, a losing stream condition is observed more often (approximately 80 percent of the time in wells along the river berm) than a gaining stream condition. The implication is a net migration of water away from the river, integrated over the course of a given year, but also characterized by an undulating (back-and-forth flow) component of flow across the shoreline on sub-month time-scale of weeks, days, or possibly even hours.

- An evaluation of LNAPL physical properties was performed based on LNAPL samples collected from four site wells. Testing results included a maximum density measurement (0.97 g/cc) less than that of water (1 g/cc) indicating the NAPL is classified as an LNAPL, and high viscosity values at site temperatures. An evaluation of LNAPL mobility was also performed based on undisturbed soil cores collected from seven locations within the inferred extent of submerged LNAPL at the site. Centrifuge testing results provided information about the relative mobility of LNAPL at the site, indicating LNAPL is not mobile in the vicinity of well OHM-4, potentially mobile in two locations near the former Power House, and potentially mobile or mobile in four locations near former underground oil pipelines.

Section 3: Conceptual Site Model

The purpose of the RI was to investigate the nature and extent of potential constituents of concern in soil and groundwater at the site and evaluate related fate and transport mechanisms. Based on the RI data and previously obtained site information, a CSM was developed to identify and illustrate potentially complete exposure pathways for site-related constituents, and the processes through which receptors can be potentially exposed. The CSM is based on an evaluation of potential sources and release mechanisms, resulting impacted site media, hydrogeologic conditions, fate and transport processes, and potential human and ecological receptors.

The following sections describe the CSM elements based on current and reasonably foreseeable future conditions at the site:

- Section 3.1 identifies potential sources of site-related constituents including potential railyard and regional background sources, and media affected by the constituents.
- Section 3.2 presents fate and transport of constituents in site media including mechanisms of transfer between different media and biotic and abiotic degradation/attenuation.
- Section 3.3 summarizes the potential exposure pathways at the site for human and ecological receptors.

Figures 62 and 63 present a plan view of the CSM overlaying the current (circa 2011) and historical (1951) aerial photographs and Figure 64 presents the CSM in cross-section.

3.1 Potential Sources of Site-Related Constituents

Based on historical railroad operations and previous investigations, site-related constituents of concern identified for the site include DRO, ORO (i.e., medium- to long-chain petroleum hydrocarbons), and GRO. Additional related constituents of concern include PAHs, including low concentrations of carcinogenic PAHs, and arsenic in site groundwater.

3.1.1 Petroleum Hydrocarbons

Potential sources of petroleum hydrocarbon-related constituents identified for the site, including DRO, ORO, GRO, and PAHs, consist of historical facility operations, specifically past oil and diesel fueling operations and steam power production, storage of oil and diesel fuel in multiple ASTs and USTs onsite, as well as associated underground piping systems.

Limited documentation is available about historical releases of petroleum hydrocarbon products (fuel or oil). SP&S correspondence from the 1950s describes releases of oil that may have occurred during unloading and loading operations. The correspondence does not specify when or where release(s) occurred, or quantities potentially released (BNSF 2017). Evidence of past oil and diesel releases to soil and groundwater have been observed during previous and current remedial investigations and previous interim remedial actions. General areas within the present upland remediation investigation areas (i.e., not including inundated lands to the south of the railyard, beneath the Columbia River) where petroleum hydrocarbon-related constituents have been identified include the following (see Figure 2):

- North of Mainline tracks – vicinity of the former Boiler House and its former UST, former Pump House (associated with former Diesel ASTs), and the current Maintenance Shop.

- South of Mainline tracks – vicinity of former diesel and oil fueling areas and underground piping, former Oil Unloading Track, former Oil Trough, and former Power House.

- Former Engine House/Machine Shop and vicinity.

- Berm Area south of the former Engine House/Machine Shop.

- Former Oil House east of the former Signal Office/former Store House.

Known and potential sources of constituents to soil and groundwater in the above areas include:

- **North of the Mainline Tracks.** DRO, ORO, and a limited amount of GRO, in soil and groundwater in this area are potentially related to the following:

    - Former 30,000-gallon Heating Oil UST (removed in 2002 along with 750 tons of petroleum hydrocarbon-impacted soil) located adjacent to the former Boiler House.

    - Former Fueling Spur and former Pump House which transferred diesel fuel to the two former Diesel ASTs located north of the pump house and to the former Fueling Island located south of the mainline tracks.

    - Two former 500-gallon Gasoline USTs located to the southwest of the Maintenance Shop.

- **South of the Mainline Tracks / Former Fueling Areas.** DRO, ORO, and PAHs with a limited amount of GRO, in soil and groundwater in this area are potentially related to the following:

    - Former oil unloading, storage, and transfer areas in the vicinity of the former Power House including operation of the former Oil Unloading Track, former Oil Trough, former Oil Sump, and former Pump Houses for transferring oil to the 30,000-barrel AST.

    - Former Elevated Oil AST, which was used for fueling steam locomotives on the western portion of the railyard; and the former Fueling Island, which was used for fueling diesel locomotives.

    - Former storage and transfer site features associated with diesel fueling including the former diesel USTs and former Pump House located on the southwestern portion of the railyard (just north of current berm) and the former Fueling Island and associated former Lubrication Oil UST to the south of the mainline tracks.

    - Former underground piping for conveying oil beneath the railyard to the fueling oil ASTs (30,000-barrel AST and elevated oil service AST) and diesel fuel to the former Diesel Fueling Spur and former Fueling Island.
    - Former Oil Drain Lines extending from the former Elevated Oil Service AST to the east past the former Oil Sump

- **Former Engine House/Machine Shop Area.** ORO in soil (limited to one shallow sample) and DRO and ORO in groundwater in this area are potentially related to locomotive maintenance and repair at the former Engine House.
- **Berm Area South of the Former Engine House/Machine Shop**. DRO and/or ORO in soil and groundwater in this area are potentially related to the following:
    - Former Oil Drain located to the north of the berm. The oil drain extended from the west (former Elevated Oil Service AST) to the east just north of the berm area toward the oil drain line extending south from the former Engine House (Figure 2).
    - Former Car Repair Shop. (The August 2018 RGW sample from B-18-22 and groundwater sample from well WMW-23 reported DRO and ORO concentrations below and Total TPH-Dx results above the MTCA Method A CULs. DRO, ORO, and Total TPH-Dx results in November 2018 through November 2019 samples from WMW-23 were below the MTCA Method A CULs.)
- **Former Oil House.** DRO and ORO in groundwater in the vicinity of the former Oil House located east of the former Signal Office (removed in 2018) are potentially related to two 2,000-gallon tanks and five 500-gallon tanks located in the basement of the former Oil House used for storage of headlight oil, car oil, valve oil, superheat valve oil, engine oil, signal oil, and mineral seal oil. It is unknown which oil was stored in 2,000-gallon or 500-gallon capacity tanks.

In addition to these upland areas, site-related constituents and NAPL have been identified in a layer of fill contained within the river sediment in an area of the inundated lands located south of the site, south of the former Power House area.

3.1.2 Arsenic

Concentrations of arsenic in soil above MTCA Method A CULs have not been reported (Table 17). In several soil borings with reported concentrations of arsenic in a shallow soil sample (generally less than 2.0 feet bgs), arsenic was not reported above laboratory reporting limits in a deeper sample from the same boring.

Arsenic is present in groundwater at reported concentrations above laboratory reporting limits and above the MTCA Method A CUL in the southern and central areas of the Main and East Areas of the site. Arsenic in groundwater at concentrations above the MTCA Method A CUL of

5 µg/L are more coincident in areas where petroleum hydrocarbons and/or residual organics from the former Septic Drainage Field create reducing groundwater conditions, resulting in transformation of naturally occurring arsenic in soil to the dissolved phase. However, as shown in Section 2.3.3.3.7, dissolved arsenic concentrations do not appear to correlate directly with dissolved manganese (serving as a proxy for local redox conditions) or Total TPH-Dx concentrations in groundwater samples. Elevated arsenic concentrations typically attenuate outside the area of reducing geochemical conditions where DO and normalized geochemistry result in the precipitation of arsenic back to the soil matrix at concentrations within the range of naturally occurring background.

3.2 Fate and Transport

This section provides a summary of constituent transport mechanisms, pathways, and exposure media for potential receptors (Section 3.3). Transport mechanism and pathways are shown on the CSM diagram (Figure 64) and described below.

The sources of most site-related constituents, with the exception of arsenic, have generally included ASTs, USTs, fuel piping, historical oil and diesel fueling operations, and potentially localized spills during previous railroad operations. Petroleum hydrocarbon-impacted soil has been removed to bedrock or to the groundwater surface from multiple locations on the site (Table 1B, Section 2.2). However, residual and/or potentially mobile petroleum hydrocarbon LNAPL in shallow and subsurface soil are a potential continuing source for dissolved-phase impacts in groundwater. Consequently, potentially complete exposure routes for both human and ecological receptors exist for site soil and groundwater, and surface water adjacent to the site (Columbia River) (see Section 3.3). Exposure routes are still being evaluated with regard to sediments and surface water.

Based on the site characterization sampling performed during this RI, VOCs are not present at appreciable concentrations beneath the site. GRO and benzene have been reported in some soil samples at concentrations above MTCA Method A CULs, but at relatively deep depths. Reported concentrations of GRO and benzene in groundwater samples have been below MTCA Method A CULs since 2004. Consequently, the vapor intrusion exposure pathway is an incomplete exposure pathway for the site.

Transport of shallow constituents includes leaching from a source, infiltration through unsaturated soils to the saturated zone during precipitation events, and migration in shallow-zone groundwater through advection and dispersion. Constituents adsorbed to saturated soils will migrate through dissolution and advective/dispersive forces. Site groundwater discharges to surface water in the Columbia River during a limited portion of the year. However, as presented in Section 2.2.7, in comparison to wells along the river berm, the Columbia River is a losing stream approximately 80 percent (10 months) of the year. Therefore, transport of site-related constituents towards the Columbia River is limited.

Figure 32 and additional figures in Appendices K and L provide representative illustrations of the typical potentiometric surface and hydraulic gradient at the site during losing and gaining stream behavior of the Columbia River.

Soil excavations performed in 2002, 2005, and 2010 (Figure 6A) have removed the majority of petroleum-impacted soil found above the groundwater table or bedrock surface (north of the main line). Since completion of these interim remedial actions, limited compounds in soil above the water table (encountered at approximately 10 to 14 feet bgs) have been observed. During the RI, soil samples collected from above the water table with reported concentrations of DRO and/or ORO above the MTCA Method A CUL were reported south of the former Power House (three samples) and within the former Engine House (one sample). In general, residual petroleum hydrocarbons in soil remain beneath the water table in the Main Area of the site (Figure 43).

Concentrations of arsenic in soil above MTCA Method A CULs have not been reported (Table 17). Arsenic is present in groundwater at concentrations above CULs primarily in the southern central and eastern parts of the site, in areas where petroleum hydrocarbons and/or residual organics from the former Septic Drainage Field create reducing conditions in groundwater, resulting in transformation of naturally occurring arsenic in soil to the dissolved phase. The partitioning of arsenic between aqueous and adsorbed states is influenced by oxidation-reduction (redox conditions), pH, and competition from other ionic complexes. Elevated arsenic concentrations typically attenuate outside the area of reducing geochemical conditions where DO and normalized geochemistry result in the precipitation of arsenic back to the soil matrix at concentrations within the range of naturally occurring background. Concentrations of arsenic above the CUL have not been reported in wells in the northeastern part of the site.

LNAPL beneath the site occurs primarily in two locations, at the northern end of the site near the mainline and in the vicinity of the Maintenance Shop; and near the southwestern end of the site near the former underground piping for conveying oil and the former Power House (Figures 15 and 16). NAPL has also been observed south of the site in the inundated lands (Figure 62). Field observations and laboratory results indicate that the upland LNAPL bodies are not migrating, which is consistent with the age of the LNAPL bodies estimated to be greater than 30 years, based on known facility operations. LNAPL found in the southwestern LNAPL body (near former underground piping and the Power House area) is classified as mobile, as evidenced by observations of measurable LNAPL in three of the four OHM wells. However, the absence of mobile LNAPL in the LIF borings immediately north of the berm, as well as in the riverbank monitoring wells indicates that this LNAPL body is not migrating. This assessment is also supported by the high viscosity of the LNAPL (7,210 cP at 50^{o} F). Based on the density of borings installed in the former Power House area, and the spacing of the wells installed along the riverbank, migration of the LNAPL is not apparent.

3.3 Potential Exposure Pathways and Receptors

Potentially complete exposure pathways for human and ecological receptors at the site generally include direct contact and/or incidental ingestion by construction workers and railyard workers of affected site media (soil and groundwater). The vapor intrusion pathway is an incomplete exposure pathway due to lack of VOCs reported in soil and groundwater and limited number of buildings (e.g., Maintenance Shop) on the site. A petroleum vapor intrusion (PVI) initial assessment (Section 2.3.5) concluded that PVI is not a risk in the Maintenance Shop. Human consumption of shallow site groundwater is also an incomplete exposure pathway. Shallow site groundwater is not a current source of drinking water and is unlikely to be identified as a drinking water source in the future as potable water is supplied by the City of Wishram (see Section 2.2.8.1.3).

3.3.1 Groundwater Use and Potability

Dermal contact with groundwater is considered a potentially complete exposure pathway for human receptors. The railyard site is currently served by the City of Wishram and water is available at multiple locations on the site.

As described in Section 2.2.8, three former water supply wells (Wells #1, #2, and #3) were located on the site; Well #1 was decommissioned in 1928. Based on available well construction records summarized in Table 16, solid protective conductor casings were installed from the ground surface into the top of the bedrock formation eliminating the potential for alluvial impacts to flow through the conductor casing protecting the former water supply wells into bedrock.

A search for current water supply wells located within an approximately 0.5-mile radius of the site was conducted using Ecology's online Well Log database (Ecology 2018d, accessed 18 December 2018). Two public and five private water supply wells were identified within the search radius. Depths of water supply wells are listed as between 300 and 602 feet bgs and water usage is listed as domestic. As summarized in Section 2.2.8.1.3 and shown on Figure 33, only the eastern portion of the site (features two former Oil Houses, former gasoline and oil USTs, and former Septic Drainage Field) is located within the 10-year travel time threshold of the wellhead protection zone for nearby public water supply wells, suggesting that migration of site-related constituents to public water supply wells is not likely. The eastern portion of the site located within the wellhead protection zone is not significantly impacted by site-related constituents and migration of these constituents toward these upgradient/upriver areas has not been observed.

A search was also conducted for existing water rights claims within an approximate 0.5-mile radius of the site using Ecology's online Water Resources Explorer database (Ecology 2018e, accessed 18 December 2018). This database shows active water rights for site groundwater held by both BNSF and SP&S. Other active water rights within a 0.5-mile radius of the site include Klickitat Public Utilities Division and five private water right holders.

As presented in Section 2.2.7, long-term water level monitoring of the river and shallow monitoring wells indicates the groundwater flow direction in the upland areas of the railyard is towards the south (toward the Columbia River) between 5 and 9 months of the year (based on WMW-5 and WMW-8 data, respectively). As such, the groundwater flow direction in the upland areas would be from off-railyard properties toward the railyard.

Based on the available information and this analysis, dermal contact with groundwater is currently considered to be a potentially complete exposure pathways for the site for construction workers. Shallow groundwater beneath the site is not a current source of drinking water and is unlikely to be identified as a drinking (domestic) water supply in the future. Elevated regional background arsenic concentrations and the shallow depth (approximately 10 to 14 feet bgs) of the saturated interval support its unsuitability as a source of potable water.

3.3.2 Human Receptors

The following exposure pathways are considered to be complete, or potentially complete, for human receptors based on the existing site conditions and uses:

- Surface and subsurface soil direct contact and/or incidental ingestion by railroad, construction, and utility workers.
- Groundwater direct contact and/or incidental ingestion by construction and utility workers (saturated conditions exist within approximately 10 to 14 feet bgs).
- Surface water direct contact and/or incidental ingestion by site, construction, and utility workers, recreational users, or designated human uses protected by treaty.
- Human consumption of aquatic organisms.

Direct contact and/or incidental ingestion of affected site media by construction, utility, or other workers performing invasive tasks, such as excavation or drilling/potholing, is a potentially complete exposure pathway. These exposure pathways would be considered potentially complete until site-related constituent concentrations are below the established cleanup standards for the affected media. Potential exposures due to invasive activities are currently managed through the use of a Health and Safety Plan (HASP) for soil disturbing activities. Future potential exposures will be addressed under the MTCA process after establishing the cleanup standards and reasonable maximum exposure scenarios.

3.3.3 Ecological Receptors

3.3.3.1 Terrestrial – Uplands

Ecological exposures to site-related constituents in upland areas of the site are negligible, as gravel and asphalt cover render ecological exposure routes incomplete across much of the site. Ecological receptors may occupy the sparsely vegetated areas along the berm separating the site from the Columbia River. Ecological receptor groups potentially exposed to constituents in terrestrial areas of the site include:

- Terrestrial plants
- Soil-dwelling invertebrates
- Mammals with terrestrial-based diets
- Birds with terrestrial-based diets.

Potential exposure risks along the berm are considered low given the existing analytical data characterizing berm surface soil (i.e., no known impacts) and delineated depth of subsurface constituent impacts beyond anticipated receptor exposure depth. Further, the primary site constituents (i.e., hydrocarbon-related semi-volatile organics) are not expected to bioaccumulate up into the food web.

3.3.3.2 Aquatic – Columbia River

Ecological exposures in the along-site reach of the Columbia River are possible. Ecological receptors potentially exposed to constituents in aquatic areas of the site include:

- Benthic invertebrates
- Aquatic plants
- Water column invertebrates
- Fish
- Mammals with aquatic-based diets
- Birds with aquatic-based diets.

Investigation of environmental conditions in the area of inundated lands in the along-site reach of the Columbia River are ongoing.

Section 4: Conclusions

The purpose of the RI is to investigate the nature and extent of constituents of concern in soil and groundwater at the railyard and evaluate related fate and transport mechanisms. The RI results form the basis of the CSM that will be used to evaluate potential exposures to site constituents of concern and support development of the FS as part of the site remediation process. Based on the data and information collected and the analysis described herein, characterization of the nature and extent of constituents in the upland area of the site is complete.

Additional evaluation of the fate and transport of site-related constituents and an evaluation of the risks to human health and the environment are planned to provide information needed to develop the forthcoming FS and future Draft Cleanup Action Plan (DCAP). Additional investigation and evaluation is also ongoing in the offshore areas of the Columbia River where petroleum hydrocarbons were identified in fill material in the river sediments. Information related to offshore conditions in the inundated lands area will be addressed in a separate investigation report and remediation planning process.

4.1 Conclusions

The following conclusions have been established though the RI process and will provide the foundation for the evaluation of remediation alternatives through FS and DCAP development:

- Petroleum hydrocarbons are present in soil and groundwater at the site in the vicinity of former USTs, former ASTs, and former infrastructure used to store and transfer fuel oils.
  - Petroleum hydrocarbons (reported as DRO and ORO) are present in soil and groundwater at concentrations above MTCA Method A CULs and are primarily related to loading, unloading, and storage of Bunker C type fuel oil and diesel fuel.
  - Hydrocarbons in the gasoline range (GRO) are present above the MTCA Method A CUL in a small number of soil samples (12 of 53 samples) and in no groundwater samples since 2004. GRO is present at locations near former gasoline tanks and does not represent a risk to human health or the environment.
  - VOCs typically associated with gasoline, such as BTEX compounds, which typically pose the greatest potential risk to receptors are not present in most samples above MTCA Method A CULs (only two of 177 soil samples for benzene and no groundwater samples for benzene since 2004). Chlorinated solvents and other VOCs are not reported at concentrations above MTCA Method A CULs in soil and groundwater samples. The relative absence of VOCs and the lack of onsite buildings in or near impacted areas indicates vapor intrusion is an incomplete exposure pathway under current site conditions.
  - PAHs, including carcinogenic PAHs, which were used to calculate Total cPAHs, were reported above MTCA Method A CULs in less than 10 percent of soil and

groundwater samples and are associated with samples that contained ORO and DRO.

  - Metals reported in soil were below applicable MTCA Method A or B CULs in 125 of 126 samples; lead was reported above its MTCA Method A CUL in one soil sample. Arsenic is present in groundwater along the river berm, and in locations where petroleum hydrocarbons related to former industrial activities and residual organics related to the former Septic Drainage Field affect groundwater geochemistry and liberate background arsenic in soil into groundwater.

- Suspected legacy sources of petroleum hydrocarbons have been decommissioned and removed from the site and impacted soil has been removed as part of IRM activities. Where implemented, IRMs successfully removed petroleum hydrocarbons down to the water table or bedrock such that soil samples collected from all but 11 of 145 soil borings/excavation confirmation sampling locations in four site areas in the unsaturated zone do not contain residual petroleum hydrocarbons above MTCA Method A CULs. A bioventing system was installed in the vicinity of the Maintenance Shop in 2012 and operated through July 2019 as an IRM.

- Hydrodynamic evaluation of the interaction between the Columbia River (Lake Celilo) and site groundwater indicates that a losing stream condition occurs during the summer, fall, and winter months across the site, and a gaining stream condition occurs in the spring months for a majority of the wells. Overall, a losing stream condition is observed more often (approximately 80 percent of the time in wells along the river berm) than a gaining stream condition. The implication is a net migration of water away from the river, infiltrating beneath the site during losing stream conditions.

- Groundwater at the site is not used as a drinking water source. Based on monitoring data, site-related constituents are limited and are not migrating in groundwater within the 10-year Time of Travel area of Wellhead Protection Zones in the vicinity of the site. However, groundwater is potable unless demonstrated to be non-potable under MTCA. Groundwater impacts will be remediated to the extent practicable, based on the assessments completed as part of the FS process.

- Mobility and migration evaluation in soil cores indicates LNAPL is classified as mobile, as defined by ITRC. The formation of Lake Celilo caused a rapid and permanent increase in groundwater elevation at the site, submerging the majority of LNAPL in the subsurface and increasing the pore entry pressure of the submerged LNAPL, thereby minimizing or eliminating the potential for the submerged viscous LNAPL to migrate horizontally. The specific gravity of the LNAPL (0.96) and observations in OHM wells (LNAPL floating on top of the water table) indicate that the submerged LNAPL does not exhibit the potential to migrate vertically downward into the bedrock. LNAPL properties (e.g., viscosity) and investigation data collected over time (including the absence of LNAPL in river berm monitoring wells) indicate LNAPL is not migrating laterally beneath the site.

- Field observations and results from the inundated lands initial investigation indicate that droplets and sheen observed on the surface of the Columbia River are linked to impacts identified within the inundated lands area, and not to the uplands area. Additional evaluation of conditions in the inundated lands area is ongoing and will be reported under separate cover.

- The transmissivity of the LNAPL is estimated to be very low. LNAPL thickness measurements increased over time in OHM wells between installation in October and November 2016 and conducting the LNAPL baildown tests in July 2019, indicating that the LNAPL thickness had not reached equilibrium in the wells. Results of the LDRM confirms that the potential to recover the LNAPL under ambient conditions is low.

- Natural source zone depletion will be evaluated in the FS, in part using biogeochemical data collected through respirometry gas monitoring, soil gas measurements, and carbon traps assessments completed in 2019 in accordance with the 2019 Work Plan (KJ 2019).

- Additional monitoring will be conducted in the FS to evaluate geochemical conditions influencing arsenic concentrations, including expanding the monitoring well network being used to assess total and dissolved arsenic concentrations across the site.

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Tables

SUMMARY OF PREVIOUS ENVIRONMENTAL INVESTIGATIONS (2002 THROUGH 2015)
BNSF Wishram Railyard, Wishram, Washington

Investigation Date	Purpose and Area(s) of Investigation	Sample Borings/Wells	Work Completed	Remarks
January – April 2002	• Evaluate presence and extent of petroleum hydrocarbon concentrations in soil. • Former Boiler House (north of Maintenance Shop)	• #1 – 17 • N-1 through N-4; N-10 through N-12 • W-5 through W-8; W-27 through W-30 • S-19 through S-26 • E-13 through E-18	• A 30,000-gallon underground storage tank (UST) and approximately 750 tons of petroleum-containing soil were removed by RMCAT Environmental Services, Inc. (**Figure 6A**) Seventeen subsurface soil samples were collected from direct-push soil borings to evaluate the extent of petroleum impacts (**Figure 7**) and 30 confirmation soil samples were collected from excavation sidewalls and floor (**Figure 6B**) for analysis of diesel- and heavy oil-range (DRO and ORO) petroleum hydrocarbons.	Site assessment and removal presented in *UST Site Assessment and Removal Report* [Kennedy/Jenks Consultants (KJ) 2003].
September 2003	• Evaluate hydrogeologic conditions and extent of petroleum-containing soil. • South (downgradient) of the Former 30,000-gallon UST removed in 2002	• WSB-1 through WSB-7 • WMW-1 through WMW-4	• Advanced seven soil borings (WSB-1 through WSB-7) as part of a UST site assessment to evaluate site hydrogeologic conditions and extent of petroleum-containing soil south and potentially downgradient of the former 30,000-gallon heating oil UST. **(Figure 7)** • Collected continuous soil samples for laboratory analysis of DRO and ORO and benzene, toluene, ethylbenzene, and total xylenes (BTEX). One sample (WSB-2-14) analyzed for semivolatile organic compounds (SVOCs) and one sample (WSB-4-10) was analyzed for polycyclic aromatic hydrocarbons (PAHs). One additional soil sample was collected at location WSB-6 to evaluate saturated zone conditions. • Installed four groundwater monitoring wells (WMW-1 through WMW-4) (**Figure 27**). Well WMW-2 was subsequently removed during soil excavation activities in 2005 and well WMW-4 was destroyed during railyard grading operations (observed in November 2006). • Groundwater samples collected from monitoring wells WMW-1 through WMW-4 in September 2003 for analysis of DRO, ORO, BTEX, and PAHs. Recorded water quality parameters at each well. • Collected undisturbed soil samples in locations WMW-1 and WMW-3 for analysis of moisture content, particle size distribution, porosity, soil pH, and total Kjeldahl nitrogen.	Site assessment results presented in *UST Site Assessment Report* (KJ 2004a).
February 2004 to April 2004	• Evaluate soil and groundwater conditions for potential constituents of concern. • Nine site locations potentially associated with industrial activities or fueling	• WSB-04-01, WSB-04-2, WSB-04-06, WSB-04-07, WSB-04-09, WSB-04-11 through WSB-04-20, WSB-04-25 through WSB-04-31; WSB-04-33 through WSB-04-38 • WMW-5 through WMW-7	• Advanced 28 soil borings (WSB-04-XX series) in and around nine site locations. Collected soil samples for analysis of petroleum hydrocarbons, BTEX, PAHs, and select metals including arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver [referenced herein as Resource Conservation and Recovery Act (RCRA) 8 metals] (No samples collected from WSB-04-28). Samples from borings WSB-04-30, WSB-04-31, and WSB-04-33 were also analyzed by the Toxicity Characteristic Leaching Procedure (TCLP) for barium, chromium, and lead **(Figure 7).** Samples from borings WSB-04-25 and WSB-04-31 were also analyzed for polychlorinated biphenyls (PCBs) (**Figure 36**). • Collected reconnaissance groundwater samples from selected borings and analyzed for one or more of gasoline-range organics (GRO), DRO, ORO, BTEX, volatile organic compounds (VOCs), PCBs, and total RCRA 8 metals. • Installed three monitoring wells: WMW-5, WMW-6, and WMW-7, which were included in the ongoing groundwater monitoring program (**Figure 27**). Well WMW-6 was subsequently removed in 2005 during removal of a former lubricating oil UST. Groundwater monitoring wells were sampled for one or more of GRO, DRO, ORO, BTEX, PAHs, and total RCRA 8 metals.	Site assessment results presented in *Site Assessment Report* (KJ 2004b).
2005	• Remediation of petroleum-containing soil. • Former Pump House, Former Fueling Island, Lube Oil UST Area, Former Boiler House (also known as Former Power House area).	• M-1-XX to M-10-XX series (13 samples) • FIEXC-XX series (9 samples), FIEAST-6, FI-MID-10 • PH-1-10, PH-2-17	• Confirmation soil samples were collected prior to backfilling multiple excavation areas in 2005. Soil samples were analyzed for DRO, ORO, GRO, BTEX, VOCs, total lead, and PCBs [**Figure 6B, Figure 36** (PCBs)]	Remediation activities and results presented in *Remediation Documentation Report* (KJ 2007).

SUMMARY OF PREVIOUS ENVIRONMENTAL INVESTIGATIONS (2002 THROUGH 2015)
BNSF Wishram Railyard, Wishram, Washington

Investigation Date	Purpose and Area(s) of Investigation	Sample Borings/Wells	Work Completed	Remarks
May 2007	• Evaluate soil affected in a small diesel release. • Remediation of diesel release. • South of the railyard depot building	• DB-1 through DB-14 • DXA1-2 through DXA7-2	• Advanced 14 soil borings (DB-1 through DB-14) in the diesel release area. Soil was logged and field-screened for presence of petroleum hydrocarbons using sensory observation and petroleum sheen testing. **(Figure 7)** • Collected 7 confirmation soil samples from the base of the excavation for analysis of DRO and ORO.	Site assessment results and removal presented in *Wishram Rail Grinder Cleanup Report* (KJ 2007).
May 2010	• Identify potential sources of residual light non-aqueous phase liquid (LNAPL). • Vicinity of Maintenance Shop	• T-1 through T-10	• Subsurface mapping survey was performed by GeoPotential using ground penetrating radar, magnetic, and electromagnetic methods in the area of monitoring well WMW-7. • Advanced 10 direct-push drill borings. Lithologic logging and field screening, including visual and olfactory observations and water-sheet testing, and soil sample collection for laboratory analyses were performed. Ten soils samples were analyzed for GRO, DRO, ORO and BTEX. **(Figure 7)**	Supplemental site investigation activities are presented in the letter report, *Supplemental Site Investigation – WMW-7 Area, Potential Light Non-aqueous Phase Liquid (LNAPL) Sources* dated 30 September 2010 (KJ 2010a).
January 2012	• Characterize site hydrogeology and evaluate soil and groundwater quality near former fueling island south of mainline tracks and Former Power House. • Remediation of soil and groundwater in vicinity of Maintenance Shop.	• B-12-1 through B-12-14 • WMW-8 through WMW-11 • AS-12-1 through AS-12-3 • SVE-12-1 through SVE-12-4 • RB1 through RB4	• Reviewed past reports and analytical data for well placement; reviewed historical information to identify potential sources of site-related constituents. • Advanced 14 direct-push soil borings (B-12-1 through B-12-14) with continuous sampling to depths up to 68.5 feet bgs. Soil samples were collected and analyzed for GRO, DRO, ORO, BTEX, PAHs, volatile petroleum hydrocarbons (VPH), and extractable petroleum hydrocarbons (EPH). Non-aqueous phase liquid (NAPL) encountered in 8 borings (B-12-1, B-12-2, B-12-4, B-12-7, B-12-8, B-12-11, B-12-12, and B 12 13) at depths typically greater than 25 feet bgs and up to 68.5 feet bgs in one location. **(Figure 7)** • Installed shallow monitoring wells (WMW-8 through WMW-11) screened to evaluate shallow groundwater impacts. Collected reconnaissance groundwater samples from wells AS-12-2, AS-12-3, RB-1, RB-3, and RB-4 and analyzed for GRO, DRO, ORO, and BTEX. **(Figure 7)** • Installed three air sparge (AS-12-1, AS-12-2, and AS-12-3) wells and four soil vapor extraction (SVE-12-1, SVE122, SVE-12-3, and SVE-12-4) wells. **(Figures 6A and 7)** Remediation system startup in June 2012 in bioventing (air injection) mode.	Site investigation activities are presented in *Site Investigation, Wishram Railyard* dated August 2012 (KJ 2012).

SUMMARY OF PREVIOUS ENVIRONMENTAL INVESTIGATIONS (2002 THROUGH 2015)
BNSF Wishram Railyard, Wishram, Washington

Investigation Date	Purpose and Area(s) of Investigation	Sample Borings/Wells	Work Completed	Remarks
July 2013	• Evaluate non-aqueous phase liquid (NAPL) distribution in subsurface. • North of mainline tracks in vicinity of Maintenance Shop and Former Pump House • South of mainline tracks in vicinity of Former Power House, Former Fueling Island (diesel) and Former Oil Service AST, and former underground oil and diesel piping	• A01 to A08; A05-N25 & -N50, A06-N25 & -N60 • B01 to TB-B08 • C00 to C08 • CR00 to CR05; CR-04_5, CR-05_5, CR-06_5 • CR-G06 to CR-G08 • D00 to D08; D00-W25 & -W50, D08-E25 • E00 to E08; E00-W25, -W50 & -W75, E08-E25 • F00 to F08; F00-W25, -W50, & -W75 • G00 to G05; G00-W25, -W50, & -W75 • NT01 to NT15; NT11-E40, NT12B	• Dakota Technologies (Dakota) of Fargo, North Dakota conducted a laser-induced fluorescence (LIF) survey between 10 and 29 July 2013 using the TarGOST LIF system, developed specifically for coal tar and heavy oil detection (Dakota Technologies 2013). The LIF survey included 102 sample points to evaluate non-aqueous phase liquid (NAPL) distribution. LIF points on approximately 12.5- to 50-foot centers, but mostly spaced on 30- to 40-foot centers. Points added on west, north and east as needed at approximately 25-foot centers to further delineate extents. The LIF tooling was advanced to refusal (top of bedrock surface) using a Geoprobe direct-push rig. **(Figure 8)** • Borings were named in the field using convention of "TG" for "TarGOST" and the transect letter (A, B, C, CR, D, E, F, G, and NT) and location number (1 to 15). In some cases, additional points were added at approximately 25-foot centers to further delineate extents. These points have additional numbering to indicate direction (e.g. "N" for north) and the distance (e.g. 25 feet). Note that on report maps, the "TG" is omitted. **(Figure 8).** • Soil samples were collected from borings at selected LIF locations (A6, CR1, CR2, CR3, D0, D1, D2, D4, D5, D6, E0, E1, E8, F1, F2, F6, CR6/G6, NT10) to qualitatively correlate the LIF signal response to laboratory soil analytical concentrations for petroleum hydrocarbons. Analyses included DRO, ORO, EPH, and PAHs. • Three soil cores (D6-30/32, F2-34.3/36.3, and F6-28/30) were collected, preserved by freezing with dry ice, and submitted to PTS Laboratories (PTS) of California for mobility analyses: grain size analysis, pore fluid saturations, air/water drainage capillarity, free product mobility testing, residual saturation estimation, and effective porosity measurements. • A grab sample of NAPL was collected from soil boring (and LIF) location D4 (refer to **Figure 8**) and submitted to PTS for analysis of the following physical properties: specific gravity, density, viscosity, and interfacial/surface tension.	LIF survey results are presented in *TarGOST® Investigation* dated 26 September 2013 (Dakota Technologies, Inc. 2013).
July 2013 to Present	• Columbia River bank monitoring for sheen or oil droplets on the water surface.	• Samples collected in 2016 to 2018 under RI.	• On 13 July 2013, heavy oil droplets and an associated sheen were observed adjacent to the site on the water surface of the Columbia River. BNSF reported the occurrence of the oil and sheen in surface water to the National Response Center (NRC) and Ecology on the same date. • Following the observation of sheen in the river, monthly inspections for possible sheen along the riverbank area began in December 2013 and has been ongoing since then.	Summaries of bank inspections included in monthly progress reports submitted to Ecology on or by the 15th of each month.
2014	• Evaluate potential mobility of saturated zone heavy oil in vicinity of Former Power House.	• OHM-1 through OHM-4 • MWD-1 through MW-4 • B-14-1	• Advanced nine pilot soil borings (OHM-1 through OHM-4, MWD-1 through MWD-4, and B-14-1) including continuous core sampling. Soil samples were analyzed for DRO and ORO. **(Figure 7)**	Data included in the *Remedial Investigation Work Plan Wishram, Washington* [KJ 2016 (Revised 2017)].
September 2003 to April 2015	• Groundwater sampling	• WMW-1 through WMW-11	• Groundwater sampling was conducted during 19 monitoring events between September 2003 and April 2015. Monitoring events included measuring groundwater levels and LNAPL thicknesses (if present) and collecting groundwater samples from up to eight of wells from WMW-1 through WMW-11. (**Figure 27**) • Groundwater samples submitted for analysis of one or more of the following: RCRA 8 metals, GRO, DRO, ORO, BTEX, VOCs, and PAHs. • Wells WMW-2 and WMW-6 were removed during soil excavation activities in 2005 and well WMW-4 was destroyed during railyard grading operations (observed in November 2006).	Data included in the *Remedial Investigation Work Plan Wishram, Washington* [KJ 2016 (Revised 2017)].

TABLE 1B

SUMMARY OF INTERIM REMEDIAL ACTIONS (2002 THROUGH 2015)
BNSF Wishram Railyard, Wishram, Washington

Date of Investigation	Purpose of Interim Remedial Action	Work Completed	Comments
January 2002 to April 2002	• Removal of an underground storage tank (UST) and remediation of petroleum hydrocarbon contaminants in soil. • Near Former Boiler House (north of Maintenance Shop)	• RMCAT Environmental Services, Inc. removed a 30,000-gallon heating oil steel, single-walled UST located adjacent to the western side of a Former Boiler House and excavated petroleum-containing soil between 23 and 25 April 2002. (Approximate UST location and lateral extent of excavation area shown on **Figure 6A**.) UST had been used to supply heating oil to the adjacent boiler house; reportedly installed in early 1970s and used until approximately 1982. Former Boiler House currently used as a garage for the Klickitat Fire Department. • Approximately 2 inches of diesel and oil were pumped out of the UST, which was then cleaned and rinsed, and fluids transported to Spencer Environmental Services of Oregon City, Oregon for recycling. The UST was cut into three pieces, flattened, and transported offsite to a scrap metal recycling facility. • RMCAT excavated approximately 750 tons of petroleum-containing soil to the top of the bedrock surface (approximately 16 feet below ground surface). Soil was transported and disposed offsite at the Rabanco Landfill in Roosevelt, Washington (Roosevelt Landfill). Clean overburden and imported pit-run were placed into the completed excavation in 2-foot-thick lifts and compacted using the excavator bucket. • 30 confirmation samples were collected from the excavation sidewalls (**Figure 6B**). Soil samples submitted to Wy'East for analysis of diesel- and oil-range organic (DRO and ORO) petroleum hydrocarbons. Results indicated a thin layer of soil containing DRO and ORO above MTCA Method A Cleanup Levels (CULs) remained in place just above bedrock to the north, east, and south of the excavated area.	• Analytical results and UST site assessment checklist presented in *UST Site Assessment and Removal Report* dated 31 October 2003.
October 2005 to November 2005	• Excavation and disposal of petroleum-containing soil, a UST, and abandoned piping. • Former Pump House, Former Fueling Island, Lube Oil UST Area, Former Boiler House (also known as Former Power House area).	• NRC Environmental Services (NRC) of Portland, Oregon completed remediation activities between 24 October and 11 November 2005 in the vicinity of a Former Pump House, Former Fueling Island, Lube Oil UST Area, and Former Boiler House (Former Power House area) (**Figure 6A**). In total, approximately 3,656 tons of petroleum-containing soil, debris and concrete were excavated and disposed of offsite at the Roosevelt Landfill. Approximately 10 tons of clean, abandoned piping and other metals were recycled at Schnitzer Steel Industries (Schnitzer) in Portland, Oregon. Approximately 1,800 gallons of fuel and oils were removed from abandoned piping and a UST and transported to Oil Re-refining Company (ORRCO) in Portland, Oregon for recycling. Approximately 500 to 1,000 cubic yards of clean overburden removed from the excavation area were replaced as backfill. • Confirmation soil samples were collected prior to backfilling excavation areas and analyzed for DRO, ORO, gasoline-range organics (GRO), BTEX and volatile organic compounds (VOCs), total lead, and polychlorinated biphenyls (PCBs) (**Figure 6B**). • NRC obtained clean pit-run for backfilling the excavations and basalt gravel for top course from Pacific Northwest Aggregates (PNA) located approximately 1 mile west of Wishram on State Route 14. Soil was placed in 1-foot-thick lifts and compacted using the excavator bucket and/or a large front-end loader. Density testing performed by Tenneson Engineers of The Dalles, Oregon, indicated 90 percent compaction or better in all tested locations. A 3-inch thick layer of top course gravel was spread over backfilled areas. • <u>Former Pump House Foundation at Maintenance Shop:</u> Removed pump house foundation, approximately 50 feet of associated piping, and excavated approximately 900 tons of soil to depths ranging 5 to 15 feet bgs. Soil excavated to extent practicable as bounded by roadway to the north, maintenance shop and a 15,000-gallon, sand-filled, abandoned septic tank to east, and mainline railroad track to the south. Capped an abandoned branch of a 12-inch diameter sewer pipe extending east/west between maintenance shop and approximate location of boring WSB-04-6. Placed 200 pounds of oxygen release compound (ORC) into saturated soil. Confirmation soil samples from bottom of excavation where ORC applied contained concentrations above applicable MTCA Method A CULs for DRO in one sample and GRO in two samples. • <u>Former Fueling Island</u>: Removed 300 cubic yard concrete fueling island pad, excavated soil to 8 feet bgs. 2004 site characterization at boring WSB-04-9 had indicated petroleum impacts in soil, however, no petroleum-like staining or odors were encountered during excavation. From excavation, 10 yards of soil and 200 yards of concrete were disposed at Roosevelt Landfill and rebar from the pad recycled at Schnitzer, and 100 yards of concrete was reused as backfill. Confirmation samples were below CULs. • <u>Former Lube Oil UST Area</u>: Approximately 1,500 tons of petroleum-containing soil was removed from area west and south of the former fueling island for offsite disposal. Stained soil was encountered approximately 5 feet west of the fueling island at 3 feet bgs around a buried valve and joint in a 6-inch diameter, abandoned fuel pipe. Soil was removed southward and westward from the pipe joint to depths between 8 and 15 feet bgs. Approximately 300 gallons of diesel fuel and water were vacuumed from the abandoned fuel pipe, which appeared to have extended from the former pump house to the northeast; the pipe was cleaned and capped. Two 6-inch diameter cast-iron fuel pipes, an empty 3-inch diameter steel pipe, and a steam line were encountered in the excavation. Approximately 200 gallons of recovered bunker C oil was recovered from the 6-inch fuel pipes and transported to ORRCO for recycling; the 6-inch fuel pipes were disposed along with other debris and petroleum-containing soil at the Roosevelt Landfill. A 5,000-gallon UST encountered at 6 feet bgs approximately 40 feet southwest of the former fueling island was abandoned and removed by NRC for recycling offsite. Approximately 1,500 gallons of unused lubricating oil was vacuumed out of the UST and disposed at ORRCO. A total of 150 pounds of ORC was tilled into the bottom of portions of the excavation area prior to backfilling where groundwater or moist soil was encountered (greater than 10 feet bgs). Monitoring well WMW-6 (formerly MW-6) was removed during removal of the UST.	• Remediation activities and results presented in *Remediation Documentation Report* [Kennedy/Jenks Consultants (KJ) 2007].

SUMMARY OF INTERIM REMEDIAL ACTIONS (2002 THROUGH 2015)
BNSF Wishram Railyard, Wishram, Washington

Date of Investigation	Purpose of Interim Remedial Action	Work Completed	Comments
October 2005 to November 2005 (continued)		• Former Boiler House (Former Power House) area: Approximately 250 tons of petroleum-containing soil was removed from the Former Oil Sump (a 40-feet long by 12-feet wide by 15-feet deep concrete bunker) (**Figure 6A**) which was encountered during excavation activities. The interior walls of the Former Oil Sump were pressure washed and the bunker was backfilled with clean soil. Additional excavation revealed that well WMW-2 and boring WSB-5 had been advanced within a few inches of the outside of the concrete walls and that the well screen of WMW-2 was positioned within a small mass of oily timbers near the base of the Former Oil Sump; petroleum-containing soil was also identified from approximately 12 to 18 feet bgs. The WMW-2 well casing, oily timbers, and petroleum-containing soils were removed to the extent possible; however, the excavation sidewalls collapsed preventing complete removal. A total of 700 tons of soil were removed from this area. Sixty pounds of ORC were mixed into the excavation prior to backfilling. Confirmation soil samples did not contain petroleum hydrocarbons; however, visual observations indicated some stained soil was left in place at approximately 18 feet bgs near the base of the Former Oil Sump.	
February 2007 to March 2007	• Remediation of a small diesel release in area to northeast of Former Engine House.	• Approximately 40 gallons of diesel fuel were reportedly released on 25 February 2007 to the ground surface during fueling of a rail grinding machine on track number 6520 northeast of Former Engine House (**Figure 6A**). NRC performed an assessment of the release on 26 February 2007 and applied a granular absorbent material to the upper foot of affected ballast in release area. • On 7 March 2007, Kennedy Jenks advanced 14 soil borings (DB-1 through DB-14) in the release area to depths ranging from 8 to 16 feet bgs. Field screening indicated presence of petroleum hydrocarbons in surface soil (0 to 2.5 feet bgs) in three locations. • On 8 March 2007, NRC removed approximately 9 tons of soil from between the ground surface and approximately 2 to 2.5 feet bgs using a vacuum truck. The material was transported to the Roosevelt Landfill for disposal. • Seven confirmation soil samples (DXA1-2 through DXA7-2) (**Figure 6B**) were collected from the base of the excavation for analysis of DRO and ORO. DRO and/or ORO were detected in 4 soil samples at concentrations below MTCA Method A CULs.	• Remediation activities and results presented in *Wishram Rail Grinder Cleanup Report* (KJ 2007).
March 2010 to June 2010	• Remediation of soil in vicinity of former concrete vault and foundation structure.	• On 20 March 2010 during utility installation work, heavy oil was observed at a depth of approximately 2 feet bgs in a southern trench excavation sidewall in an area approximately 25 feet north of a concrete vault and foundation structure, which may have supported a former elevated oil service 28,500-gallon AST (**Figure 6A**). No visible oil impacts were observed on the northern trench sidewall. • Remedial work was performed between 21 and 24 June 2010 and included demolition of the concrete vault and foundation structure and excavation of approximately 628 tons of associated petroleum hydrocarbon-containing soil, concrete, and wood debris. Petroleum impacted soil was excavated from around the concrete structure to depths up to approximately 6 feet bgs. Soil, oily ballast and remains of a wooden platform structure were excavated from an approximately 15-foot by 90-foot area to the north of the concrete structure to depths ranging from approximately 3 to 5 feet bgs. NRC of Spokane, Washington performed demolition, excavation, backfilling and transport, and other construction-related tasks. • Eight confirmation soil samples (WR-B1-5, WR-B2-6, WR-S1-3, WR-S2-3, WR-S3-3, WR-S4-3, WR-S5-4, WR-S6-4) (**Figure 6B**) were collected from the excavation area and analyzed for GRO, DRO, ORO and BTEX. No analytes were detected above laboratory reporting limits. • Excavation was backfilled to existing site grade with imported pit-run material and ¾-inch minus crushed rock material (uppermost lift to match the existing surface). The fill material was placed and compacted in approximately 1-foot lifts. Baer Testing and Consulting, Inc. of Yakima, Washington, performed compaction testing on the uppermost lifts to confirm that 90% compaction was achieved.	• Remediation activities and results are presented in the *Supplemental Site Remediation – Concrete Vault/Foundation Area* letter report dated 12 August 2010 (KJ 2010b).
February 2012 - Present	• Remediation of groundwater near Maintenance Shop.	• Installed three air sparge (AS-12-1 through AS-12-3) and four soil vapor extraction (SVE-12-1 through SVE-12-4) wells (**Figures 6A and 8**) in January 2012 and constructed operating system in February 2012 to remediate petroleum hydrocarbon impacts in soil and groundwater in vicinity of monitoring wells WMW-7 and WMW-8. Light non-aqueous phase liquid (LNAPL) had been detected in WMW-7 since July 2004 and WMW-8 since September 2012. • Because of irregularities in the presence of LNAPL in well WMW-7, air sparging was discontinued in June 2012. Due to fluctuating groundwater levels within the unconsolidated aquifer in this northern portion of the site, the SVE system was modified to operate in biovent mode by injecting air (rather than pulling air) through the SVE wells. • Remediation system startup began in June 2012 in bioventing mode. Bioventing with ambient air through the SVE wells operated in continuous mode (24 hours a day, 7 days a week) between June 2012 and April 2017, when the system blower failed. The system blower was replaced on 28 November 2017, and the bioventing system was restarted, operating again in continuous mode. • Apparent thicknesses of LNAPL were last measured in wells WMW-7 and WMW-8 in December 2015 and November 2016, respectively.	• Groundwater monitoring and remediation activities presented in the *March 2012 Groundwater Monitoring and Remediation System Construction Report* dated 7 September 2012.

TABLE 2

SUMMARY OF MTCA METHOD CLEANUP LEVELS
BNSF Wishram Railyard, Wishram, Washington

		Groundwater MTCA Standards (Used for Uplands Remedial Investigation Report Groundwater Results)							Freshwater Applicable or Relevant and Appropriate Requirements (ARARs)												
		Groundwater MTCA A then lowest MTCA B	Groundwater MTCA A then lowest MTCA B note	Groundwater MTCA A	Groundwater MTCA B Cancer	Groundwater MTCA B NonCancer	Groundwater MTCA Toxic equivalency factor	Environmental Effects-Based Concentrations for Surface Water	Freshwater Lowest ARARs	Freshwater Lowest ARARs note	MTCA Surface Water Method B Cancer	MTCA Surface Water Method B Non cancer	Surface Water Aquatic Life Freshwater / Acute CWA 304	Surface Water Aquatic Life Freshwater / Acute NTR 40 CFR 131	Surface Water Aquatic Life Freshwater / Acute 173-201A WAC	Surface Water Aquatic Life Freshwater / Chronic CWA 304	Surface Water Aquatic Life Freshwater / Chronic NTR 40 CFR 131	Surface Water Aquatic Life Freshwater / Chronic 173-201A WAC	Surface Water Human Health Freshwater CWA 304	Surface Water Human Health and Organism Freshwater CWA 304	Surface Water Human Health Freshwater NTR 40 CFR 131
Chemical	Units	WG MTCA A then B	WG MTCA A then B note	WG MTCA A	WG B Cancer	WG B NonCancer	WG TEF	Effects-Based Conc	WS Lowest ARARs	WS Lowest ARARs note	WS B Cancer	WS B NonCancer	WS Acute CWA 304	WS Acute NTR	WS Acute WAC	WS Chronic CWA 304	WS Chronic NTR	WS Chronic WAC	WS Human CWA	WS Human & Organism CWA	WS Human NTR
NWTPH-Gx																					
Gasoline-Range Organics	µg/L	**800/1000**	**Method A**	800/1000																	
NWTPH-Dx																					
Diesel-Range Organics	µg/L	**500**	**Method A**	500				Fresh diesel: 250 Weathered diesel: 3,040													
Oil-Range Organics	µg/L	**500**	**Method A**	500																	
Total TPH-Dx (HalfDL_WA)	µg/L	**500**	**Method A**	500																	
Total TPH-Dx (HitsOnly)	µg/L	**500**	**Method A**	500																	
BTEX																					
Benzene	µg/L	**5**	**Method A**	5	0.795	32			**0.44**	**WS Human & Organism CWA**	22.7	1,990							2.2	0.44	1.2
Ethylbenzene	µg/L	**700**	**Method A**	700		800			**200**	**WS Human & Organism CWA**		6,820							530	200	3,100
Toluene	µg/L	**1,000**	**Method A**	1,000		640			**180**	**WS Human & Organism CWA**		18,900							1,300	180	6,800
Xylene, m,p-	µg/L																				
Xylene, o-	µg/L	**1,600**	**B Non Cancer**			1,600															
Total Xylenes (HalfDL_WA)	µg/L	**1,000**	**Method A**	1,000		1,600															
Xylene, total	µg/L	**1,000**	**Method A**	1,000		1,600															
Metals																					
Arsenic	µg/L	**5**	**Method A**	5	0.0583	4.8			**0.018**	**WS Human CWA**	0.0982	17.7	340	360	360	150	190	190	0.018	10	0.018
Barium	µg/L	**3,200**	**B Non Cancer**			3,200			**1000**	**WS Human CWA**									1,000		
Cadmium	µg/L	**5**	**Method A**	5		8			**0.25**	**WS Chronic CWA 304**		40.5	2	3.9	0.82	0.25	1	0.37			
Chromium	µg/L	**100**	**Method A**	100																	
Iron	µg/L	**11,200**	**B Non Cancer**			11,200			**300**	**WS Human CWA**						1,000			300		
Lead	µg/L	**15**	**Method A**	15					**0.54**	**WS Chronic WAC**			65	65	13.88	2.5	2.5	0.54			
Manganese	µg/L	**2,240**	**B Non Cancer**			2,240			**50**	**WS Human CWA**									50		
Mercury	µg/L	**2**	**Method A**	2					**0.012**	**WS Chronic NTR**			1.4	2.1	2.1	0.77	0.012	0.012		0.14	0.14
Selenium	µg/L	**80**	**B Non Cancer**			80			**5**	**WS Chronic CWA 304**		2,700		20	20	5	5	5	170	120	
Silver	µg/L	**80**	**B Non Cancer**			80			**0.32**	**WS Acute WAC**		25,900	3.2	3.4	0.32						
Semi Volatile Organic Compounds																					
1,2,4-Trichlorobenzene	µg/L	**1.51**	**B Cancer**		1.51	80			**0.12**	**WS Human & Organism CWA**	2.03	236							35	0.12	
2,2'-oxybis(1-Chloro)propane	µg/L	**0.625**	**B Cancer**		0.625	320			**37**	**WS B Cancer**	37.0	41,500									
2,4,6-Trichlorophenol	µg/L	**3.98**	**B Cancer**		3.98	8			**0.25**	**WS Human & Organism CWA**	3.93	17.3							1.4	0.25	2.1
2,4-Dichlorophenol	µg/L	**24**	**B Non Cancer**			24			**25**	**WS Human & Organism CWA**		190							77	25	93
2,4-Dimethylphenol	µg/L	**160**	**B Non Cancer**			160			**85**	**WS Human & Organism CWA**		552							380	85	
2,4-Dinitrophenol	µg/L	**32**	**B Non Cancer**			32			**60**	**WS Human & Organism CWA**		3,460							69	60	70
2,4-Dinitrotoluene	µg/L	**0.282**	**B Cancer**		0.282	32			**0.039**	**WS Human & Organism CWA**	5.50	1,360							0.11	0.039	0.11
2,6-Dinitrotoluene	µg/L	**0.0583**	**B Cancer**		0.0583	4.8															
2-Chlorophenol	µg/L	**40**	**B Non Cancer**			40			**15**	**WS Human & Organism CWA**		99.7								15	
2-Methylphenol (o-Cresol)	µg/L	**400**	**B Non Cancer**			400															
2-Nitrophenol	µg/L																				
3,3'-Dichlorobenzidine	µg/L	**0.194**	**B Cancer**		0.194				**0.0031**	**WS Human & Organism CWA**	0.0465								0.021	0.0031	0.04
4,6-Dinitro-2-Methylphenol	µg/L								**7.1**	**WS Human & Organism CWA**										7.1	
4-Bromophenyl phenyl ether	µg/L																				
4-Chloro-3-Methylphenol	µg/L								**36**	**WS Human & Organism CWA**										36	
4-Chlorophenyl phenyl ether	µg/L																				
4-Nitrophenol	µg/L																				
Benzidine	µg/L	**0.000380**	**B Cancer**		0.000380	48			**0.00002**	**WS Human & Organism CWA**	0.000320	88.4							0.000086	0.00002	0.00012
Benzyl butyl phthalate	µg/L	**46.1**	**B Cancer**		46.1	3,200			**0.56**	**WS Human & Organism CWA**	8.32	1,260							1,500	0.56	
bis(2-Chloroethoxy) methane	µg/L																				
bis(2-Chloroethyl) ether	µg/L	**0.0398**	**B Cancer**		0.0398				**0.02**	**WS Human & Organism CWA**	0.854								0.03	0.02	0.031
bis(2-Ethylhexyl) phthalate	µg/L	**6.25**	**B Cancer**		6.25	320			**0.23**	**WS Human & Organism CWA**	3.56	399							1.2	0.23	1.8
Diethyl phthalate	µg/L	**12,800**	**B Non Cancer**			12,800			**4200**	**WS Human & Organism CWA**		28,400							17,000	4,200	23,000
Dimethyl phthalate	µg/L								**92000**	**WS Human & Organism CWA**									270,000	92,000	313,000
Di-n-butyl phthalate	µg/L	**1,600**	**B Non Cancer**			1,600			**450**	**WS Human & Organism CWA**		2,910							2,000	450	2,700
Di-n-Octyl phthalate	µg/L	**160**	**B Non Cancer**			160															
Hexachlorobenzene	µg/L	**0.0547**	**B Cancer**		0.0547	12.8			**0.000051**	**WS Human & Organism CWA**	0.000466	0.238							0.00028	0.000051	0.00075
Hexachlorobutadiene	µg/L	**0.561**	**B Cancer**		0.561	8			**0.44**	**WS Human CWA**	29.7	926							0.44	0.69	0.44
Hexachlorocyclopentadiene	µg/L	**48**	**B Non Cancer**			48			**40**	**WS Human CWA**		3,620							40	150	240
Hexachloroethane	µg/L	**1.09**	**B Cancer**		1.09	5.6			**0.11**	**WS Human & Organism CWA**	1.86	20.9							1.4	0.11	1.9
Isophorone	µg/L	**46.1**	**B Cancer**		46.1	1,600			**8.4**	**WS Human NTR**	1,550	118,000							35	27	8.4
Methylphenol, 3 & 4	µg/L																				
Nitrobenzene	µg/L	**16**	**B Non Cancer**			16			**17**	**WS Human CWA**		1,790							17	55	17
n-Nitrosodimethylamine	µg/L	**0.000858**	**B Cancer**		0.000858	0.064			**0.00065**	**WS Human & Organism CWA**	4.89	798							0.00069	0.00065	0.00069
n-Nitrosodi-n-Propylamine	µg/L	**0.0125**	**B Cancer**		0.0125				**0.0044**	**WS Human & Organism CWA**	0.842								0.005	0.0044	
n-Nitrosodiphenylamine	µg/L	**17.9**	**B Cancer**		17.9				**0.62**	**WS Human & Organism CWA**	9.45								3.3	0.62	5
Pentachlorophenol	µg/L	**0.219**	**B Cancer**		0.219	80			**0.046**	**WS Human & Organism CWA**	1.47	1,180	19	20	20.27	15	13	12.79	0.27	0.046	0.28
Phenol	µg/L	**2,400**	**B Non Cancer**			2,400			**18000**	**WS Human & Organism CWA**		556,000							21,000	18,000	21,000

SUMMARY OF MTCA METHOD CLEANUP LEVELS
BNSF Wishram Railyard, Wishram, Washington

		Groundwater MTCA Standards (Used for Uplands Remedial Investigation Report Groundwater Results)							Freshwater Applicable or Relevant and Appropriate Requirements (ARARs)												
		Groundwater MTCA A then lowest MTCA B	Groundwater MTCA A then lowest MTCA B note	Groundwater MTCA A	Groundwater MTCA B Cancer	Groundwater MTCA B NonCancer	Groundwater MTCA Toxic equivalency factor	Environmental Effects-Based Concentrations for Surface Water	Freshwater Lowest ARARs	Freshwater Lowest ARARs note	MTCA Surface Water Method B Cancer	MTCA Surface Water Method B Non cancer	Surface Water Aquatic Life Freshwater / Acute CWA 304	Surface Water Aquatic Life Freshwater / Acute NTR 40 CFR 131	Surface Water Aquatic Life Freshwater / Acute 173-201A WAC	Surface Water Aquatic Life Freshwater / Chronic CWA 304	Surface Water Aquatic Life Freshwater / Chronic NTR 40 CFR 131	Surface Water Aquatic Life Freshwater / Chronic 173-201A WAC	Surface Water Human Health Freshwater CWA 304	Surface Water Human Health and Organism Freshwater CWA 304	Surface Water Human Health Freshwater NTR 40 CFR 131
Chemical	**Units**	**WG MTCA A then B**	**WG MTCA A then B note**	**WG MTCA A**	**WG B Cancer**	**WG B NonCancer**	**WG TEF**	**Effects-Based Conc**	**WS Lowest ARARs**	**WS Lowest ARARs note**	**WS B Cancer**	**WS B NonCancer**	**WS Acute CWA 304**	**WS Acute NTR**	**WS Acute WAC**	**WS Chronic CWA 304**	**WS Chronic NTR**	**WS Chronic WAC**	**WS Human CWA**	**WS Human & Organism CWA**	**WS Human NTR**
Polycyclic Aromatic Hydrocarbons																					
1-Methylnaphthalene	µg/L	**1.5**	**B Cancer**		1.5	560															
2-Chloronaphthalene	µg/L	**640**	**B Non Cancer**			640			**170**	**WS Human & Organism CWA**		1,040							1,000	170	
2-Methylnaphthalene	µg/L	**32**	**B Non Cancer**			32															
Acenaphthene	µg/L	**960**	**B Non Cancer**			960			**110**	**WS Human & Organism CWA**		648							670	110	
Acenaphthylene	µg/L																				
Anthracene	µg/L	**4,800**	**B Non Cancer**			4,800			**3100**	**WS Human & Organism CWA**		25,900							8,300	3,100	9,600
Benzo(a)anthracene	µg/L	**0.120**	**B Cancer**		0.120		0.1		**0.0028**	**WS Human NTR**	0.296								0.0038	0.014	0.0028
Benzo(a)pyrene	µg/L	**0.1**	**Method A**	0.1	0.0120		1		**0.0014**	**WS Human & Organism CWA**	0.0296								0.0038	0.0014	0.0028
Benzo(b)Fluoranthene	µg/L	**0.120**	**B Cancer**		0.120		0.1		**0.0028**	**WS Human NTR**	0.296								0.0038	0.014	0.0028
Benzo(g,h,i)Perylene	µg/L																				
Benzo(k)Fluoranthene	µg/L	**1.20**	**B Cancer**		1.20		0.1		**0.0028**	**WS Human NTR**	2.96								0.0038	0.014	0.0028
Chrysene	µg/L	**12.0**	**B Cancer**		12.0		0.01		**0.0028**	**WS Human NTR**	29.6								0.0038	1.4	0.0028
Dibenz(a,h)Anthracene	µg/L	**0.0120**	**B Cancer**		0.0120		0.1		**0.0014**	**WS Human & Organism CWA**	0.0296								0.0038	0.0014	0.0028
Fluoranthene	µg/L	**640**	**B Non Cancer**			640			**16**	**WS Human & Organism CWA**		86.4							130	16	300
Fluorene	µg/L	**640**	**B Non Cancer**			640			**420**	**WS Human & Organism CWA**		3,460							1,100	420	1,300
Indeno(1,2,3-c,d)Pyrene	µg/L	**0.120**	**B Cancer**		0.120		0.1		**0.0028**	**WS Human NTR**	0.296								0.0038	0.014	0.0028
Naphthalene	µg/L	**160**	**Method A**	160		160			**4710**	**WS B NonCancer**		4,710									
Phenanthrene	µg/L																				
Pyrene	µg/L	**480**	**B Non Cancer**			480			**310**	**WS Human & Organism CWA**		2,590							830	310	960
Total Naphthalenes (HalfDL_WA)	µg/L	**160**	**Method A**	160		160						4,710									
Total Naphthalenes (HitsOnly)	µg/L	**160**	**Method A**	160		160						4,710									
Total cPAHs (HalfDL_WA)	µg/L	**0.1**	**Method A**	0.1	0.0120		1				0.0296								0.0038	0.0014	0.0028
Total cPAHs (HitsOnly)	µg/L	**0.1**	**Method A**	0.1	0.0120		1				0.0296								0.0038	0.0014	0.0028
Volatile Organic Compounds																					
1,1,1,2-Tetrachloroethane	µg/L	**1.68**	**B Cancer**		1.68	240															
1,1,1-Trichloroethane	µg/L	**200**	**Method A**	200		16,000			**47000**	**WS Human & Organism CWA**		926,000								47,000	
1,1,2,2-Tetrachloroethane	µg/L	**0.219**	**B Cancer**		0.219	160			**0.12**	**WS Human & Organism CWA**	6.48	10,400							0.17	0.12	0.17
1,1,2-Trichloroethane	µg/L	**0.768**	**B Cancer**		0.768	32			**0.44**	**WS Human & Organism CWA**	25.3	2,300							0.59	0.44	0.6
1,1-Dichloroethane	µg/L	**7.68**	**B Cancer**		7.68	1,600															
1,1-Dichloroethene	µg/L	**400**	**B Non Cancer**			400			**0.057**	**WS Human NTR**		23,100							330	1,200	0.057
1,1-Dichloropropene	µg/L																				
1,2,3-Trichlorobenzene	µg/L																				
1,2,3-Trichloropropane	µg/L	**0.00146**	**B Cancer**		0.00146	32															
1,2,3-Trimethylbenzene	µg/L																				
1,2,4-Trimethylbenzene	µg/L																				
1,2-Dibromo-3-Chloropropane (DBCP)	µg/L	**0.0547**	**B Cancer**		0.0547	1.6															
1,2-Dibromoethane (EDB)	µg/L	**0.01**	**Method A**	0.01	0.0219	72															
1,2-Dichlorobenzene	µg/L	**720**	**B Non Cancer**			720			**420**	**WS Human CWA**		4,170							420	2,000	2,700
1,2-Dichloroethane (EDC)	µg/L	**0.481**	**B Cancer**	5	0.481	48			**0.38**	**WS Human CWA**	59.4	13,000							0.38	9.3	0.38
1,2-Dichloropropane	µg/L	**1.22**	**B Cancer**		1.22	720			**0.5**	**WS Human CWA**	43.9	56,900							0.5	0.71	
1,3,5-Trimethylbenzene	µg/L	**80**	**B Non Cancer**			80															
1,3-Dichlorobenzene	µg/L								**13**	**WS Human & Organism CWA**									320	13	400
1,3-Dichloropropane	µg/L																				
1,4-Dichlorobenzene	µg/L	**8.10**	**B Cancer**		8.10	560			**21.4**	**WS B Cancer**	21.4	3,240							63	460	400
2,2-Dichloropropane	µg/L																				
2-Chloroethyl Vinyl ether	µg/L																				
2-Chlorotoluene	µg/L	**160**	**B Non Cancer**			160															
4-Chlorotoluene	µg/L																				
Acetone	µg/L	**7,200**	**B Non Cancer**			7,200															
Acrolein	µg/L	**4**	**B Non Cancer**			4			**1**	**WS Human & Organism CWA**									190	1	320
Acrylonitrile	µg/L	**0.0810**	**B Cancer**		0.0810	320			**0.019**	**WS Human & Organism CWA**	0.400	3,460							0.051	0.019	0.059
Bromobenzene	µg/L																				
Bromodichloromethane	µg/L	**0.706**	**B Cancer**		0.706	160			**0.27**	**WS Human NTR**	27.5	13,600							0.55	0.77	0.27
Bromoform	µg/L	**5.54**	**B Cancer**		5.54	160			**4.3**	**WS Human CWA**	216	13,600							4.3	5.8	4.3
Bromomethane	µg/L	**11.2**	**B Non Cancer**			11.2			**47**	**WS Human CWA**		955							47	520	48
Carbon Tetrachloride	µg/L	**0.625**	**B Cancer**		0.625	32			**0.2**	**WS Human & Organism CWA**	4.87	546							0.23	0.2	0.25
Chlorobenzene	µg/L	**160**	**B Non Cancer**			160			**130**	**WS Human CWA**		5,190							130	380	680
Chloroethane	µg/L																				
Chloroform	µg/L	**1.41**	**B Cancer**		1.41	80			**5.7**	**WS Human CWA**	55.0	6,820							5.7	260	5.7
Chloromethane	µg/L																				

SUMMARY OF MTCA METHOD CLEANUP LEVELS
BNSF Wishram Railyard, Wishram, Washington

		Groundwater MTCA Standards (Used for Uplands Remedial Investigation Report Groundwater Results)							Freshwater Applicable or Relevant and Appropriate Requirements (ARARs)												
		Groundwater MTCA A then lowest MTCA B	Groundwater MTCA A then lowest MTCA B note	Groundwater MTCA A	Groundwater MTCA B Cancer	Groundwater MTCA B NonCancer	Groundwater MTCA Toxic equivalency factor	Environmental Effects-Based Concentrations for Surface Water	Freshwater Lowest ARARs	Freshwater Lowest ARARs note	MTCA Surface Water Method B Cancer	MTCA Surface Water Method B Non cancer	Surface Water Aquatic Life Freshwater / Acute CWA 304	Surface Water Aquatic Life Freshwater / Acute NTR 40 CFR 131	Surface Water Aquatic Life Freshwater / Acute 173-201A WAC	Surface Water Aquatic Life Freshwater / Chronic CWA 304	Surface Water Aquatic Life Freshwater / Chronic NTR 40 CFR 131	Surface Water Aquatic Life Freshwater / Chronic 173-201A WAC	Surface Water Human Health Freshwater CWA 304	Surface Water Human Health and Organism Freshwater CWA 304	Surface Water Human Health Freshwater NTR 40 CFR 131
Chemical	Units	WG MTCA A then B	WG MTCA A then B note	WG MTCA A	WG B Cancer	WG B NonCancer	WG TEF	Effects-Based Conc	WS Lowest ARARs	WS Lowest ARARs note	WS B Cancer	WS B NonCancer	WS Acute CWA 304	WS Acute NTR	WS Acute WAC	WS Chronic CWA 304	WS Chronic NTR	WS Chronic WAC	WS Human CWA	WS Human & Organism CWA	WS Human NTR
cis-1,2-Dichloroethene	µg/L	**16**	**B Non Cancer**			16															
cis-1,3-Dichloropropene	µg/L	**0.438**	**B Cancer**		0.438	240			**0.24**	**WS Human & Organism CWA**	34.1	40,900							0.34	0.24	10
Cymene (p-Isopropyltoluene)	µg/L																				
Dibromochloromethane	µg/L	**0.521**	**B Cancer**		0.521	160			**0.4**	**WS Human CWA**	20.3	13,600							0.4	0.65	0.41
Dibromomethane	µg/L	**80**	**B Non Cancer**			80			**48**	**WS Human NTR**											48
Dichlorodifluoromethane	µg/L	**1,600**	**B Non Cancer**			1,600															
Di-Isopropyl ether (DIPE)	µg/L																				
Freon 113	µg/L	**240,000**	**B Non Cancer**			240,000															
Isopropylbenzene	µg/L	**800**	**B Non Cancer**			800															
Methyl ethyl ketone (2-Butanone)	µg/L	**4,800**	**B Non Cancer**			4,800															
Methyl Isobutyl Ketone (MIBK)	µg/L	**640**	**B Non Cancer**			640															
Methyl tert-Butyl ether	µg/L	**20**	**Method A**	20	24.3																
Methylene Chloride	µg/L	**5**	**Method A**	5	21.9	48			**4.6**	**WS Human CWA**	3,600	17,300							4.6	16	4.7
n-Butylbenzene	µg/L	**400**	**B Non Cancer**			400															
n-Propylbenzene	µg/L	**800**	**B Non Cancer**			800															
Sec-Butylbenzene	µg/L	**800**	**B Non Cancer**			800															
Styrene	µg/L	**1,600**	**B Non Cancer**			1,600															
Tert-Butylbenzene	µg/L	**800**	**B Non Cancer**			800															
Tetrachloroethene (PCE)	µg/L	**5**	**Method A**	5	20.8	48			**0.69**	**WS Human CWA**	99.6	502							0.69	4.9	0.8
trans-1,2-Dichloroethene	µg/L	**160**	**B Non Cancer**			160			**600**	**WS Human & Organism CWA**		32,400							140,000	600	
trans-1,3-Dichloropropene	µg/L	**0.438**	**B Cancer**		0.438	240			**0.34**	**WS Human CWA**	34.1	40,900							0.34		10
Trichloroethene (TCE)	µg/L	**5**	**Method A**	5	0.540	4			**0.38**	**WS Human & Organism CWA**	12.8	118							2.5	0.38	2.7
Trichlorofluoromethane	µg/L	**2,400**	**B Non Cancer**			2,400															
Vinyl Chloride	µg/L	**0.2**	**Method A**	0.2	0.0290	24			**0.02**	**WS Human & Organism CWA**	3.7	6,480							0.025	0.02	2

Cleanup Levels

Groundwater MTCA Cleanup level values based on Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Method A values for groundwater (Method A) based on Washington State Administrative Code (WAC) 173-340-900 Table 720-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2020).

Total TPH-Dx = Total TPH-Dx concentrations calculated by summing diesel-range organics (DRO) and oil-range organics (ORO) concentrations. Non-detects included as noted.

Total cPAHs = Possible Total Carcinogenic Polycyclic Aromatic hydrocarbons (cPAHs) based on the relative toxicity of each cPAH to benzo(a)pyrene and calculated by multiplying the individual cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations.

Total Naphthalenes = Total Naphthalenes concentrations calculated by summing 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene concentrations.

Total Xylenes = Total Xylenes concentrations calculated by summing Xylene, m,p- and Xylene, o- concentrations.

(HalfDL_WA) = If an individual chemical is not detected, a value of one half the method reporting limit is used as the concentration in the calculation, except when all chemicals used in the calculation are not detected, then one half the lowest method reporting limit is used as the total concentration.

(HitsOnly) = If an individual chemical is not detected, it is not included in the calculation.

Environmental Effects-Based Concentrations for Surface Water. Value for Fresh Diesel based on Table 2 of Environmental Effects-Based Concentrations for Total Petroleum Hydrocarbons (TPH), February 2018, Ecology Publication No. 18-03-002. Value for Weathered Diesel based on Environmental Effects-Based Concentrations for Weathered Diesel-Range Organics, June 2020, Ecology Publication No. 20-03-008.

CWA = Clean Water Act

NTR = National Toxic Rule

The total chromium federal and Washington State Maximum Contaminant Level is 100 µg/L. Hexavalent chromium is not present at the site, so per CLARC, the Method A number for chromium is 100 µg/L.

SUMMARY OF MTCA METHOD CLEANUP LEVELS
BNSF Wishram Railyard, Wishram, Washington

Soil MTCA Standards (Used for Uplands Remedial Investigation Report Soil Results)											
		Soil MTCA A Unrestricted Use then Lowest MTCA B	Soil MTCA A Unrestricted Use then Lowest MTCA B note	Soil MTCA A Unrestricted Use	Soil MTCA B Cancer	Soil MTCA B NonCancer	Soil Protective of Groundwater (Vadose Zone at 13°C)	Soil Protective of Groundwater (Saturated)	Soil MTCA C Cancer	Soil MTCA C NonCancer	Soil MTCA Toxic equivalency factor
Chemical	Units	SO MTCA A Un then B	SO MTCA A Un then B note	SO MTCA A Un	SO B Cancer	SO B NonCancer			SO C Cancer	SO C NonCancer	SO TEF
Total Petroleum Hydrocarbons											
Gasoline-Range Organics	mg/kg	30/100	Method A	30/100							
TPH-NWTPH											
Diesel-Range Organics	mg/kg	2000	Method A	2000							
Oil-Range Organics	mg/kg	2000	Method A	2000							
TPH-DRO	mg/kg	2000	Method A	2000							
Total TPH-Dx (HalfDL_WA)	mg/kg	2000	Method A	2000							
Total TPH-Dx (HitsOnly)	mg/kg	2000	Method A	2000							
BTEX	mg/kg										
Benzene	mg/kg	0.03	Method A	0.03	18	320	0.027	0.0017	2400	14000	
Ethylbenzene	mg/kg	6	Method A	6		8000	5.9	0.34		350000	
Toluene	mg/kg	7	Method A	7		6400	4.5	0.27		280000	
Xylene, m-	mg/kg	16000	Method B Non cancer			16000	13	0.77		700000	
Xylene, p-	mg/kg	16000	Method B Non cancer			16000	17	0.96		700000	
Xylene, o-	mg/kg	16000	Method B Non cancer			16000	14	0.84		700000	
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A	9		16000	14	0.83		700000	
Xylene, total	mg/kg	9	Method A	9		16000	14	0.83		700000	
Metals											
Arsenic	mg/kg	20	Method A	20	0.67	24	2.9	0.15	88	1100	
Barium	mg/kg	16000	Method B Non cancer			16000	1600	83		700000	
Cadmium	mg/kg	2	Method A	2		80	0.69	0.035		3500	
Chromium, Hexavalent	mg/kg	19	Method A	19		240	18	0.93		11000	
Chromium	mg/kg	2000	Method A	2000		120000	480000	24000		5.3e+006	
Lead	mg/kg	250	Method A	250			3000	150			
Mercury	mg/kg	2	Method A	2			2.1	0.1			
Selenium	mg/kg	400	Method B Non cancer			400	5.2	0.26		18000	
Silver	mg/kg	400	Method B Non cancer			400	14	0.69		18000	
NWEPH											
C10-C12 Aliphatic Hydrocarbons	mg/kg										
C10-C12 Aromatics	mg/kg										
C12-C16 Aliphatics	mg/kg										
C12-C16 Aromatics	mg/kg										
C16-C21 Aliphatics	mg/kg										
C16-C21 Aromatics	mg/kg										
C21-C34 Aliphatics	mg/kg										
C21-C34 Aromatics	mg/kg										
C8-C10 Aliphatics	mg/kg										
C8-C10 Aromatics	mg/kg										
Polychlorinated Biphenyls	mg/kg										
PCB-1016 (Aroclor 1016)	mg/kg	5.6	Method B Non cancer (Method A Sum PCBs AL= 1 mg/kg)		14	5.6			1900	250	
PCB-1221 (Aroclor 1221)	mg/kg										
PCB-1232 (Aroclor 1232)	mg/kg										
PCB-1242 (Aroclor 1242)	mg/kg										
PCB-1248 (Aroclor 1248)	mg/kg										
PCB-1254 (Aroclor 1254)	mg/kg	0.5	Method B Cancer (Method A Sum PCBs AL= 1 mg/kg)		0.5	1.6			66	70	
PCB-1260 (Aroclor 1260)	mg/kg	0.5	Method B Cancer (Method A Sum PCBs AL= 1 mg/kg)		0.5				66		
PCB-1262 (Aroclor 1262)	mg/kg										
PCB-1268 (Aroclor 1268)	mg/kg										
Total PCBs (HalfDL_WA)	mg/kg	1	Method A	1							
Total PCBs (HitsOnly)	mg/kg	1	Method A	1							

SUMMARY OF MTCA METHOD CLEANUP LEVELS
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	Soil MTCA A Unrestricted Use then Lowest MTCA B	Soil MTCA A Unrestricted Use then Lowest MTCA B note	Soil MTCA A Unrestricted Use	Soil MTCA B Cancer	Soil MTCA B NonCancer	Soil Protective of Groundwater (Vadose Zone at 13°C)	Soil Protective of Groundwater (Saturated)	Soil MTCA C Cancer	Soil MTCA C NonCancer	Soil MTCA Toxic equivalency factor
		Soil MTCA Standards (Used for Uplands Remedial Investigation Report Soil Results)									
Chemical	Units	SO MTCA A Un then B	SO MTCA A Un then B note	SO MTCA A Un	SO B Cancer	SO B NonCancer			SO C Cancer	SO C NonCancer	SO TEF
Semi Volatile Organic Compounds	mg/kg										
1,2,4-Trichlorobenzene	mg/kg	34	Method B Cancer		34	800	0.56	0.029	4500	35000	
2,2'-oxybis(1-Chloro)propane	mg/kg	14	Method B Cancer		14	3200			1900	140000	
2,4,5-Trichlorophenol	mg/kg	8000	Method B Non cancer			8000	29	1.5		350000	
2,4,6-Trichlorophenol	mg/kg	80	Method B Non cancer		91	80	0.046	0.0027	12000	3500	
2,4-Dichlorophenol	mg/kg	240	Method B Non cancer			240	0.17	0.01		11000	
2,4-Dimethylphenol	mg/kg	1600	Method B Non cancer			1600	1.3	0.079		70000	
2,4-Dinitrophenol	mg/kg	160	Method B Non cancer			160	0.13	0.0092		7000	
2,4-Dinitrotoluene	mg/kg	3.2	Method B Cancer		3.2	160	0.0017	0.00011	420	7000	
2,6-Dinitrotoluene	mg/kg	0.67	Method B Cancer		0.67	24	0.00031	2.1e-005	88	1100	
2-Chlorophenol	mg/kg	400	Method B Non cancer			400	0.47	0.027		18000	
2-Methylphenol (o-Cresol)	mg/kg	4000	Method B Non cancer			4000	2.3	0.15		180000	
2-Nitroaniline	mg/kg	800	Method B Non cancer			800				35000	
2-Nitrophenol	mg/kg										
3,3'-Dichlorobenzidine	mg/kg	2.2	Method B Cancer		2.2		0.0036	0.0002	290		
3-Nitroaniline	mg/kg										
4,6-Dinitro-2-Methylphenol	mg/kg	6.4	Method B Non cancer			6.4				280	
4-Bromophenyl phenyl ether	mg/kg										
4-Chloro-3-Methylphenol	mg/kg	8000	Method B Non cancer			8000				350000	
4-Chloroaniline	mg/kg	5	Method B Cancer		5	320	0.0012	7.7e-005	660	14000	
4-Chlorophenyl phenyl ether	mg/kg										
4-Nitroaniline	mg/kg	320	Method B Non cancer			320				14000	
4-Nitrophenol	mg/kg										
Benzidine	mg/kg	0.0043	Method B Cancer		0.0043	240			0.57	11000	
Benzoic Acid	mg/kg	320000	Method B Non cancer			320000	260	18		1.4e+007	
Benzyl Alcohol	mg/kg	8000	Method B Non cancer			8000				350000	
Benzyl butyl phthalate	mg/kg	530	Method B Cancer		530	16000	13	0.65	69000	700000	
bis(2-Chloroethoxy) methane	mg/kg										
bis(2-Chloroethyl) ether	mg/kg	0.91	Method B Cancer		0.91		0.00022	1.4e-005	120		
bis-(2-Chloroisopropyl) ether	mg/kg										
bis(2-Ethylhexyl) phthalate	mg/kg	71	Method B Cancer		71	1600	13	0.67	9400	70000	
Dibenzofuran	mg/kg	80	Method B Non cancer			80				3500	
Diethyl phthalate	mg/kg	64000	Method B Non cancer			64000	72	4.7		2.8e+006	
Dimethyl phthalate	mg/kg										
Di-n-butyl phthalate	mg/kg	8000	Method B Non cancer			8000	57	3		350000	
Di-n-Octyl phthalate	mg/kg	800	Method B Non cancer			800	270000	13000		35000	
Hexachlorobenzene	mg/kg	0.63	Method B Cancer		0.63	64	0.88	0.044	82	2800	
Hexachlorobutadiene	mg/kg	13	Method B Cancer		13	80	0.6	0.03	1700	3500	
Hexachlorocyclopentadiene	mg/kg	480	Method B Non cancer			480	190	9.6		21000	
Hexachloroethane	mg/kg	25	Method B Cancer		25	56	0.043	0.0023	3300	2500	
Isophorone	mg/kg	1100	Method B Cancer		1100	16000	0.23	0.015	140000	700000	
Methylphenol, 3 & 4	mg/kg										
Nitrobenzene	mg/kg	160	Method B Non cancer			160	0.1	0.0065		7000	
n-Nitrosodimethylamine	mg/kg	0.02	Method B Cancer		0.02	0.64			2.6	28	
n-Nitrosodi-n-Propylamine	mg/kg	0.14	Method B Cancer		0.14		5.6e-005	3.9e-006	19		
n-Nitrosodiphenylamine	mg/kg	200	Method B Cancer		200		0.53	0.028	27000		
Pentachlorophenol	mg/kg	2.5	Method B Cancer		2.5	400	0.016	0.00088	330	18000	
Phenol	mg/kg	24000	Method B Non cancer			24000	11	0.76		1.1e+006	

SUMMARY OF MTCA METHOD CLEANUP LEVELS
BNSF Wishram Railyard, Wishram, Washington

		Soil MTCA Standards (Used for Uplands Remedial Investigation Report Soil Results)									
		Soil MTCA A Unrestricted Use then Lowest MTCA B	Soil MTCA A Unrestricted Use then Lowest MTCA B note	Soil MTCA A Unrestricted Use	Soil MTCA B Cancer	Soil MTCA B NonCancer	Soil Protective of Groundwater (Vadose Zone at 13°C)	Soil Protective of Groundwater (Saturated)	Soil MTCA C Cancer	Soil MTCA C NonCancer	Soil MTCA Toxic equivalency factor
Chemical	Units	SO MTCA A Un then B	SO MTCA A Un then B note	SO MTCA A Un	SO B Cancer	SO B NonCancer			SO C Cancer	SO C NonCancer	SO TEF
Semi Volatile Organic Compounds using SIM											
1-Methylnaphthalene	mg/kg	34	Method B Cancer		34	5600			4500	250000	
2-Chloronaphthalene	mg/kg	6400	Method B Non cancer			6400				280000	
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			320				14000	
Acenaphthene	mg/kg	4800	Method B Non cancer			4800	98	5		210000	
Acenaphthylene	mg/kg										
Anthracene	mg/kg	24000	Method B Non cancer			24000	2300	110		1.1e+006	
Benzo(a)anthracene	mg/kg										0.1
Benzo(a)pyrene	mg/kg	0.1	Method A	0.1	0.19	24	3.9	0.19	130	1100	1
Benzo(b)Fluoranthene	mg/kg										0.1
Benzo(g,h,i)Perylene	mg/kg										
Benzo(k)Fluoranthene	mg/kg										0.1
Chrysene	mg/kg										0.01
Dibenz(a,h)Anthracene	mg/kg										0.1
Fluoranthene	mg/kg	3200	Method B Non cancer			3200	630	32		140000	
Fluorene	mg/kg	3200	Method B Non cancer			3200	100	5.1		140000	
Indeno(1,2,3-c,d)Pyrene	mg/kg										0.1
Naphthalene	mg/kg	5	Method A	5		1600	4.5	0.24		70000	
Phenanthrene	mg/kg										
Pyrene	mg/kg	2400	Method B Non cancer			2400	650	33		110000	
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			1600	4.5	0.24		70000	
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			1600	4.5	0.24		70000	
Total cPAHs (HalfDL_WA)	mg/kg	0.1	Method A (Sum cPAHs)		0.19	24	3.9	0.19	130	1100	1
Total cPAHs (HitsOnly)	mg/kg	0.1	Method A (Sum cPAHs)		0.19	24	3.9	0.19	130	1100	1
Volatile Organic Compounds											
1,1,1,2-Tetrachloroethane	mg/kg	38	Method B Cancer		38	2400			5000	110000	
1,1,1-Trichloroethane	mg/kg	2	Method A	2		160000	1.5	0.084		7e+006	
1,1,2,2-Tetrachloroethane	mg/kg	5	Method B Cancer		5	1600	0.0012	8e-005	660	70000	
1,1,2-Trichloroethane	mg/kg	18	Method B Cancer		18	320	0.028	0.0018	2300	14000	
1,1-Dichloroethane	mg/kg	180	Method B Cancer		180	16000	0.041	0.0026	23000	700000	
1,1-Dichloroethene	mg/kg	4000	Method B Non cancer			4000	0.046	0.0025		180000	
1,1-Dichloropropene	mg/kg										
1,2,3-Trichlorobenzene	mg/kg										
1,2,3-Trichloropropane	mg/kg	0.0063	Method B Cancer		0.033	320			4.4	14000	
1,2,3-Trimethylbenzene	mg/kg	800	Method B Non cancer			800				35000	
1,2,4-Trimethylbenzene	mg/kg	800	Method B Non cancer			800				35000	
1,2-Dibromo-3-Chloropropane (DBCP)	mg/kg	1.3	Method B Cancer		1.3	16			160	700	
1,2-Dibromoethane (EDB)	mg/kg	0.005	Method A	0.005	0.5	720			66	32000	
1,2-Dichlorobenzene	mg/kg	7200	Method B Non cancer			7200	7	0.4		320000	
1,2-Dichloroethane (EDC)	mg/kg	11	Method B Cancer		11	480	0.023	0.0016	1400	21000	
1,2-Dichloropropane	mg/kg	27	Method B Cancer		27	3200	0.025	0.0017	3500	140000	
1,3,5-Trimethylbenzene	mg/kg	800	Method B Non cancer			800				35000	
1,3-Dichlorobenzene	mg/kg										
1,3-Dichloropropane	mg/kg										
1,4-Dichlorobenzene	mg/kg	190	Method B Cancer		190	5600	1.2	0.068	24000	250000	
2,2-Dichloropropane	mg/kg										
2-Chloroethyl Vinyl ether	mg/kg										
2-Chlorotoluene	mg/kg	1600	Method B Non cancer			1600				70000	
2-Hexanone	mg/kg	400	Method B Non cancer			400				18000	
4-Chlorotoluene	mg/kg										
Acetone	mg/kg	72000	Method B Non cancer			72000	29	2.1		3.2e+006	
Acrylonitrile	mg/kg	1.9	Method B Cancer		1.9	3200			240	140000	
Bromobenzene	mg/kg	640	Method B Cancer			640	0.56	0.033		28000	
Bromochloromethane	mg/kg										
Bromodichloromethane	mg/kg	16	Method B Cancer		16	1600	0.037	0.0024	2100	70000	
Bromoform	mg/kg	130	Method B Cancer		130	1600	0.36	0.023	17000	70000	
Bromomethane	mg/kg	110	Method B Non cancer			110	0.05	0.0033		4900	

TABLE 2

SUMMARY OF MTCA METHOD CLEANUP LEVELS
BNSF Wishram Railyard, Wishram, Washington

		Soil MTCA Standards (Used for Uplands Remedial Investigation Report Soil Results)									
		Soil MTCA A Unrestricted Use then Lowest MTCA B	Soil MTCA A Unrestricted Use then Lowest MTCA B note	Soil MTCA A Unrestricted Use	Soil MTCA B Cancer	Soil MTCA B NonCancer	Soil Protective of Groundwater (Vadose Zone at 13°C)	Soil Protective of Groundwater (Saturated)	Soil MTCA C Cancer	Soil MTCA C NonCancer	Soil MTCA Toxic equivalency factor
Chemical	**Units**	**SO MTCA A Un then B**	**SO MTCA A Un then B note**	**SO MTCA A Un**	**SO B Cancer**	**SO B NonCancer**			**SO C Cancer**	**SO C NonCancer**	**SO TEF**
Carbon Disulfide	mg/kg	8000	Method B Non cancer			8000	5	0.27		350000	
Carbon Tetrachloride	mg/kg	14	Method B Cancer		14	320	0.042	0.0022	1900	14000	
Chlorobenzene	mg/kg	1600	Method B Non cancer			1600	0.86	0.051		70000	
Chloroethane	mg/kg										
Chloroform	mg/kg	32	Method B Cancer		32	800	0.074	0.0048	4200	35000	
Chloromethane	mg/kg										
cis-1,2-Dichloroethene	mg/kg	160	Method B Non cancer			160	0.078	0.0052		7000	
cis-1,3-Dichloropropene	mg/kg	10	Method B Cancer		10	2400	0.0023	0.00014	1300	110000	
Cymene (p-Isopropyltoluene)	mg/kg										
Dibromochloromethane	mg/kg	12	Method B Cancer		12	1600	0.028	0.0018	1600	70000	
Dibromomethane	mg/kg	800	Method B Non cancer			800				35000	
Dichlorodifluoromethane	mg/kg	16000	Method B Non cancer			16000				700000	
Di-Isopropyl ether (DIPE)	mg/kg										
Freon 113	mg/kg	2.4e+006	Method B Non cancer			2.4e+006				1.1e+008	
Gasoline Range Hydrocarbons	mg/kg	30	Method A	30							
Isopropylbenzene	mg/kg	8000	Method B Non cancer			8000				350000	
Methyl ethyl ketone (2-Butanone)	mg/kg	48000	Method B Non cancer			48000				2.1e+006	
Methyl Isobutyl Ketone (MIBK)	mg/kg	6400	Method B Non cancer			6400				280000	
Methyl tert-Butyl ether	mg/kg	0.1	Method A	0.1	560		0.1	0.0072	73000		
Methyl-2-Pentanol, 4-	mg/kg										
Methylene Chloride	mg/kg	0.02	Method A	0.02	500	480	0.021	0.0015	66000	21000	
n-Butylbenzene	mg/kg	4000	Method B Non cancer			4000				180000	
n-Propylbenzene	mg/kg	8000	Method B Non cancer			8000				350000	
Sec-Butylbenzene	mg/kg	8000	Method B Non cancer			8000				350000	
Styrene	mg/kg	16000	Method B Non cancer			16000	2.2	0.12		700000	
Tert-Butylbenzene	mg/kg	8000	Method B Non cancer			8000				350000	
Tetrachloroethene (PCE)	mg/kg	0.05	Method A	0.05	480	480	0.05	0.0028	63000	21000	
trans-1,2-Dichloroethene	mg/kg	1600	Method B Non cancer			1600	0.52	0.032		70000	
trans-1,3-Dichloropropene	mg/kg	10	Method B Cancer		10	2400	0.0023	0.00014	1300	110000	
Trichloroethene (TCE)	mg/kg	0.03	Method A	0.03	12	40	0.025	0.0015	2800	1800	
Trichlorofluoromethane	mg/kg	24000	Method B Non cancer			24000				1.1e+006	
Vinyl Chloride	mg/kg	0.67	Method B Cancer		0.67	240	0.0017	8.9e-005	88	11000	

Cleanup Levels

Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for unrestricted land use (Method A) based on Washington State Administrative Code (WAC) 173-340-740 Table 740-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2020).

Total TPH-Dx = Total TPH-Dx concentrations calculated by summing diesel-range organics (DRO) and oil-range organics (ORO) concentrations. Non-detects included as noted.

Total cPAHs = Possible Total Carcinogenic Polycyclic Aromatic hydrocarbons (cPAHs) based on the relative toxicity of each cPAH to benzo(a)pyrene and calculated by multiplying the individual cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations.

Total Naphthalenes = Total Naphthalenes concentrations calculated by summing 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene concentrations.

Total Xylenes = Total Xylenes concentrations calculated by summing Xylene, m,p- and Xylene, o- concentrations.

(HalfDL_WA) = If an individual chemical is not detected, a value of one half the method reporting limit is used as the concentration in the calculation, except when all chemicals used in the calculation are not detected, then one half the lowest method reporting limit is used as the total concentration.

(HitsOnly) = If an individual chemical is not detected, it is not included in the calculation.

Chromium cleanup levels are listed as Chromium III CLARC cleanup levels, since hexavalent chromium was not historically used at the site nor has it been detected in site samples.

SUMMARY OF SOIL BORINGS AND FIELD OBSERVATIONS
BNSF Wishram Railyard, Wishram, Washington

Boring ID	Date Completed	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Boring Depth (feet bgs)	Hydrocarbon Observations	Depth and Type of Observed Hydrocarbon Impacts	Highest PID Value	Depth of Highest PID Value (feet bgs)
2016 RI Borings									
B-16-01	10/18/2016	118068.29	1520640.05	173.42	10	None	--	4.7	7
B-16-02	10/13/2016	118165.60	1520556.28	173.60	30	Visible LNAPL, Odor, Sheen	10' - 21': Odor and sheen 25': LNAPL	471.2	25
B-16-03	10/13/2016	118223.54	1520597.36	173.62	23.9	Odor, Sheen	10' - 15': Odor and sheen 22' - 23': Odor and sheen	220.3	22
B-16-04	08/11/2016	118092.76	1520362.98	172.77	15	None	--	0.6	10
B-16-05	08/11/2016	118090.75	1520398.00	173.00	15	None	--	0.0	--
B-16-06	08/05/2016	118575.86	1520542.36	180.43	7	None	--	0.0	--
B-16-07	08/02/2016	118595.57	1520580.26	179.96	17	None	--	0.0	--
B-16-08	08/05/2016	118588.91	1520661.52	178.02	25	None	--	0.1	15
B-16-09	08/09/2016	118123.33	1520971.04	172.43	20	None	--	0.1	5
B-16-10	08/08/2016	118229.59	1521170.64	173.17	15	None	--	0.0	--
B-16-11	08/08/2016	118246.96	1521211.95	172.95	15	None	--	0.0	--
B-16-12	08/09/2016	118294.88	1520850.02	173.69	15	None	--	0.1	5
B-16-13	08/08/2016	118465.35	1521385.71	173.09	15	None	--	0.0	--
B-16-14	08/08/2016	118432.23	1521376.06	172.94	15	None	--	0.1	5
B-16-15	08/09/2016	118961.75	1521930.51	173.83	15	None	--	0.1	15
B-16-16	08/09/2016	118982.30	1521972.28	174.63	20	None	--	0.0	--
B-16-17	08/09/2016	118709.12	1521285.77	174.15	15	None	--	0.0	--
B-16-18	08/11/2016	118338.76	1520859.28	173.68	15	None	--	0.4	4
B-16-19	08/08/2016	118347.15	1520981.94	173.52	15	None	--	0.2	15
B-16-20	08/08/2016	118388.63	1521071.53	173.57	15	None	--	0.0	--
B-16-21	08/08/2016	118297.80	1520992.95	172.99	15	None	--	0.0	--
B-16-22	08/09/2016	118278.43	1521039.07	172.36	15	None	--	0.1	15
B-16-23	08/08/2016	118322.60	1521125.39	172.85	15	None	--	0.1	10
B-16-24	08/10/2016	118364.99	1521139.20	173.75	30	None	--	1.1	12
RMD-1 (boring)	08/05/2016	118060.34	1520519.17	177.04	44.5	Weak odor	40': Weak odor, no sheen	14.4	40
RMD-2 (boring)	08/05/2016	118055.39	1520602.01	176.61	51	Odor, Sheen	17' - 20': Strong odor and sheen 38' - 44': Odor and sheen	127.0	40
RMD-3 (boring)	08/04/2016	118048.23	1520679.29	176.92	62	Odor, Sheen	18' - 22': Weak odor and slight sheen	27.1	19
RMD-4 (boring)	08/03/2016	118060.86	1520765.80	176.75	82	None	--	0.1	Throughout

SUMMARY OF SOIL BORINGS AND FIELD OBSERVATIONS
BNSF Wishram Railyard, Wishram, Washington

Boring ID	Date Completed	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Boring Depth (feet bgs)	Hydrocarbon Observations	Depth and Type of Observed Hydrocarbon Impacts	Highest PID Value	Depth of Highest PID Value (feet bgs)
2018 RI Borings									
B-18-01	08/16/2018	118357.15	1520902.95	173.18	15	None	--	5.9	13
B-18-02	08/16/2018	118377.76	1520944.74	173.70	15	None	--	2.9	13
B-18-03	08/16/2018	118396.51	1520982.38	173.69	15	None	--	2.0	8
B-18-04	08/16/2018	118418.64	1521030.01	173.51	15	None	--	0.6	9
B-18-05	08/16/2018	118438.88	1521075.04	173.42	15	None	--	0.1	9
B-18-06	08/13/2018	118296.23	1520935.32	173.26	15	None	--	0.0	--
B-18-07	08/14/2018	118334.56	1520963.10	173.50	15	None	--	0.0	--
B-18-08	08/13/2018	118383.08	1521063.31	173.61	15	None	--	0.1	12
B-18-09	08/20/2018	118311.59	1521025.53	173.99	15	None	--	0.0	--
B-18-10	08/20/2018	118335.72	1521080.37	174.11	15	None	--	0.0	--
B-18-11	08/20/2018	118353.26	1521115.32	174.03	15	None	--	0.0	--
B-18-12	08/14/2018	118288.80	1521093.98	172.46	15	None	--	0.1	13
B-18-13	08/14/2018	118241.99	1521113.13	172.62	15	None	--	0.0	--
B-18-14	08/09/2018	118185.24	1521115.21	173.28	27	None	--	0.0	--
B-18-15	08/13/2018	118156.17	1521070.33	173.92	15	None	--	0.0	--
B-18-16	08/09/2018	118165.58	1521022.19	172.53	20	None	--	0.0	--
B-18-17	08/13/2018	118143.53	1520969.61	171.47	15	None	--	0.0	--
B-18-18	08/21/2018	118119.64	1520930.92	171.56	68	None	--	7.7	68
B-18-19	08/20/2018	118097.50	1520864.99	171.69	15	None	--	0.0	--
B-18-20	08/20/2018	118114.77	1520838.86	171.54	15	None	--	0.0	--
B-18-21	08/20/2018	118081.82	1520816.48	174.77	20	None	--	0.0	--
B-18-22	08/16/2018	118258.01	1521188.83	173.65	15	None	--	4.2	14
B-18-23	08/17/2018	118309.17	1520778.16	173.01	15	None	--	2.7	8
B-18-24	08/21/2018	118376.61	1520495.79	174.59	27	Odor, Sheen	10': Slight petroleum-like odor, no sheen 15': Petroleum-like odor and sheen 18': Slight petroleum-like odor, slight sheen	34.8	15
B-18-25	08/21/2018	118417.34	1520629.03	174.57	14	None	--	2.0	13
B-18-26	08/15/2018	118696.34	1522131.99	171.73	15	None	--	2.1	7
B-18-27	08/15/2018	118625.43	1521954.44	171.51	15	None	--	0.5	7; 14
B-18-28	08/15/2018	118559.66	1521794.52	171.55	15	None	--	0.7	13
B-18-29	08/15/2018	118513.91	1521744.58	171.06	15	None	--	0.3	8
B-18-30	08/15/2018	118447.30	1521724.91	176.05	20	None	--	1.8	14
RMD-5 (boring)	07/31/2018	118058.78	1520457.20	177.29	50.5	None	--	14.9	3
RMD-6 (boring)	08/01/2018	118073.77	1520875.03	176.86	71.5	None	--	0.0	--

SUMMARY OF SOIL BORINGS AND FIELD OBSERVATIONS
BNSF Wishram Railyard, Wishram, Washington

Boring ID	Date Completed	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Boring Depth (feet bgs)	Hydrocarbon Observations	Depth and Type of Observed Hydrocarbon Impacts	Highest PID Value	Depth of Highest PID Value (feet bgs)
2016 Well Borings									
OHM-1	11/2/2016	118166.15	1520658.80	173.05	80.5	Visible LNAPL, Odor, Sheen	18' - 20': Strong petroleum hydrocarbon-like odor and sheen 25' - 80': visible oil and high sheen	71.4	17
OHM-2	10/27/2016	118183.98	1520688.80	173.04	51.5	Visible LNAPL, Odor, Sheen	0' - 2': Petroleum hydrocarbon-like odor, no sheen 12' - 20': strong petroleum hydrocarbon-like odor and sheen 20' - 51.5': Visible oil and high sheen	162.4	16
OHM-3	10/28/2016	118244.25	1520685.67	173.10	42.2	Visible LNAPL, Odor, Sheen	3' - 5': Petroleum hydrocarbon-like odor, no sheen 13' - 42.2': visible oil, high sheen	275.6	23
OHM-4	10/20/2016	118158.29	1520505.62	173.80	25.8	Visible LNAPL, Odor, Sheen	11' - 17': very strong petroleum hydrocarbon - like odor and sheen decreasing with depth 23' - 25.8': Visible oil and high sheen	88.1	11
RMD-1 (well)	10/12/2016	118060.34	1520519.17	177.04	44.5	None	--	14.4	40
RMD-2 (well)	10/14/2016	118055.39	1520602.01	176.61	50	Odor, Sheen	19' - 20': strong petroleum hydrocarbon-like odor, moderate sheen	49.2	19
RMD-3 (well)	10/14/2016	118048.23	1520679.29	176.92	60	Odor, Sheen	19' - 20': Strong petroleum hydrocarbon-like odor and sheen	195.5	19
RMD-4 (well)	10/12/2016	118060.86	1520765.80	176.75	65	None	--	0.5	5; 10
WMW-12	10/11/2016	118232.55	1520334.13	173.58	25	None	--	0.1	15; 20
WMW-13	10/11/2016	118115.77	1520385.06	173.84	25	None	--	0.2	5
WMW-14	10/18/2016	118058.74	1520450.04	177.39	30	None	--	0.8	15
WMW-15	10/18/2016	118060.70	1520514.17	177.22	30	None	--	2.2	15
WMW-16	10/17/2016	118055.77	1520597.43	176.71	30	Odor, Sheen	18' - 22': Strong petroleum hydrocarbon-like odor and sheen decreasing with depth	98.3	19
WMW-17	10/13/2016	118048.42	1520674.59	176.69	30	Odor, Sheen	17' - 20': Strong petroleum hydrocarbon-like odor and sheen	236.6	18
WMW-18	10/12/2016	118060.67	1520761.30	176.86	30	None	--	0.4	25

SUMMARY OF SOIL BORINGS AND FIELD OBSERVATIONS
BNSF Wishram Railyard, Wishram, Washington

Boring ID	Date Completed	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Boring Depth (feet bgs)	Hydrocarbon Observations	Depth and Type of Observed Hydrocarbon Impacts	Highest PID Value	Depth of Highest PID Value (feet bgs)
2018 Well Borings									
RMD-5 (well)	8/20/2018	118058.78	1520457.20	177.29	45	None	--	1.7	6
RMD-6 (well)	8/21/2018	118073.77	1520875.03	176.86	65	None	--	0.2	22
WMW-19	7/31/2018	118053.08	1520376.20	176.96	25	None	--	5.5	2.5
WMW-20	8/2/2018	118072.91	1520868.44	176.99	25	None	--	0.0	--
WMW-21	8/7/2018	118086.23	1520957.27	175.97	25	None	--	0.0	--
WMW-22	8/7/2018	118153.92	1521131.00	176.35	25	None	--	0.0	--
WMW-23	8/7/2018	118198.10	1521229.78	176.12	25	None	--	0.0	--
WMW-24	8/2/2018	118278.95	1520806.69	173.44	20	None	--	0.0	--
WMW-26	8/3/2018	118354.84	1521006.08	173.42	20	None	--	0.0	--
WMW-27	8/3/2018	118255.49	1521044.81	172.14	20	None	--	0.1	17
WMW-28	8/2/2018	118227.24	1520890.14	172.20	20	None	--	0.0	--
WMW-29	8/3/2018	118380.39	1521178.63	173.56	20	None	--	0.0	--
WMW-30	8/6/2018	118449.49	1521397.13	172.96	20	None	--	0.0	--
WMW-31	8/8/2018	118721.84	1521266.72	173.31	20	None	--	0.0	--
WMW-32	8/8/2018	118953.33	1521922.05	173.83	20	None	--	0.0	--
2014 Borings									
B-14-1	7/30/2014	118053.83	1520558.79	176.76	39.5	None	--	0.0	--
MWD-1	7/24/2014	118088.60	1520522.46	172.88	35	Odor, Sheen	16' - 35': Strong hydrocarbon odor and sheen, weakening around 34'	110.0	30
MWD-2	7/23/2014	118096.09	1520598.94	172.87	43	Visible LNAPL, Odor, Sheen	12' - 13.9': Drainable oil, strong hydrocarbon odor and sheen 25' - 26': very slight hydrocarbon odor 32.4' - 36': strong hydrocarbon odor and sheen 36' - 37': decreasing odor, no sheen	122.3	33
MWD-3	7/25/2014	118104.28	1520678.33	173.07	69.5	Visible LNAPL, Odor, Sheen	22' - 39': Hydrocarbon odor, no sheen 39' - 50': Drainable oil, strong sheen and hydrocarbon odor 59' - 64': No sheen, weak hydrocarbon odor	141.6	40

SUMMARY OF SOIL BORINGS AND FIELD OBSERVATIONS
BNSF Wishram Railyard, Wishram, Washington

Boring ID	Date Completed	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Boring Depth (feet bgs)	Hydrocarbon Observations	Depth and Type of Observed Hydrocarbon Impacts	Highest PID Value	Depth of Highest PID Value (feet bgs)
MWD-4	7/23/2014	118093.75	1520749.28	171.79	70	None	--	0.0	--
OHM-1	7/30/2014	118166.15	1520658.80	173.05	74.8	Visible LNAPL, Odor, Sheen	17' - 21': Drainable oil, strong hydrocarbon odor and sheen; 25' - 74.8': Drainable oil, strong hydrocarbon odor and sheen	553.0	50
OHM-2	7/29/2014	118183.98	1520688.80	173.04	46.1	Visible LNAPL, Odor, Sheen	14' - 15': Slight hydrocarbon - like odor; 23.4' - 46.1': Drainable oil, strong hydrocarbon odor and sheen	244.0	30
OHM-3	7/28/2014	118244.25	1520685.67	173.10	34	Visible LNAPL, Odor, Sheen	5' - 20': Drainable oil, strong hydrocarbon odor and sheen 20.5' - 34': strong hydrocarbon odor and sheen	453.0	34
OHM-4	7/28/2014	118158.29	1520505.62	173.80	25.2	Visible LNAPL, Odor, Sheen	13' - 14': Strong diesel - like odor and moderate sheen 21.5' - 25': Drainable oil	700.2	25
2012 Borings									
AS-12-1	1/12/2012	118333.77	1520534.96	174.54	19.3	Odor, Sheen	10' - 13.5': Petroleum-like odor and sheen	10.2	11
AS-12-2	1/13/2012	118318.59	1520508.90	174.61	19.3	Odor, Sheen	8.5' - 12.5': Petroleum-like odor and sheen	41.2	10
AS-12-3	1/16/2012	118330.87	1520494.59	174.46	19.5	Odor, Sheen	8' - 14': Petroleum-like odor and sheen	71.1	14
MW-10	2/2/2012	118082.76	1520444.31	173.56	25	None	- -	0.0	--
MW-11	2/3/2012	118082.47	1520522.35	173.38	25	Odor, Sheen	15 - 25': Petroleum-like odor and sheen	62.9	25
MW-8	2/3/2012	118297.12	1520437.09	173.73	25	Odor, Sheen	9.5' - 12': Petroleum-like odor and slight sheen	5.4	10
MW-9	2/2/2012	118150.38	1520456.83	173.31	25	None	- -	0.0	--
SVE-12-1	1/16/2012	118341.05	1520516.79	174.44	22	Odor, Sheen	11' - 15': Petroleum-like odor and sheen	99.4	13
SVE-12-2	1/15/2012	118408.33	1520576.96	175.32	16	Odor, Sheen	11.5' - 14': Petroleum-like odor and sheen	45.7	12
SVE-12-3	1/13/2012	118433.88	1520619.32	176.71	12	None	--	0.0	--
SVE-12-4	1/13/2012	118451.64	1520661.89	176.68	10.1	None	--	0.0	--
RB1	1/16/2012	118264.47	1520589.98	174.20	20	Odor, Sheen	10' - 15': Petroleum-like odor and sheen	45.7	10
RB2	1/17/2012	118242.41	1520540.78	174.26	20	None	--	0.0	--
RB3	1/16/2012	118221.12	1520494.96	174.23	20	Odor, Sheen	9' - 14': Petroleum-like odor and sheen	8.4	10

SUMMARY OF SOIL BORINGS AND FIELD OBSERVATIONS
BNSF Wishram Railyard, Wishram, Washington

Boring ID	Date Completed	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Boring Depth (feet bgs)	Hydrocarbon Observations	Depth and Type of Observed Hydrocarbon Impacts	Highest PID Value	Depth of Highest PID Value (feet bgs)
RB4	1/16/2012	118202.95	1520458.15	174.19	20	None	--	0.1	10
B-12-1	1/10/2012	118125.18	1520670.41	173.29	60	Visible LNAPL, Odor, Sheen	32' - 55': Visible LNAPL, petroleum-like odor and sheen	141.5	54
B-12-10	2/1/2012	118086.85	1520675.91	172.86	60	None	--	0.1	30
B-12-11	2/2/2012	118211.33	1520704.55	173.19	55	Visible LNAPL, Odor, Sheen	26' - 40': Visible LNAPL, petroleum-like odor and sheen 55': Staining, petroleum-like odor and sheen	114.6	35B
B-12-12	2/4/2012	118158.72	1520577.99	173.20	22.5	Visible LNAPL, Odor, Sheen	10.5 - 13': Petroleum-like odor and sheen 20' - 22.5': Petroleum-like odor and sheen 22.5': Black/brown hydrocarbon in shoe	73.1	12
B-12-13	2/4/2012	118239.45	1520667.57	173.23	33.5	Visible LNAPL, Odor, Sheen	24' - 33.5': Visible LNAPL, petroleum-like odor and sheen	32.4	25
B-12-14	2/4/2012	118285.25	1520641.14	174.05	17.5	None	--	0.0	--
B-12-2	1/11/2012	118112.54	1520710.34	173.29	55	Visible LNAPL, Odor, Sheen	7' - 16': Petroleum coated woody material 32.5' - 46': Visible LNAPL, petroleum-like odor and sheen	121.0	35
B-12-3	1/11/2012	118122.68	1520610.12	173.14	37	Odor, Sheen	12' - 14': Petroleum-like odor and sheen	56.5	13
B-12-4	1/12/2012	118162.27	1520699.76	173.15	68	Visible LNAPL, Odor, Sheen	30.5' - 50': Visible LNAPL, petroleum-like odor and sheen 55' - 68': LNAPL staining, petroleum-like odor and sheen	102.3	67
B-12-5	1/17/2012	118183.57	1520741.19	173.22	64.5	None	--	0.4	45
B-12-6	1/31/2012	118147.62	1520774.94	173.06	60	None	--	0.0	--
B-12-7	1/31/2012	118166.74	1520643.33	173.18	55	Visible LNAPL, Odor, Sheen	26' - 55': Petroleum-like odor and sheen	80.8	45
B-12-8	2/1/2012	118206.60	1520620.94	173.29	37.5	Visible LNAPL, Odor, Sheen	10' - 13': Petroleum-like odor and sheen 27' - 30': Visible LNAPL, petroleum-like odor and sheen	31.7	30
B-12-9	2/1/2012	118123.83	1520792.05	172.23	50	None	--	0.1	40

SUMMARY OF SOIL BORINGS AND FIELD OBSERVATIONS
BNSF Wishram Railyard, Wishram, Washington

Boring ID	Date Completed	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Boring Depth (feet bgs)	Hydrocarbon Observations	Depth and Type of Observed Hydrocarbon Impacts	Highest PID Value	Depth of Highest PID Value (feet bgs)
2010 Borings									
T-1	5/20/2010	118324.21	1520510.07	--	15	Odor, Sheen	11.5' - 15': Petroleum-like odor and iridescent sheen	NA	NA
T-2	5/20/2010	118334.10	1520533.25	--	15	Odor, Sheen	11' - 15': Petroleum-like odor and iridescent sheen	NA	NA
T-3	5/20/2010	118392.18	1520530.12	--	15	Odor, Sheen	11.5' - 15': Slight Petroleum-like odor and iridescent sheen	NA	NA
T-4	5/20/2010	118408.85	1520553.56	--	15	Odor, Sheen	13.4 - 15': Petroleum-like odor and iridescent sheen	NA	NA
T-5	5/20/2010	118436.46	1520553.30	--	15	None	--	NA	NA
T-6	5/20/2010	118402.86	1520585.86	--	15	Odor, Sheen	10.5 - 15': Slight Petroleum-like odor and iridescent sheen	NA	NA
T-7	5/20/2010	118374.73	1520592.89	--	15	None	--	NA	NA
T-8	5/20/2010	118361.97	1520598.88	--	15	None	--	NA	NA
T-9	5/20/2010	118377.08	1520618.94	--	15	None	--	NA	NA
T-10	5/20/2010	118369.26	1520634.56	--	14.5	None	--	NA	NA
2007 Borings									
DB-1	3/7/2007	118491.55	1521228.78	--	16	None	--	NA	NA
DB-2	3/7/2007	118488.47	1521220.33	--	16	None	--	NA	NA
DB-3	3/7/2007	118484.80	1521210.20	--	12	Odor, Sheen	1' - 2': diesel odor and sheen	NA	NA
DB-4	3/7/2007	118481.97	1521202.41	--	12	Odor, Sheen	1' - 2.5': diesel odor and sheen	NA	NA
DB-5	3/7/2007	118479.51	1521195.62	--	12	None	--	NA	NA
DB-6	3/7/2007	118489.93	1521215.91	--	8	None	--	NA	NA
DB-7	3/7/2007	118486.22	1521205.83	--	8	Odor, Sheen	1' - 2.5': diesel odor and sheen	NA	NA
DB-8	3/7/2007	118483.35	1521197.91	--	8	None	--	NA	NA
DB-9	3/7/2007	118474.72	1521202.24	--	8	Odor, Sheen	1' - 2': oil-like hydrocarbon odor and sheen	NA	NA
DB-10	3/7/2007	118480.72	1521218.66	--	8	Odor, Sheen	1' - 2.5': oil-like hydrocarbon odor and sheen; Above ~2.5': slight odor	NA	NA
DB-11	3/7/2007	118483.18	1521225.45	--	8	Odor, Sheen	1' - 2': Oil-like hydrocarbon odor and sheen	NA	NA
DB-12	3/7/2007	118477.35	1521209.58	--	12	Odor, Sheen	1' - 2': Oil-like hydrocarbon odor and sheen	NA	NA
DB-13	3/7/2007	118476.55	1521224.03	--	8	None	--	NA	NA
DB-14	3/7/2007	118473.10	1521214.41	--	8	None	--	NA	NA

SUMMARY OF SOIL BORINGS AND FIELD OBSERVATIONS
BNSF Wishram Railyard, Wishram, Washington

Boring ID	Date Completed	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Boring Depth (feet bgs)	Hydrocarbon Observations	Depth and Type of Observed Hydrocarbon Impacts	Highest PID Value	Depth of Highest PID Value (feet bgs)
2003 - 2004 Borings									
WMW-1	9/12/2003	118101.05	1520597.16	172.84	20	None	--	NA	NA
WMW-2	9/12/2003	118115.12	1520697.17	173.29	20	None	--	NA	NA
WMW-3	9/12/2003	118194.16	1520598.29	173.02	20	None	--	NA	NA
WMW-4	9/12/2003	118091.35	1520477.24	174.00	20	None	--	NA	NA
WMW-5	4/5/2004	118234.80	1520759.98	172.62	25	None	--	NA	NA
WMW-6	4/5/2004	118172.91	1520525.71	174.04	24	Visible LNAPL, Odor, Sheen	10' - 15': Viscous waxy petroleum, moderate odor and sheen 15' - 17': Strong odor and sheen	NA	NA
WMW-7		118349.93	1520548.97	174.15	20	Odor, Sheen	9' - 11': Strong odor and sheen	NA	NA
WSB-04-01	2/26/2004	118460.29	1520463.76	178.46	16	None	--	NA	NA
WSB-04-02	2/26/2004	118393.38	1520484.91	176.23	16	Odor, Sheen	12' - 13': Slight odor and sheen	NA	NA
WSB-04-06	2/26/2004	118332.52	1520486.13	174.42	16	Odor, Sheen	12' - 13': Slight odor and sheen	NA	NA
WSB-04-07	4/5/2004	118345.01	1520574.23	174.71	15	Odor, Sheen	9' - 10': Strong odor and sheen	NA	NA
WSB-04-09	2/25/2004	118229.40	1520532.30	174.23	16	Odor	1' - 2': Slight odor 10' - 11': Slight odor	NA	NA
WSB-04-11	2/24/2004	118588.04	1520587.49	179.76	12	None	--	NA	NA
WSB-04-12	2/26/2004	118259.01	1520768.99	172.94	12	None	--	NA	NA
WSB-04-13	2/24/2004	118551.71	1520618.87	178.81	16	None	--	NA	NA
WSB-04-14	2/24/2004	118501.24	1520732.71	176.23	12	None	--	NA	NA
WSB-04-15	2/25/2004	118407.70	1520708.09	175.49	16	None	--	NA	NA
WSB-04-16	2/26/2004	118200.95	1520636.67	173.29	16	None	--	NA	NA
WSB-04-17	2/26/2004	118457.58	1520827.50	175.06	16	None	--	NA	NA
WSB-04-18	2/24/2004	118717.95	1521269.17	174.26	12	None	--	NA	NA
WSB-04-19	2/24/2004	118668.65	1521234.44	174.26	12	None	--	NA	NA
WSB-04-20	2/24/2004	118957.85	1521942.50	173.80	22	None	--	NA	NA
WSB-04-25	2/25/2004	118084.90	1520426.11	174.21	16	None	--	NA	NA
WSB-04-26	2/25/2004	118182.59	1520522.22	174.18	16	Odor, Sheen	13' - 14': Slight odor and sheen	NA	NA
WSB-04-27	2/26/2004	118344.34	1520908.05	173.67	16	None	--	NA	NA
WSB-04-29	2/25/2004	118231.11	1520803.84	172.83	12	None	--	NA	NA
WSB-04-30	2/25/2004	118262.40	1520910.14	173.11	12	None	--	NA	NA
WSB-04-31	2/25/2004	118353.37	1521168.47	173.47	12	None	--	NA	NA
WSB-04-33	2/25/2004	118256.84	1521001.11	172.56	12	None	--	NA	NA
WSB-04-34	2/25/2004	118136.35	1520844.12	172.82	16	None	--	NA	NA

SUMMARY OF SOIL BORINGS AND FIELD OBSERVATIONS
BNSF Wishram Railyard, Wishram, Washington

Boring ID	Date Completed	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Boring Depth (feet bgs)	Hydrocarbon Observations	Depth and Type of Observed Hydrocarbon Impacts	Highest PID Value	Depth of Highest PID Value (feet bgs)
WSB-04-35	2/25/2004	118154.76	1521058.75	172.35	16	None	--	NA	NA
WSB-04-36	2/25/2004	118218.65	1521255.28	172.51	12	None	--	NA	NA
WSB-04-37	4/5/2004	118122.42	1520744.52	173.49	10	Visible LNAPL, Odor, Sheen	0' - 1': Moderate odor with petroleum residue 9' - 10': NAPL present on groundwater	NA	NA
WSB-04-38	4/5/2004	118151.82	1520659.52	173.26	10	None	--	NA	NA
WSB-1	9/2/2003	118430.16	1520654.96	176.30	17	None	--	NA	NA
WSB-2	9/2/2003	118417.25	1520627.57	176.15	15	None	--	NA	NA
WSB-3	9/2/2003	118404.91	1520601.41	175.66	16	None	--	NA	NA
WSB-4	9/2/2003	118105.92	1520582.88	173.14	32	None	--	NA	NA
WSB-5	9/2/2003	118127.52	1520688.16	173.31	10	None	--	NA	NA
WSB-6	9/2/2003	118092.80	1520467.11	173.86	17	None	--	NA	NA
WSB-7	9/2/2003	118216.56	1520627.19	173.43	20	None	--	NA	NA

Notes:
amsl = above mean sea level
bgs = below ground surface
NAPL = Non-Aqueous Phase Liquid
PID = photoionization detector
-- = information not applicable or not available

Monitoring wells and soil borings installed during the RI activities were surveyed by KPG, Inc. of Tacoma, Washington to determine their vertical elevation (using NAVD88 datum) and horizontal position (using Washington State Plane Coordinates, NAD83). Horizontal positions of soil borings installed prior to 2016 were obtained from previous reports and ground elevations were estimated from a 2005 topographic survey.

SUMMARY OF LIF RESULTS AND SOIL SAMPLES
BNSF Wishram Railyard, Wishram, Washington

Location	Sample Date	Sample ID	Sample Depth (feet)	Nearest LIF Boring	Distance from LIF Boring (feet)	Sample Interval Petroleum Hydrocarbon Observation	General Petroleum Hydrocarbon Observation	PHC Value	DRO (mg/kg)	ORO (mg/kg)	Hits Only Total TPH-Dx (mg/kg)	MAX LIF 3-ft (%RE)	AVG LIF 3-ft (%RE)	NOTES
WSB-3	09/02/2003	WSB-3-10	10.0 ft	TG-NT09	41.5	No observation	None	0	< 25	< 50	0	1.96	1.23	
WSB-3	09/02/2003	WSB-3-16	16.0 ft	TG-NT09	41.5	No observation	None	0	< 25	< 50	0	3.53	1.59	
WSB-4	09/02/2003	WSB-4-10	10.0 ft	TG-G02	6.3	No observation	None	0	< 25	< 50	0	192.19	31.06	
WSB-6	09/02/2003	WSB-6-10	10.0 ft	TG-CR00-W25	16.2	No observation	None	0	< 25	< 50	0	2.92	1.55	
WSB-6	09/02/2003	WSB-6-14	14.0 ft	TG-CR00-W25	16.2	No observation	None	0	**265**	**75.4**	**340.4**	3.57	1.90	
WSB-7	09/02/2003	WSB-7-10	10.0 ft	TG-B03	7.4	No observation	None	0	**240**	**72.3**	**312.3**	2.05	1.31	
WSB-04-02	02/26/2004	WSB-04-2-2	2.0 ft	TG-NT07	32.0	No odor or sheen	None	0	< 25	< 50	0	4.50	1.23	
WSB-04-12	02/26/2004	WSB-04-12-5	5.0 ft	TG-A08	35.9	No odor or sheen	None	0	< 25	< 50	0	3.58	1.39	
WSB-04-12	02/26/2004	WSB-04-12-10	10.0 ft	TG-A08	35.9	No odor or sheen	None	0	< 25	< 50	0	4.50	1.36	
WSB-04-15	02/25/2004	WSB-04-15-10	10.0 ft	TG-NT15	22.2	No odor or sheen	None	0	< 25	< 50	0	2.29	1.34	
WSB-04-25	02/25/2004	WSB-04-25-5	5.0 ft	TG-CR00-W25	33.7	No odor or sheen	None	0	< 25	< 50	0	2.88	1.47	
WSB-04-25	02/25/2004	WSB-04-25-10	10.0 ft	TG-CR00-W25	33.7	No odor or sheen	None	0	< 25	< 50	0	2.92	1.55	
WSB-04-38	04/05/2004	WSB-04-38-10	10.0 ft	TG-E04	14.5	No odor or sheen	None	0	< 25	< 50	0	2.84	0.90	
T-5	05/20/2010	T-5-14.5	14.5 ft	TG-NT03	4.4	No odor or iridescent sheen	None	0	< 24.9	< 99.7	0	4.13	2.03	
B-12-1	01/10/2012	B-12-1-59	59.0 ft	TG-F05	6.5	No observation	None	0	< 28	**20 J**	**20**	5.07	1.25	
B-12-2	01/11/2012	B-12-2-55	55.0 ft	TG-F07	8.1	No sheen	None	0	**33 Y**	**54 J**	**87**	101.04	11.30	
B-12-5	01/17/2012	B-12-5-45	45.0 ft	TG-C08	6.8	No petroleum-like odor or sheen in boring	None	0	< 30	< 61	0	3.02	1.30	
B-12-6	01/31/2012	B-12-6-45	45.0 ft	TG-D08-E25	13.3	No petroleum-like odor or sheen in boring	None	0	**12 J**	< 63	12	2.06	1.19	
B-12-7	01/31/2012	B-12-7-24	24.0 ft	TG-D04	5.3	Weak sheen	None	0	**470 B**	**530 Y**	**1,000**	145.72	39.85	
B-12-8	02/01/2012	B-12-8-37	37.0 ft	TG-C03	10.1	No sheen	None	0	**340 B**	**1,700 Y**	**2,040**	152.23	86.30	
B-12-9	02/01/2012	B-12-9-40	40.0 ft	TG-E08-E25	19.3	No petroleum-like odor or sheen in boring	None	0	**12 J**	< 59	12	3.09	0.86	
B-12-10	02/01/2012	B-12-10-40	40.0 ft	TG-CR-05	11.5	No petroleum-like odor or sheen in boring	None	0	**14 J**	< 61	14	2.87	0.48	
CR-6/G-6	08/01/2013	CR-6-25(LR-6-25)	25.0 ft	TG-CR-G06	2.0	No observation	NA	0	< 5	< 12	0	2.52	0.95	
MWD-2	07/23/2014	MWD-2-20	20.0 ft	TG-G02	12.6	No odor, no sheen	None	0	< 5.5	< 14	0	3.04	1.33	
MWD-2	07/23/2014	MWD-2-43	43.0 ft	TG-G02	12.6	No odor, no sheen	None	0	< 5.2	< 13	0	2.55	1.08	Max depth G01 was 42 feet
MWD-3	07/25/2014	MWD-3-69.5	69.5 ft	TG-F06	15.6	No sheen, week hydrocarbon odor	None	0	**74**	**89**	**163**	7.70	1.04	Max depth G05 was 67 feet
MWD-4	07/22/2014	MWD-4-35	35.0 ft	TG-F08	11.0	No hydrocarbon odor or sheen in boring	None	0	< 5.5	< 14	0	3.45	1.52	
MWD-4	07/23/2014	MWD-4-70	70.0 ft	TG-F08	11.0	No hydrocarbon odor or sheen in boring	None	0	< 4.4	< 11	0	3.24	1.38	Max depth F08 was 67 feet
RMD-1 (boring)	08/05/2016	RMD-1-18	17.0-18.0 ft	TG-CR-01	16.5	No odor and no sheen	None	0	< 4.99	< 12.5	0	3.70	1.38	Corrected berm well sample depth for CR
RMD-1 (boring)	08/05/2016	RMD-1-39	38.0-39.0 ft	TG-CR-01	16.5	No odor and no sheen	None	0	< 4.90	< 12.2	0	2.69	0.83	Corrected berm well sample depth for CR
RMD-1 (boring)	08/05/2016	RMD-1-44.5	44.0-44.5 ft	TG-CR-01	16.5	No odor and no sheen	None	0	< 5.13	< 12.8	0			Max depth CR-01 was 38.5 feet
RMD-2 (boring)	08/05/2016	RMD-2-51	50.0-51.0 ft	TG-CR-03	18.0	No odor and no sheen	None	0	**22.7**	**23.5**	**46.2**			Max depth CR-03 was 42 feet
RMD-3 (boring)	08/03/2016	RMD-3-19	18.0-19.0 ft	TG-CR-5_5	31.9	Weak odor and sheen	None	0	< 4.42	< 11.0	0	3.35	1.80	Corrected berm well sample depth for CR
RMD-3 (boring)	08/04/2016	RMD-3-60	59.0-60.0 ft	TG-CR-5_5	31.9	No odor and no sheen	None	0	< 5.20	< 13.0	0	3.45	1.26	Corrected berm well sample depth for CR
RMD-4 (boring)	08/02/2016	RMD-4-30	29.0-30.0 ft	TG-CR-G08	25.3	No odor and no sheen	None	0	< 4.80	< 12.0	0	5.07	1.44	Corrected berm well sample depth for CR
RMD-4 (boring)	08/03/2016	RMD-4-60	59.0-60.0 ft	TG-CR-G08	25.3	No odor and no sheen	None	0	**322**	**1,610**	**1,932**	7.78	0.88	Corrected berm well sample depth for CR
RMD-4 (well)	10/12/2016	RMD-4-60R	59.0-60.0 ft	TG-CR-G08	25.3	No odor and no sheen	None	0	< 5.15	< 12.9	0	7.78	0.88	Corrected berm well sample depth for CR
RMD-4 (well)	10/12/2016	DUP-01	59.0-60.0 ft	TG-CR-G08	25.3	No odor and no sheen	None	0	< 5.32	< 13.3	0	7.78	0.88	Corrected berm well sample depth for CR
RMD-4 (well)	10/12/2016	RMD-4-65	64.0-65.0 ft	TG-CR-G08	25.3	No odor and no sheen	None	0	< 5.30	< 13.2	0	8.52	1.15	Corrected berm well sample depth for CR
WMW-14	10/18/2016	MW-14-20	19.0-20.0 ft	TG-CR00-W25	22.6	No odor and no sheen	None	0	< 5.10	< 12.8	0	2.90	1.57	Corrected berm well sample depth for CR
WMW-15	10/18/2016	MW-15-20	20.0-21.0 ft	TG-CR-01	18.3	No odor and no sheen	None	0	< 4.73	< 11.8	0	6.95	1.89	Corrected berm well sample depth for CR
WMW-18	10/11/2016	MW-18-16	15.0-16.0 ft	TG-CR-G08	27.2	No odor and no sheen	None	0	**24.3**	**90.0**	**114.3**	4.54	1.28	Corrected berm well sample depth for CR
B-18-21	08/17/2018	B-18-21(3.0-3.5)	3.0-3.5 ft	TG-CR-G08	49.0	No odor and no sheen	None	0	< 22.5	< 56.3	0	5.38	1.16	
B-18-21	08/20/2018	B-18-21(7.5-8.0)	7.5-8.0 ft	TG-CR-G08	49.0	No odor and no sheen	None	0	< 45.4	< 113	0	5.77	1.30	
B-18-24	08/21/2018	B-18-24(2.0-2.5)	2.0-2.5 ft	TG-NT07	31.1	No odor and no sheen	None	0	**39.3**	< 12.3	39.3	4.50	1.31	
B-18-24	08/21/2018	B-18-24(9.0-9.5)	9.0-9.5 ft	TG-NT07	31.1	Slight petroleum-like odor, No sheen	None	0	**2,700**	< 546	**2,700**	2.18	1.32	
B-18-24	08/21/2018	B-18-24(22.5-23.0)	22.5-23.0 ft	TG-NT07	31.1	No odor and no sheen	None	0	< 5.38	< 13.5	0	2.05	1.13	
RMD-5 (boring)	07/30/2018	RMD-5(2.0-2.5)	2.0-2.5 ft	TG-CR00-W25	20.0	No odor and no sheen	None	0	< 25.2	< 63.0	0			Sample above CR location
RMD-5 (boring)	07/31/2018	RMD-5(7.5-8.0)	7.5-8.0 ft	TG-CR00-W25	20.0	No odor and no sheen	None	0	< 81.3	**307**	**307**	2.88	1.47	Corrected berm well sample depth for CR
RMD-5 (boring)	07/31/2018	RMD-5(29.5-30.0)	29.5-30.0 ft	TG-CR00-W25	20.0	No odor and no sheen	None	0	< 5.21	< 13.0	0	2.63	1.17	Corrected berm well sample depth for CR
RMD-5 (boring)	07/31/2018	RMD-5(49.5-50.0)	49.5-50.0 ft	TG-CR00-W25	20.0	No odor and no sheen	None	0	< 5.18	< 13.0	0			Max depth CR-00-W25 was 36 ft
WSB-04-02	02/26/2004	WSB-04-2-12	12.0 ft	TG-NT07	32.0	Slight odor and sheen	Weak odor and sheen	1	< 25	< 50	0	3.33	1.47	
TG-E1	07/24/2013	TG-E1-23	23.0 ft	TG-E01	2.0	Weak odor	Weak odor	1	**2,400**	**3,900**	**6,300**	75.86	10.56	
OHM-1	11/01/2016	OHM-1-20	19.0-20.0 ft	TG-D04	11.1	Weak to no sheen (2 feet above strong odor, sheen and visible oil)	Weak to no sheen	1	**1,750**	**1,560**	**3,310**	20.72	3.15	
T-1	05/20/2010	T-1-12	12.0 ft	TG-NT13	32.8	Petroleum-like odor and iridescent sheen	Odor and sheen	2	**545**	< 99.6	545	5.63	2.65	
T-2	05/20/2010	T-2-11	11.0 ft	TG-NT14	9.6	Petroleum-like odor and iridescent sheen	Odor and sheen	2	**314**	< 91.9	314	4.69	1.28	
T-3	05/20/2010	T-3-12	12.0 ft	TG-NT08	18.3	Slight Petroleum-like odor and iridescent sheen	Odor and sheen	2	**314**	< 97.3	314	2.49	1.26	
T-4	05/20/2010	T-4-13.5	13.5 ft	TG-NT09	6.6	Petroleum-like odor and iridescent sheen	Odor and sheen	2	**683**	< 98.3	683	3.53	1.34	
T-6	05/20/2010	T-6-10.5	10.5 ft	TG-NT09	26.6	Slight Petroleum-like odor and iridescent sheen	Odor and sheen	2	< 24.5	< 97.8	0	1.96	1.23	
B-12-1	01/10/2012	B-12-1-32	32.0 ft	TG-F05	6.5	Visible black/brown hydrocarbon, strong odor and sheen	Odor and sheen	2	**12,000 Y**	**14,000 Y**	**26,000**	11.02	1.84	
B-12-3	01/11/2012	B-12-3-13	13.0 ft	TG-F03	5.6	Petroleum-like odor and sheen	Odor and sheen	2	**28,000 Y**	**2,700 Y**	**30,700**	29.12	8.23	
B-12-4	01/12/2012	B-12-4-68	68.0 ft	TG-D06	2.8	Petroleum-like odor and sheen, black/brown stained	Odor and sheen	2	**14 J**	**24 J**	**38**	281.82	153.18	
B-12-12	02/04/2012	B-12-12-12	12.0 ft	TG-D01	23.9	Strong petroleum-like odor and sheen	Odor and sheen	2	**30,000 B**	**1,700 Y**	**31,700**	213.47	39.46	
B-12-13	02/04/2012	B-12-13-30	30.0 ft	TG-A05	7.4	Petroleum-like odor and sheen	Odor and sheen	2	**7,200 B**	**10,000 Y**	**17,200**	55.73	32.70	
TG-CR1	07/31/2013	TG-CR1-32	32.0 ft	TG-CR-01	2.0	Strong odor and sheen, diesel-type odor	Diesel-like sheen	2	**5,300**	**280**	**5,580**	10.22	3.30	
TG-CR2	07/24/2013	TG-CR2-12	12.0 ft	TG-CR-02	2.0	Strong odor and sheen	Odor and sheen	2	**16,000**	**1,800**	**17,800**	61.12	23.92	
TG-CR3	07/24/2013	TG-CR3-12	12.0 ft	TG-CR-03	2.0	No boring log. Sheen at similar depth in MWD-2	Odor and sheen	2	**17,000**	**1,400**	**18,400**	42.51	21.86	
TG-D1	07/24/2013	TG-D1-12	12.0 ft	TG-D01	2.0	Strong petroleum-like odor and sheen	Odor and sheen	2	**43,000**	**10,000**	**53,000**	213.47	39.46	
TG-D2	07/24/2013	TG-D2-24	24.0 ft	TG-D02	2.0	Weak odor and sheen at bottom	Weak odor and sheen	2	**16,000**	**46,000**	**62,000**	18.87	6.44	

SUMMARY OF LIF RESULTS AND SOIL SAMPLES
BNSF Wishram Railyard, Wishram, Washington

Location	Sample Date	Sample ID	Sample Depth (feet)	Nearest LIF Boring	Distance from LIF Boring (feet)	Sample Interval Petroleum Hydrocarbon Observation	General Petroleum Hydrocarbon Observation	PHC Value	DRO (mg/kg)	ORO (mg/kg)	Hits Only Total TPH-Dx (mg/kg)	MAX LIF 3-ft (%RE)	AVG LIF 3-ft (%RE)	NOTES
TG-D5	07/30/2013	TG-D5-33	33.0 ft	TG-D05	2.0	Strong petroleum-like odor and sheen	Odor and sheen	2	**24,000**	**32,000**	**56,000**	249.88	180.19	
TG-E0	07/24/2013	TG-E0-22	22.0 ft	TG-E00	2.0	Strong odor and sheen	Odor and sheen	2	**8,800**	**2,800**	**11,600**	170.37	32.44	
TG-F1	07/24/2013	TG-F1-25	25.0 ft	TG-F01	2.0	Sheen	Sheen	2	**450**	**480**	**930**	15.08	3.65	
TG-F6	07/30/2013	TG-F6-25	25.0 ft	TG-F06	2.0	No odor, moderate sheen	Sheen	2	**2,200**	**3,800**	**6,000**	168.31	100.80	
MWD-1	07/24/2014	MWD-1-25	25.0 ft	TG-CR-01	12.0	Strong hydrocarbon odor and sheen	Odor and sheen	2	**1,000**	**73**	**1,073**	3.75	1.44	
MWD-1	07/24/2014	MWD-1-33-2	33.0 ft	TG-CR-01	12.0	Strong hydrocarbon odor and sheen	Odor and sheen	2	**44**	< 13	44	10.22	3.21	
MWD-2	07/23/2014	MWD-2-33-2	33.0 ft	TG-G02	12.6	Residual oil, odor and sheen (oil NAPL at 32.4 but not reflected in the TPH result)	Odor and sheen	2	**900**	**930**	**1,830**	2.58	1.02	
OHM-1	07/29/2014	OHM-1-19	19.0 ft	TG-D04	11.1	Black/brown oil NAPL presence	Residual oil, odor and sheen	2	**2,600**	**2,800**	**5,400**	29.05	6.32	
OHM-3	07/28/2014	OHM-3-4	4.0 ft	TG-A05A06	18.4/11.3	Strong hydrocarbon odor and moderate sheen, residual oil	Odor and sheen	2	**26,000**	**20,000**	**46,000**	77.48	4.83	
B-16-01	10/18/2016	B-16-01-07	7.0-8.0 ft	TG-CR-04	7.2	Dry, no odor and no sheen; fill material below	None	2	**4,610**	**12,600**	**17,210**	49.29	10.78	
B-16-02	10/13/2016	B-16-02-19	18.0-19.0 ft	TG-E01	11.0	Strong petroleum-like odor and sheen	Odor and sheen	2	**441**	**233**	**674**	5.03	1.48	
B-16-03	10/13/2016	B-16-03-22	21.0-22.0 ft	TG-B02	6.2	Moderate odor and sheen	Odor and sheen	2	**1,480**	**136**	**1,616**	54.20	8.53	
OHM-2	10/25/2016	OHM-2-20	19.0-20.0 ft	TG-C05	14.4	Strong petroleum-like odor and sheen	Odor and sheen	2	**2,090**	**1,720**	**3,810**	3.58	0.78	
RMD-2 (boring)	08/04/2016	RMD-2-18	17.0-18.0 ft	TG-CR-03	18.0	Strong petroleum-like odor and sheen	Odor and sheen	2	**827**	**1,330**	**2,157**	3.91	1.36	Corrected berm well sample depth for CR
RMD-2 (boring)	08/04/2016	RMD-2-39	38.0-39.0 ft	TG-CR-03	18.0	Moderate to strong petroleum-like odor and sheen	Odor and sheen	2	**935**	**70.6**	**1,005.6**	3.95	0.77	Corrected berm well sample depth for CR
WMW-17	10/12/2016	MW-17-18	17.0-18.0 ft	TG-CR-5_5	33.5	Strong petroleum-like odor and sheen	Odor and sheen	2	**744**	**108**	**852**	3.56	1.92	Corrected berm well sample depth for CR
WMW-17	10/17/2016	MW-17-20	19.0-20.0 ft	TG-CR-5_5	33.5	Strong petroleum-like odor and sheen	Odor and sheen	2	**105**	**57.1**	**162.1**	4.14	1.83	Corrected berm well sample depth for CR
B-18-24	08/21/2018	B-18-24(13.5-14.0)	13.5-14.0 ft	TG-NT07	31.1	Petroleum-like odor and moderate sheen	Odor and sheen	2	**9,070**	< 1,270	**9,070**	3.39	2.00	
B-12-2	01/10/2012	B-12-2-40	40.0 ft	TG-F07	8.1	Visible black/brown hydrocarbon, strong odor and sheen	Visible LNAPL	3	**5,800 BY**	**5,500 Y**	**11,300**	76.65	45.17	
B-12-4	01/11/2012	B-12-4-40	40.0 ft	TG-D06	2.8	Petroleum-like odor and sheen, black/brown stained	Visible LNAPL	3	**65,000 B**	**67,000**	**132,000**	296.71	223.89	
B-12-11	02/02/2012	B-12-11-35	35.0 ft	TG-B06	9.6	Visible black/brown hydrocarbon, strong petroleum-like odor and sheen	Visible LNAPL	3	**52,000 B**	**61,000 Y**	**113,000**	129.95	71.40	
B-12-12	02/04/2012	B-12-12-23	23.0 ft	TG-D01	23.9	Visible black/brown hydrocarbon, strong petroleum-like odor and sheen	Odor and sheen	3	**42,000 B**	**52,000 Y**	**94,000**	93.21	58.96	Max depth D01 was 22 feet
TG-A6	07/31/2013	TG-A6-36	36.0 ft	TG-A06	2.0	NAPL Observed, strong odor and sheen	Visible LNAPL	3	**30,000**	**38,000**	**68,000**	199.74	116.71	
TG-D0	07/24/2013	TG-D0-12	12.0 ft	TG-D00	2.0	Black/brown stain, very strong odor and sheen	Visible LNAPL	3	**30,000**	**33,000**	**63,000**	309.43	71.49	
TG-D4	07/30/2013	TG-D4-37	37.0 ft	TG-D04	2.0	Strong odor and sheen, and visible NAPL	Visible LNAPL	3	**7,100**	**8,000**	**15,100**	562.06	299.96	
TG-D6	07/30/2013	TG-D6-17	17.0 ft	TG-D06	2.0	At 17 feet, transition from visible product in fine sand (15-17) to no odor or sheen in clayey silt (17-20)	Visible LNAPL, transition	3	**1,000**	**1,400**	**2,400**	378.94	213.51	
TG-D6	07/31/2013	TG-D6-29	29.0 ft	TG-D06	2.0	NAPL saturated, stained black	Visible LNAPL	3	**27,000**	**31,000**	**58,000**	441.19	273.09	
TG-D6	07/30/2013	TG-D6-48	48.0 ft	TG-D06	2.0	Stained black, strong odor and sheen, free product	Visible LNAPL	3	**3,800**	**4,900**	**8,700**	308.69	180.52	
TG-E8	07/30/2013	TG-E8-24	24.0 ft	TG-E08	2.0	Stained black, strong odor and sheen	Visible LNAPL	3	**31,000**	**41,000**	**72,000**	631.84	323.79	
TG-F2	07/31/2013	TG-F2-36	36.0 ft	TG-F02	2.0	Strong odor, strong sheen, intermittent visible NAPL	Visible LNAPL, intermittent	3	**320**	**370**	**690**	97.48	35.47	
TG-F6	08/01/2013	TG-F6-29	29.0 ft	TG-F06	2.0	No observation	Visible LNAPL	3	**23,000**	**29,000**	**52,000**	164.66	89.67	
MWD-3	07/24/2014	MWD-3-39	39.0 ft	TG-F06	15.6	Black/brown drainable oil NAPL present, strong sheen and hydrocarbon odor	Visible LNAPL	3	**4,600**	**5,100**	**9,700**	106.44	67.25	
MWD-3	07/25/2014	MWD-3-42.5-2	42.5 ft	TG-F06	15.6	Drainable oil NAPL, strong sheen	Visible LNAPL	3	**2,400**	**2,700**	**5,100**	145.21	82.64	
OHM-1	07/30/2014	OHM-1-36-2	36.0 ft	TG-D04	11.1	Oil saturated, strong hydrocarbon odor and sheen	Visible LNAPL	3	**29,000**	**29,000**	**58,000**	562.06	267.76	
OHM-1	07/30/2014	OHM-1-43	43.0 ft	TG-D04	11.1	Oil saturated, strong hydrocarbon odor and sheen	Visible LNAPL	3	**18,000**	**22,000**	**40,000**	239.04	147.09	
OHM-1	07/30/2014	OHM-1-50	50.0 ft	TG-D04	11.1	Oil saturated, strong hydrocarbon odor and sheen	Visible LNAPL	3	**22,000**	**23,000**	**45,000**	262.04	154.02	
OHM-1	07/30/2014	OHM-1-75	75.0 ft	TG-D04	11.1	Oil, strong hydrocarbon odor and sheen	Visible LNAPL	3	**2,400**	**2,500**	**4,900**	11.68	3.42	
OHM-2	07/28/2014	OHM-2-17	17.0 ft	TG-C06	10.1	Clayey, less frequent NAPL, but still present in discreet pockets	Visible LNAPL	3	**7,600**	**8,100**	**15,700**	84.27	52.14	
OHM-2	07/28/2014	OHM-2-34	34.0 ft	TG-C06	10.1	Black/brown stained, strong hydrocarbon odor and sheen, drainable oil	Visible LNAPL	3	**42,000**	**44,000**	**86,000**	167.59	103.26	
OHM-2	07/28/2014	OHM-2-36.5	36.5 ft	TG-C06	10.1	Oil saturated, strong hydrocarbon odor and sheen	Visible LNAPL	3	**29,000**	**30,000**	**59,000**	135.23	95.49	
OHM-3	07/28/2014	OHM-3-34-2	34.0 ft	TG-A05A06	18.4/11.3	Oil saturated zones, strong hydrocarbon odor and sheen, DO	Visible LNAPL	3	**5,400**	**5,600**	**11,000**	199.74	97.08	
OHM-4	07/28/2014	OHM-4-25-2	25.0 ft	TG-E00-W50	15.2	Black/brown NAPL present, drainable oil	Visible LNAPL, not mobile	3	**5,500**	**5,600**	**11,100**	45.60	35.73	No mobile NAPL in well OHM-4
OHM-1	11/01/2016	OHM-1-51	50.0-51.0 ft	TG-D04	11.1	Visible oil NAPL, strong sheen	Visible LNAPL	3	**2,190**	**2,000**	**4,190**	262.04	145.51	
OHM-2	10/25/2016	OHM-2-38	36.0-38.0 ft	TG-C05	14.4	Visible oil NAPL, strong sheen	Visible LNAPL	3	**15,900**	**16,100**	**32,000**	111.85	49.02	
OHM-3	10/20/2016	OHM-3-26	25.0-26.0 ft	TG-A05A06	18.4/11.3	Silt lens with less NAPL oil presence, strong sheen	Visible LNAPL	3	**6,940**	**6,910**	**13,850**	140.10	60.21	
OHM-3	10/20/2016	OHM-3-34	33.0-34.0 ft	TG-A05A06	18.4/11.3	Visible oil NAPL, strong sheen	Visible LNAPL	3	**9,010**	**9,670**	**18,680**	199.74	97.08	
OHM-4	10/20/2016	OHM-4-25	25.0-25.5 ft	TG-E00-W50	15.2	basalt	Visible LNAPL, not mobile	3	**104**	**113**	**217**	38.67	30.66	Max depth E00-W50 was 25 feet

Notes:
Location = soil boring installed between 2002 and 2018 within extent of LIF investigation.
Nearest LIF Boring and Distance = nearest LIF boring to soil boring under "Location". Location OHM-3 boring log matched portions of TG-A05 and TG-A06. TG-## soil confirmation borings advanced adjacent to LIF borings (approximately 2 to 5 feet).
General Petroleum Hydrocarbon Observation and PHC Value - generalization of the PHC observation and assigned value in parentheses ( ). None (0), Weak odor or sheen (1), Odor and Sheen (Residual LNAPL) (2), Visible or Drainable LNAPL (3)
Sample Interval PHC Observation - detailed observation from sample interval in soil boring
NWTPH-Dx - Ecology Method Northwest Total Petroleum Hydrocarbons as Diesel Extended (NWTPH-Dx) with and without silica gel cleanup (SGC).
DRO = diesel-range organics; ORO - oil-range organics. Hits Only Total TPH-Dx = Total TPH-Dx concentrations were calculated by summing DRO and ORO concentrations (detections only).
34300 Detected concentrations above the cleanup level are shaded blue and bolded. **1700** Detected concentrations at or above the method reporting limit are shown in bold. " < " denotes not detected at or above the indicated method reporting limit.
MAX LIF 3-ft (%RE) = maximum LIF percent reference emitter (%RE) response in a 3-foot interval at the soil sample depth.
AVG LIF 3-ft (%RE) = average LIF %RE response in a 3-foot interval at the soil sample depth.

SUMMARY OF SOIL BORINGS COMPLETED - AUGUST 2016 THROUGH AUGUST 2018
BNSF Wishram Railyard, Wishram, Washington

Boring ID	Date Completed	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Boring Depth (feet bgs)	Temporary Well Screen Interval (feet bgs)	Temporary Well Screen Interval (feet amsl)	Temporary Well Screen Length	Soil Samples Collected (feet bgs)
2016 RI Borings									
B-16-01	10/18/2016	118068.29	1520640.05	173.42	10	--	--	--	7 - 8
B-16-02	10/13/2016	118165.60	1520556.28	173.60	30	--	--	--	18 - 19 23.5 - 24.5
B-16-03	10/13/2016	118223.54	1520597.36	173.62	23.9	--	--	--	21 - 22
B-16-04	08/11/2016	118092.76	1520362.98	172.77	15	--	--	--	4 - 5 9 - 10
B-16-05	08/11/2016	118090.75	1520398.00	173.00	15	--	--	--	3 - 4 9 - 10
B-16-06	08/05/2016	118575.86	1520542.36	180.43	7	--	--	--	4 - 5 6 - 7
B-16-07	08/02/2016	118595.57	1520580.26	179.96	17	--	--	--	10 - 11 16 - 17
B-16-08	08/05/2016	118588.91	1520661.52	178.02	25	--	--	--	13 - 14 24 - 25
B-16-09	08/09/2016	118123.33	1520971.04	172.43	20	10 - 20	162.43 - 152.43	10	14 - 15
B-16-10	08/08/2016	118229.59	1521170.64	173.17	15	10 - 15	163.17 - 158.17	5	9 - 10
B-16-11	08/08/2016	118246.96	1521211.95	172.95	15	10 - 15	162.95 - 157.95	5	11 - 12
B-16-12	08/09/2016	118294.88	1520850.02	173.69	15	10 - 15	163.69 - 158.69	5	9 - 10
B-16-13	08/08/2016	118465.35	1521385.71	173.09	15	10.1 - 15.1	162.99 - 157.99	5	10 - 11
B-16-14	08/08/2016	118432.23	1521376.06	172.94	15	10 - 15	162.94 - 157.94	5	9 - 10
B-16-15	08/09/2016	118961.75	1521930.51	173.83	15	10 - 15	163.63 - 154.63	5	11 - 12
B-16-16	08/09/2016	118982.30	1521972.28	174.63	20	10 - 20	164.63 - 154.63	10	11 - 12
B-16-17	08/09/2016	118709.12	1521285.77	174.15	15	10 - 15	164.15 - 159.15	5	9 - 10
B-16-18	08/11/2016	118338.76	1520859.28	173.68	15	10 - 15	163.68 - 158.68	5	9 - 10
B-16-19	08/08/2016	118347.15	1520981.94	173.52	15	10 - 15	163.52 - 158.52	5	11 - 12
B-16-20	08/08/2016	118388.63	1521071.53	173.57	15	10 - 15	163.57 - 158.57	5	9 - 10
B-16-21	08/08/2016	118297.80	1520992.95	172.99	15	10 - 15	162.99 - 157.99	5	12 - 13
B-16-22	08/09/2016	118278.43	1521039.07	172.36	15	10 - 15	162.36 - 157.36	5	9 - 10
B-16-23	08/08/2016	118322.60	1521125.39	172.85	15	10 - 15	162.85 - 157.85	5	9 - 10
B-16-24	08/10/2016	118364.99	1521139.20	173.75	30	10 - 15 25 - 30	163.75 - 158.75 148.75 - 143.75	5 5	11 - 12 29 - 30
2018 RI Borings									
B-18-01	08/16/2018	118357.15	1520902.955	173.18	15	10 - 15	163.18 - 158.18	5	3 - 3.5 9.5 - 10
B-18-02	08/16/2018	118377.763	1520944.741	173.70	15	10 - 15	163.70 - 158.70	5	2 - 2.5 9.5 - 10
B-18-03	08/16/2018	118396.506	1520982.382	173.69	15	10 - 15	163.69 - 158.69	5	2 - 2.5 9.5 - 10
B-18-04	08/16/2018	118418.64	1521030.013	173.51	15	10 - 15	163.51 - 158.51	5	2 - 2.5 9.5 - 10
B-18-05	08/16/2018	118438.882	1521075.044	173.42	15	10 - 15	163.42 - 158.42	5	2 - 2.5 9.5 - 10

SUMMARY OF SOIL BORINGS COMPLETED - AUGUST 2016 THROUGH AUGUST 2018
BNSF Wishram Railyard, Wishram, Washington

Boring ID	Date Completed	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Boring Depth (feet bgs)	Temporary Well Screen Interval (feet bgs)	Temporary Well Screen Interval (feet amsl)	Temporary Well Screen Length	Soil Samples Collected (feet bgs)
B-18-06	08/13/2018	118296.226	1520935.316	173.26	15	10 - 15	163.26 - 158.26	5	2 - 2.5 9.5 - 10
B-18-07	08/14/2018	118334.56	1520963.101	173.50	15	10 - 15	163.50 - 158.50	5	2 - 2.5 9.5 - 10
B-18-08	08/13/2018	118383.08	1521063.308	173.61	15	5 -15	168.61 - 158.61	10	2 - 2.5 9.5 - 10
B-18-09	08/20/2018	118311.587	1521025.526	173.99	15	10 - 15	163.99 - 158.99	5	2 - 2.5 9.5 - 10
B-18-10	08/20/2018	118335.717	1521080.374	174.11	15	10 - 15	164.11 - 159.11	5	2 - 2.5 9.5 - 10
B-18-11	08/20/2018	118353.261	1521115.317	174.03	15	10 - 15	164.03 - 159.03	5	2 - 2.5 9.5 - 10
B-18-12	08/14/2018	118288.803	1521093.978	172.46	15	10 - 15	162.46 - 157.46	5	2 - 2.5 9.5 - 10
B-18-13	08/14/2018	118241.991	1521113.127	172.62	15	5 - 15	167.62 - 157.62	10	2 - 2.5 12 - 12.5
B-18-14	08/09/2018	118185.242	1521115.205	173.28	27	10 - 15	163.28 - 158.28	5	2 - 2.5 9.5 - 10 26 - 26.5
B-18-15	08/13/2018	118156.165	1521070.333	173.92	15	10 - 15	163.92 - 158.92	5	2 - 2.5 12 - 12.5
B-18-16	08/09/2018	118165.58	1521022.19	172.53	20	10 - 15	162.53 - 157.53	5	2 - 2.5 9 - 9.5
B-18-17	08/13/2018	118143.531	1520969.608	171.47	15	10 - 15	161.47 - 156.47	5	2 - 2.5 9 - 9.5
B-18-18	08/21/2018	118119.642	1520930.918	171.56	68	10 - 20	161.56 - 151.56	10	1.5 - 2 14.14.5 47 - 47.5 52.5 - 53 67.5 - 68
B-18-19	08/20/2018	118097.495	1520864.994	171.69	15	10 - 15	161.69 - 156.69	5	2 - 2.5 9.5 - 10
B-18-20	08/20/2018	118114.771	1520838.861	171.54	15	--	--	--	2 - 2.5 12 - 12.5
B-18-21	08/20/2018	118081.818	1520816.482	174.77	20	15 - 20	159.77 - 154.77	5	3 - 3.5 7.5 - 8
B-18-22	08/16/2018	118258.013	1521188.826	173.65	15	10 - 15	163.65 - 158.65	5	2 - 2.5 9.5 - 10
B-18-23	08/17/2018	118309.166	1520778.163	173.01	15	10 - 15	163.01 - 158.01	5	2 - 2.5 3 - 3.5 9.5 - 10
B-18-24	08/21/2018	118376.613	1520495.793	174.59	27	14 - 19	160.59 - 155.59	5	2 - 2.5 9 - 9.5 13.5 - 14 22.5 - 23
B-18-25	08/21/2018	118417.34	1520629.027	174.57	14	9 - 14	165.57 - 160.57	5	2 - 2.5 9.5 - 10

SUMMARY OF SOIL BORINGS COMPLETED - AUGUST 2016 THROUGH AUGUST 2018
BNSF Wishram Railyard, Wishram, Washington

Boring ID	Date Completed	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Boring Depth (feet bgs)	Temporary Well Screen Interval (feet bgs)	Temporary Well Screen Interval (feet amsl)	Temporary Well Screen Length	Soil Samples Collected (feet bgs)
B-18-26	08/15/2018	118696.339	1522131.985	171.73	15	10 - 15	161.73 - 156.73	5	2 - 2.5 7.5 - 8
B-18-27	08/15/2018	118625.432	1521954.443	171.51	15	10 - 15	161.51 - 156.51	5	2 - 2.5 8 - 8.5
B-18-28	08/15/2018	118559.66	1521794.52	171.55	15	10 - 15	161.55 - 156.55	5	2 - 2.5 7.5 - 8
B-18-29	08/15/2018	118513.909	1521744.581	171.06	15	5 - 15	166.06 - 156.06	10	2 - 2.5 9.5 - 10
B-18-30	08/15/2018	118447.297	1521724.915	176.05	20	15 - 20	166.05 - 156.05	5	2 - 2.5 9.5 - 10

Notes:

Reconnaissance groundwater sample was not collected from boring B-18-25 due to insufficient recharge of temporary well.
Soil borings were surveyed by KPG, Inc. of Tacoma, Washington in 2016 and 2018 to determine their vertical elevation (using NAVD88 datum) and horizontal position (using Washington State Plane Coordinates, NAD83).

amsl = above mean sea level
bgs = below ground surface

TABLE 6

SUMMARY OF MONITORING WELL CONSTRUCTION
BNSF Wishram Railyard, Wishram, Washington

Well ID	Installation Date	Ecology Well Tag ID No.	Northing (feet)	Easting (feet)	Top of Casing Elevation[a] (feet amsl)	Flushmount Lid Elevation (feet amsl)	Well Depth (feet bgs)	Well Screen Diameter and Material[b]	Screen Interval (feet bgs)	Screen Interval (feet amsl)	Screen Length (feet)
Shallow Monitoring Wells[c]											
WMW-1	09/12/2003	AHQ578	118101.05	1520597.16	172.42	172.98	20	2-inch PVC	10 - 20	162.98 - 152.98	10
WMW-3	09/12/2003	AHQ580	118194.16	1520598.29	172.97	173.44	20	2-inch PVC	10 - 20	163.44 - 153.44	10
WMW-5	04/05/2004	AKS192	118234.80	1520759.98	172.61	172.99	25	2-inch PVC	15 - 25	157.99 - 147.99	10
WMW-7	04/05/2004	AKS194	118349.93	1520548.97	174.12	174.71	20	2-inch PVC	10 - 20	164.71 - 154.71	10
WMW-8 [d]	02/03/2012	RE06703	118297.12	1520437.09	173.65	174.18	22	2-inch PVC	7 - 22	167.18 - 152.18	15
WMW-9 [d]	02/02/2012	RE06703	118150.38	1520456.83	173.12	173.80	23.5	2-inch PVC	8.5 - 23.5	165.30 - 150.30	15
WMW-10 [d]	02/02/2012	RE06703	118082.76	1520444.31	172.96	173.53	22.5	2-inch PVC	7.5 - 22.5	166.03 - 151.03	15
WMW-11 [d]	02/03/2012	RE06703	118082.47	1520522.35	172.89	173.35	22	2-inch PVC	7 - 22	166.35 - 151.35	15
WMW-12	10/11/2016	BJX218	118232.55	1520334.13	173.25	173.58	25	2-inch PVC	6 - 21	167.58 - 152.58	15
WMW-13	10/11/2016	BJX219	118115.77	1520385.06	173.58	173.84	25	2-inch PVC	6 - 21	167.84 - 152.84	15
WMW-14	10/18/2016	BJX228	118058.74	1520450.04	177.15	177.58	30	2-inch PVC	12 - 27	165.58 - 150.58	15
WMW-15	10/18/2016	BJX227	118060.70	1520514.17	176.99	177.35	30	2-inch PVC	12 - 27	165.35 - 150.35	15
WMW-16	10/17/2016	BJX222	118055.77	1520597.43	176.74	176.94	30	2-inch PVC	11.33 - 26.33	165.61 - 150.61	15
WMW-17	10/13/2016	BJX224	118048.42	1520674.59	176.54	177.01	30	2-inch PVC	12 - 27	165.01 - 150.01	15
WMW-18	10/12/2016	BJX220	118060.67	1520761.30	176.72	177.05	30	2-inch PVC	12 - 27	165.05 - 150.05	15
WMW-19	07/31/2018	BKL001	118053.08	1520376.20	176.99	177.27	21.5	2-inch PVC	11.5 - 21.5	165.77 - 155.77	10
WMW-20	08/02/2018	BKL002	118072.91	1520868.44	176.92	177.18	21.5	2-inch PVC	11.5 - 21.5	165.68 - 155.68	10
WMW-21	08/07/2018	BKL009	118086.23	1520957.27	176.06	176.36	21.5	2-inch PVC	11.5 - 21.5	164.86 - 154.86	10
WMW-22	08/07/2018	BKL010	118153.92	1521131.00	176.37	176.68	21.5	2-inch PVC	11.5 - 21.5	165.18 - 155.18	10
WMW-23	08/06/2018	BKL011	118198.10	1521229.78	176.15	176.43	21.5	2-inch PVC	11.5 - 21.5	164.93 - 154.93	10
WMW-24	08/02/2018	BKL003	118278.95	1520806.69	173.20	173.51	17	2-inch PVC	7 - 17	166.51 - 156.51	10
WMW-26	08/03/2018	BKL006	118354.84	1521006.08	173.48	173.79	17	2-inch PVC	7 - 17	166.79 - 156.79	10
WMW-27	08/03/2018	BKL005	118255.49	1521044.81	172.14	172.40	17	2-inch PVC	7 - 17	165.40 - 155.40	10
WMW-28	08/02/2018	BKL004	118227.24	1520890.14	172.22	172.55	17	2-inch PVC	7 - 17	165.55 - 155.55	10
WMW-29	08/03/2018	BKL007	118380.39	1521178.63	173.49	173.74	17	2-inch PVC	7 - 17	166.74 - 156.74	10
WMW-30	08/06/2018	BKL008	118449.49	1521397.13	172.94	173.21	17	2-inch PVC	7 - 17	166.21 - 156.21	10
WMW-31	08/08/2018	BKL012	118721.84	1521266.72	173.24	173.47	17	2-inch PVC	7 - 17	166.47 - 156.47	10
WMW-32	08/08/2018	BKL013	118953.33	1521922.05	173.78	174.03	17	2-inch PVC	7 - 17	167.03 - 157.03	10

SUMMARY OF MONITORING WELL CONSTRUCTION
BNSF Wishram Railyard, Wishram, Washington

Well ID	Installation Date	Ecology Well Tag ID No.	Northing (feet)	Easting (feet)	Top of Casing Elevation[a] (feet amsl)	Flushmount Lid Elevation (feet amsl)	Well Depth (feet bgs)	Well Screen Diameter and Material[b]	Screen Interval (feet bgs)	Screen Interval (feet amsl)	Screen Length (feet)
Deep Monitoring Wells[b]											
RMD-1	10/12/2016	BJX223	118060.34	1520519.17	176.89	177.30	44.6	2-inch PVC	29.6 - 44.6	147.70 - 132.70	15
RMD-2	10/14/2016	BJX226	118055.39	1520602.01	176.59	176.82	50	2-inch PVC	30 - 50	146.82 - 126.82	20
RMD-3	10/14/2016	BJX225	118048.23	1520679.29	176.90	177.18	60	2-inch PVC	40 - 60	137.18 - 117.18	20
RMD-4	10/12/2016	BJX221	118060.86	1520765.80	176.79	177.11	65	2-inch PVC	45 - 65	132.11 - 112.11	20
RMD-5	08/20/2018	BLK014	118058.78	1520457.20	176.65	177.41	45	2-inch PVC	30 - 45	147.41 - 132.41	15
RMD-6	08/21/2018	BLK015	118073.77	1520875.03	176.55	177.20	65	2-inch PVC	45 - 65	132.20 - 112.20	20
Oil Head Monitoring Wells											
OHM-1	11/02/2016	BJX232	118166.15	1520658.80	172.68	173.05	80.5	4-inch PVC	15 - 80	158.05 - 93.05	65
OHM-2	10/27/2016	BJX230	118183.98	1520688.80	172.73	173.04	51.5	4-inch PVC	16 - 51	157.04 - 122.04	35
OHM-3	10/28/2016	BJX229	118245.91	1520690.92	172.82	173.12	42.2	4-inch PVC	16.8 - 41.8	156.32 - 131.32	25
OHM-4 [e]	10/20/2016	BJX231	118158.29	1520505.62	173.51	173.80	25.8	4-inch Steel	20.4 - 25.4	153.40 - 148.40	5

Notes:

(a) Deep monitoring well screens constructed with 2-inch diameter Schedule 40 polyvinyl chloride (PVC) screen with 0.020-inch slot size.
(b) Oil head monitoring well screens constructed with 4-inch diameter Schedule 40 PVC pre-packed screen with 0.040-inch slot size.
(c) Shallow monitoring well screens constructed with 2-inch diameter Schedule 40 PVC screen with 0.010-inch slot size.
(d) Well identification (ID) tag numbers unknown / not assigned for wells WMW-8 through WMW-11. Notice of intent numbers shown.
(e) OHM-4 well screen constructed with 4-inch diameter type 304 stainless steel screen with 0.040-inch slot size.

Ecology Well Tag ID No. = Unique well tag ID assigned by State of Washington Department of Ecology.
amsl = above mean sea level
bgs = below ground surface
Monitoring wells were surveyed by KPG, Inc. of Tacoma, Washington in 2016 and 2018 to determine their vertical elevation (using NAVD88 datum) and horizontal position (using Washington State Plane Coordinates, NAD83).

TABLE 7

SUMMARY OF REMEDIAL INVESTIGATION SOIL SAMPLES COLLECTED - AUGUST 2016 TO AUGUST 2018
BNSF Wishram Railyard, Wishram, Washington

Location ID	Sample ID	Parent ID	Soil Sampling Depth (feet bgs) [(a)]	Total Boring Depth (feet bgs)	Sample Date	Total Boring Depth (feet bgs)	Area/Description	Analytical Tests									
								NWTPH-Dx (Diesel and Oil) without SGC	NWTPH-Dx (Diesel and Oil) with SGC	NWTPH-Gx (Gasoline)	Polycyclic Aromatic Hydrocarbons (PAHs)	Semivolatile Organic Compounds (SVOCs)	BTEX Only	Volatile Organic Compounds (VOCs) including BTEX	Metals (RCRA 8)	Polychlorinated Biphenyls (PCBs)	Field Duplicate Collected?
2016 Soil Borings																	
B-16-01	B-16-01-07		7.0-8.0 ft	10	10/18/2016	10	Vadose Boring		1		1	1	1	1			
B-16-02	B-16-02-19		18.0-19.0 ft	30	10/13/2016	30	Potential Submerged Diesel NAPL	1	1		1						
B-16-03	B-16-03-22		21.0-22.0 ft	23.9	10/13/2016	23.9	Potential Submerged Diesel NAPL	1	1		1						
B-16-04	B-16-04-04		4.0-5.0 ft	15	8/11/2016	15	Former Transformer Storage Area									1	
B-16-04	B-16-04-10		9.0-10.0 ft	15	8/11/2016	15	Former Transformer Storage Area									1	
B-16-05	B-16-05-04		3.0-4.0 ft	15	8/11/2016	15	Former Transformer Storage Area									1	
B-16-05	B-16-05-10		9.0-10.0 ft	15	8/11/2016	15	Former Transformer Storage Area									1	
B-16-06	B-16-06-05		4.0-5.0 ft	7	8/5/2016	7	Former 30,000-Barrel AST Area	1			1						
B-16-06	B-16-06-07		6.0-7.0 ft	7	8/5/2016	7	Former 30,000-Barrel AST Area	1			1						
B-16-07	B-16-07-11		10.0-11.0 ft	17	8/5/2016	17	Former 30,000-Barrel AST Area	1			1						
B-16-07	B-16-07-17		16.0-17.0 ft	17	8/5/2016	17	Former 30,000-Barrel AST Area	1			1						
B-16-08	B-16-08-14		13.0-14.0 ft	25	8/5/2016	25	Former 30,000-Barrel AST Area	1			1						
B-16-08	B-16-08-25		24.0-25.0 ft	25	8/5/2016	25	Former 30,000-Barrel AST Area	1			1						
B-16-09	B-16-09-15		14.0-15.0 ft	20	8/9/2016	20	Former Repair Shops		1		1		1	1	1		
B-16-10	B-16-10-10FT		9.0-10.0 ft	15	8/8/2016	15	Former Repair Shops	1			1		1	1	1		
B-16-11	B-16-11-12FT		11.0-12.0 ft	15	8/8/2016	15	Former Repairs Shops	1			1		1	1	1		
B-16-12	B-16-12-10		9.0-10.0 ft	15	8/9/2016	15	Former Washrack		1		1		1	1	1		
B-16-13	B-16-13-11FT		10.0-11.0 ft	15	8/8/2016	15	Former Oil House (E Store House)	1			1		1	1	1		
B-16-14	B-16-14FT		9.0-10.0 ft	15	8/8/2016	15	Former Oil House (E Store House)	1			1		1	1	1		
B-16-15	B-16-15-12FT		11.0-12.0 ft	15	8/9/2016	15	Former Oil House and 1,000-gallon Gasoline UST	1		1	1		1				
B-16-16	B-16-16-12FT		11.0-12.0 ft	20	8/9/2016	20	Former Oil House and 1,000-gallon Gasoline UST	1		1	1		1				
B-16-17	B-16-17-10FT		9.0-10.0 ft	15	8/9/2016	15	Former 5,000-gallon Oil UST	1									

SUMMARY OF REMEDIAL INVESTIGATION SOIL SAMPLES COLLECTED - AUGUST 2016 TO AUGUST 2018
BNSF Wishram Railyard, Wishram, Washington

Location ID	Sample ID	Parent ID	Soil Sampling Depth (feet bgs) [(a)]	Total Boring Depth (feet bgs)	Sample Date	Total Boring Depth (feet bgs)	Area/Description	Analytical Tests									
								NWTPH-Dx (Diesel and Oil) without SGC	NWTPH-Dx (Diesel and Oil) with SGC	NWTPH-Gx (Gasoline)	Polycyclic Aromatic Hydrocarbons (PAHs)	Semivolatile Organic Compounds (SVOCs)	BTEX Only	Volatile Organic Compounds (VOCs) including BTEX	Metals (RCRA 8)	Polychlorinated Biphenyls (PCBs)	Field Duplicate Collected?
B-16-18	B-16-18-10		9.0-10.0 ft	15	8/11/2016	15	Former Engine House / Machine Shop		1		1		1	1	1		Y
B-16-18	DUP-0811	B-16-18-10	9.0-10.0 ft	15	8/11/2016	15	Former Engine House / Machine Shop		1		1		1	1	1		
B-16-19	B-16-19-12FT		11.0-12.0 ft	15	8/8/2016	15	Former Engine House / Machine Shop	1			1		1	1	1		
B-16-20	B-16-20-10FT		9.0-10.0 ft	15	8/8/2016	15	Former Engine House / Machine Shop	1			1		1	1	1		
B-16-21	B-16-21-13FT		12.0-13.0 ft	15	8/8/2016	15	Former Engine House / Machine Shop	1			1		1	1	1		
B-16-22	B-16-22-10FT		9.0-10.0 ft	15	8/9/2016	15	Former Engine House / Machine Shop	1			1		1	1	1		Y
B-16-22	DUP-0809	B-16-22-10FT	9.0-10.0 ft	15	8/9/2016	15	Former Engine House / Machine Shop	1			1		1	1	1		
B-16-23	B-16-23-10FT		9.0-10.0 ft	15	8/8/2016	15	Former Engine House / Machine Shop	1			1		1	1	1		
B-16-24	B-16-24-12		11.0-12.0 ft	30	8/10/2016	30	Former Engine House / Machine Shop		1		1		1	1	1		
B-16-24	B-16-24-29		29.0-30.0 ft	30	8/10/2016	30	Former Engine House / Machine Shop		1		1		1	1	1		
2018 Soil Borings																	
B-18-01	B-18-01(3.0-3.5)		3.0-3.5 ft	15	8/16/2018	15	Former Engine House	1	1		1		1	1	1		
B-18-01	B-18-01(9.5-10.0)		9.5-10.0 ft	15	8/16/2018	15	Former Engine House	1	1		1		1	1	1		
B-18-02	B-18-02(2.0-2.5)		2.0-2.5 ft	15	8/16/2018	15	Former Engine House	1			1		1	1	1		
B-18-02	B-18-02(9.5-10.0)		9.5-10.0 ft	15	8/16/2018	15	Former Engine House	1			1		1	1	1		
B-18-03	B-18-03(2.0-2.5)		2.0-2.5 ft	15	8/16/2018	15	Former Engine House	1			1		1	1	1		
B-18-03	B-18-03(9.5-10.0)		9.5-10.0 ft	15	8/16/2018	15	Former Engine House	1			1		1	1	1		Y
B-18-03	DUP-03-20180816	B-18-03(9.5-10.0)	9.5-10.0 ft	15	8/16/2018	15	Former Engine House	1			1		1	1	1		
B-18-04	B-18-04(2.0-2.5)		2.0-2.5 ft	15	8/16/2018	15	Former Engine House	1			1		1	1	1		
B-18-04	B-18-04(9.5-10.0)		9.5-10.0 ft	15	8/16/2018	15	Former Engine House	1			1		1	1	1		
B-18-05	B-18-05(2.0-2.5)		2.0-2.5 ft	15	8/16/2018	15	Former Engine House	1			1		1	1	1		
B-18-05	B-18-05(9.5-10.0)		9.5-10.0 ft	15	8/16/2018	15	Former Engine House	1			1		1	1	1		

SUMMARY OF REMEDIAL INVESTIGATION SOIL SAMPLES COLLECTED - AUGUST 2016 TO AUGUST 2018
BNSF Wishram Railyard, Wishram, Washington

Location ID	Sample ID	Parent ID	Soil Sampling Depth (feet bgs) [(a)]	Total Boring Depth (feet bgs)	Sample Date	Total Boring Depth (feet bgs)	Area/Description	Analytical Tests									
								NWTPH-Dx (Diesel and Oil) without SGC	NWTPH-Dx (Diesel and Oil) with SGC	NWTPH-Gx (Gasoline)	Polycyclic Aromatic Hydrocarbons (PAHs)	Semivolatile Organic Compounds (SVOCs)	BTEX Only	Volatile Organic Compounds (VOCs) including BTEX	Metals (RCRA 8)	Polychlorinated Biphenyls (PCBs)	Field Duplicate Collected?
B-18-06	B-18-06(2.0-2.5)		2.0-2.5 ft	15	8/10/2018	15	Former Engine House	1	1		1		1	1	1		
B-18-06	B-18-06(9.5-10.0)		9.5-10.0 ft	15	8/13/2018	15	Former Engine House	1	1		1		1	1	1		
B-18-07	B-18-07(2.0-2.5)		2.0-2.5 ft	15	8/10/2018	15	Former Engine House	1			1		1	1	1		
B-18-07	B-18-07(9.5-10.0)		9.5-10.0 ft	15	8/14/2018	15	Former Engine House	1			1		1	1	1		
B-18-08	B-18-08(2.0-2.5)		2.0-2.5 ft	15	8/10/2018	15	Former Engine House	1			1		1	1	1		
B-18-08	B-18-08(9.5-10.0)		9.5-10.0 ft	15	8/14/2018	15	Former Engine House	1			1		1	1	1		
B-18-09	B-18-09(2.0-2.5)		2.0-2.5 ft	15	8/20/2018	15	Former Engine House	1			1		1	1	1		
B-18-09	B-18-09(9.5-10.0)		9.5-10.0 ft	15	8/20/2018	15	Former Engine House	1			1		1	1	1		
B-18-10	B-18-10(2.0-2.5)		2.0-2.5 ft	15	8/17/2018	15	Former Engine House	1			1		1	1	1		
B-18-10	B-18-10(9.5-10.0)		9.5-10.0 ft	15	8/17/2018	15	Former Engine House	1			1		1	1	1		
B-18-11	B-18-11(2.0-2.5)		2.0-2.5 ft	15	8/17/2018	15	Former Engine House	1	1		1		1	1	1		
B-18-11	B-18-11(9.5-10.0)		9.5-10.0 ft	15	8/17/2018	15	Former Engine House	1	1		1		1	1	1		
B-18-12	B-18-12(2.0-2.5)		2.0-2.5 ft	15	8/10/2018	15	Oil Drain Lines	1			1		1	1	1		
B-18-12	B-18-12(9.5-10.0)		9.5-10.0 ft	15	8/14/2018	15	Oil Drain Lines	1			1		1	1	1		
B-18-13	B-18-13(2.0-2.5)		2.0-2.5 ft	15	8/10/2018	15	Oil Drain Lines	1			1		1	1	1		
B-18-13	B-18-13(12.0-12.5)		12.0-12.5 ft	15	8/14/2018	15	Oil Drain Lines	1			1		1	1	1		
B-18-14	B-18-14(2.0-2.5)		2.0-2.5 ft	27	8/8/2018	27	Oil Drain Lines	1			1		1	1	1		
B-18-14	B-18-14(9.5-10.0)		9.5-10.0 ft	27	8/9/2018	27	Oil Drain Lines	1			1		1	1	1		
B-18-14	B-18-14(26.0-26.5)		26.0-26.5 ft	27	8/9/2018	27	Oil Drain Lines	1			1		1	1	1		
B-18-15	B-18-15(2.0-2.5)		2.0-2.5 ft	15	8/8/2018	15	Oil Drain Lines	1			1		1	1	1		
B-18-15	B-18-15(12.0-12.5)		12.0-12.5 ft	15	8/13/2018	15	Oil Drain Lines	1			1		1	1	1		

SUMMARY OF REMEDIAL INVESTIGATION SOIL SAMPLES COLLECTED - AUGUST 2016 TO AUGUST 2018
BNSF Wishram Railyard, Wishram, Washington

Location ID	Sample ID	Parent ID	Soil Sampling Depth (feet bgs) [(a)]	Total Boring Depth (feet bgs)	Sample Date	Total Boring Depth (feet bgs)	Area/Description	Analytical Tests									
								NWTPH-Dx (Diesel and Oil) without SGC	NWTPH-Dx (Diesel and Oil) with SGC	NWTPH-Gx (Gasoline)	Polycyclic Aromatic Hydrocarbons (PAHs)	Semivolatile Organic Compounds (SVOCs)	BTEX Only	Volatile Organic Compounds (VOCs) including BTEX	Metals (RCRA 8)	Polychlorinated Biphenyls (PCBs)	Field Duplicate Collected?
B-18-16	B-18-16(2.0-2.5)		2.0-2.5 ft	20	8/8/2018	20	Oil Drain Lines	1			1		1	1	1		
B-18-16	B-18-16(9.0-9.5)		9.0-9.5 ft	20	8/9/2018	20	Oil Drain Lines	1			1		1	1	1		
B-18-17	B-18-17(2.0-2.5)		2.0-2.5 ft	15	8/10/2018	15	Oil Drain Lines	1	1		1		1	1	1		
B-18-17	B-18-17(9.0-9.5)		9.0-9.5 ft	15	8/13/2018	15	Oil Drain Lines	1	1		1		1	1	1		
B-18-18	B-18-18(1.5-2.0)		1.5-2.0 ft	68	8/8/2018	68	Oil Drain Lines	1			1		1	1	1		
B-18-18	B-18-18(14.0-14.5)		14.0-14.5 ft	68	8/9/2018	68	Oil Drain Lines	1			1		1	1	1		
B-18-18	B-18-18(47.0-47.5)		47.0-47.5 ft	68	8/9/2018	68	Oil Drain Lines	1			1		1	1	1		
B-18-18	B-18-18(52.5-53.0)		52.5-53.0 ft	68	8/21/2018	68	Oil Drain Lines	1			1		1	1	1		
B-18-18	B-18-18(67.5-68.0)		67.5-68.0 ft	68	8/21/2018	68	Oil Drain Lines	1			1		1	1	1		
B-18-19	B-18-19(2.0-2.5)		2.0-2.5 ft	15	8/17/2018	15	Shallow Well Transect - Former Oil/Water Seperator	1			1		1	1	1		
B-18-19	B-18-19(9.5-10.0)		9.5-10.0 ft	15	8/20/2018	15	Shallow Well Transect - Former Oil/Water Seperator	1			1		1	1	1		
B-18-20	B-18-20(2.0-2.5)		2.0-2.5 ft	15	8/17/2018	15	Shallow Well Transect - Former Oil/Water Seperator	1			1		1	1	1		
B-18-20	B-18-20(12.0-12.5)		12.0-12.5 ft	15	8/20/2018	15	Shallow Well Transect - Former Oil/Water Seperator	1			1		1	1	1		
B-18-21	B-18-21(3.0-3.5)		3.0-3.5 ft	20	8/17/2018	20	Shallow Well Transect - Former Oil/Water Seperator	1			1		1	1	1		
B-18-21	B-18-21(7.5-8.0)		7.5-8.0 ft	20	8/20/2018	20	Shallow Well Transect - Former Oil/Water Seperator	1			1		1	1	1		
B-18-22	B-18-22(2.0-2.5)		2.0-2.5 ft	15	8/16/2018	15	Former Repair Shop and Turntable	1			1		1	1	1		
B-18-22	B-18-22(9.5-10.0)		9.5-10.0 ft	15	8/16/2018	15	Former Repair Shop and Turntable	1			1		1	1	1		
B-18-23	B-18-23(3.0-3.5)		3.0-3.5 ft	15	8/17/2018	15	North of Former Washrack	1	1	1	1		1	1	1		
B-18-23	B-18-23(9.5-10.0)		9.5-10.0 ft	15	8/17/2018	15	North of Former Washrack	1	1	1	1		1	1	1		
B-18-24	B-18-24(2.0-2.5)		2.0-2.5 ft	27	8/21/2018	27	Former Boiler House and Maintenance Shop	1			1		1	1	1		
B-18-24	B-18-24(9.0-9.5)		9.0-9.5 ft	27	8/21/2018	27	Former Boiler House and Maintenance Shop	1			1		1	1	1		

SUMMARY OF REMEDIAL INVESTIGATION SOIL SAMPLES COLLECTED - AUGUST 2016 TO AUGUST 2018
BNSF Wishram Railyard, Wishram, Washington

Location ID	Sample ID	Parent ID	Soil Sampling Depth (feet bgs) [(a)]	Total Boring Depth (feet bgs)	Sample Date	Total Boring Depth (feet bgs)	Area/Description	Analytical Tests									
								NWTPH-Dx (Diesel and Oil) without SGC	NWTPH-Dx (Diesel and Oil) with SGC	NWTPH-Gx (Gasoline)	Polycyclic Aromatic Hydrocarbons (PAHs)	Semivolatile Organic Compounds (SVOCs)	BTEX Only	Volatile Organic Compounds (VOCs) including BTEX	Metals (RCRA 8)	Polychlorinated Biphenyls (PCBs)	Field Duplicate Collected?
B-18-24	B-18-24(13.5-14.0)		13.5-14.0 ft	27	8/21/2018	27	Former Boiler House and Maintenance Shop	1			1		1	1	1		
B-18-24	B-18-24(22.5-23.0)		22.5-23.0 ft	27	8/21/2018	27	Former Boiler House and Maintenance Shop	1			1		1	1	1		
B-18-25	B-18-25(2-2.5)		2.0-2.5 ft	14	8/21/2018	14	Former Boiler House and Maintenance Shop	1			1		1	1	1		Y
B-18-25	DUP-04-20180821	B-18-25(2-2.5)	2.0-2.5 ft	14	8/21/2018	14	Former Boiler House and Maintenance Shop	1			1		1	1	1		
B-18-25	B-18-25(9.5-10)		9.5-10.0 ft	14	8/21/2018	14	Former Boiler House and Maintenance Shop	1			1		1	1	1		
B-18-26	B-18-26(2.0-2.5)		2.0-2.5 ft	15	8/14/2018	15	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1		
B-18-26	B-18-26(7.5-8.0)		7.5-8.0 ft	15	8/15/2018	15	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1		
B-18-27	B-18-27(2.0-2.5)		2.0-2.5 ft	15	8/14/2018	15	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1		
B-18-27	B-18-27(8.0-8.5)		8.0-8.5 ft	15	8/15/2018	15	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1		
B-18-28	B-18-28(2.0-2.5)		2.0-2.5 ft	15	8/14/2018	15	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1		
B-18-28	B-18-28(7.5-8.0)		7.5-8.0 ft	15	8/15/2018	15	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1		
B-18-29	B-18-29(2.0-2.5)		2.0-2.5 ft	15	8/14/2018	15	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1		
B-18-29	B-18-29(9.5-10.0)		9.5-10.0 ft	15	8/15/2018	15	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1		
B-18-30	B-18-30(2.0-2.5)		2.0-2.5 ft	20	8/14/2018	20	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1		
B-18-30	B-18-30(9.5-10.0)		9.5-10.0 ft	20	8/15/2018	20	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1		
2016 and 2018 Well Installations																	
OHM-1	OHM-1-20		19.0-20.0 ft	80.5	11/1/2016	80.5	Former Power House Oilhead Monitoring		1								
OHM-1	OHM-1-51		50.0-51.0 ft	80.5	11/1/2016	80.5	Former Power House Oilhead Monitoring		1								
OHM-2	OHM-2-20		19.0-20.0 ft	51.5	10/25/2016	51.5	Former Power House Oilhead Monitoring		1								
OHM-2	OHM-2-38		36.0-38.0 ft	51.5	10/25/2016	51.5	Former Power House Oilhead Monitoring		1								
OHM-3	OHM-3-26		25.0-26.0 ft	42.2	10/20/2016	42.2	Former Power House Oilhead Monitoring		1								
OHM-3	OHM-3-34		33.0-34.0 ft	42.2	10/20/2016	42.2	Former Power House Oilhead Monitoring		1								
OHM-4	OHM-4-25		25.0-25.5 ft	25.8	10/20/2016	25.8	Former Power House Oilhead Monitoring		1								

TABLE 7

SUMMARY OF REMEDIAL INVESTIGATION SOIL SAMPLES COLLECTED - AUGUST 2016 TO AUGUST 2018
BNSF Wishram Railyard, Wishram, Washington

Location ID	Sample ID	Parent ID	Soil Sampling Depth (feet bgs) [(a)]	Total Boring Depth (feet bgs)	Sample Date	Total Boring Depth (feet bgs)	Area/Description	Analytical Tests									
								NWTPH-Dx (Diesel and Oil) without SGC	NWTPH-Dx (Diesel and Oil) with SGC	NWTPH-Gx (Gasoline)	Polycyclic Aromatic Hydrocarbons (PAHs)	Semivolatile Organic Compounds (SVOCs)	BTEX Only	Volatile Organic Compounds (VOCs) including BTEX	Metals (RCRA 8)	Polychlorinated Biphenyls (PCBs)	Field Duplicate Collected?
RMD-1	RMD-1-18		17.0-18.0 ft	44.6	8/5/2016	44.6	Deep Riverside Wells	1									
RMD-1	RMD-1-39		38.0-39.0 ft	44.6	8/5/2016	44.6	Deep Riverside Wells	1			1	1					
RMD-1	RMD-1-44.5		44.0-44.5 ft	44.6	8/5/2016	44.6	Deep Riverside Wells	1									
RMD-2	RMD-2-18		17.0-18.0 ft	50	8/4/2016	50	Deep Riverside Wells	1			1	1					
RMD-2	RMD-2-39		38.0-39.0 ft	50	8/4/2016	50	Deep Riverside Wells	1			1	1					
RMD-2	RMD-2-51		50.0-51.0 ft	50	8/5/2016	50	Deep Riverside Wells	1			1						
RMD-3	RMD-3-19		18.0-19.0 ft	60	8/3/2016	60	Deep Riverside Wells	1									
RMD-3	RMD-3-60		59.0-60.0 ft	60	8/4/2016	60	Deep Riverside Wells	1									
RMD-4	RMD-4-30		29.0-30.0 ft	65	8/2/2016	65	Deep Transect Wells	1									
RMD-4	RMD-4-60		59.0-60.0 ft	65	8/3/2016	65	Deep Transect Wells	1									
RMD-4	RMD-4-60R		59.0-60.0 ft	65	10/12/2016	65	Deep Transect Wells	1	1								Y
RMD-4	DUP-01	RMD-4-60R	59.0-60.0 ft	65	10/12/2016	65	Deep Transect Wells	1	1								
RMD-4	RMD-4-65		64.0-65.0 ft	65	10/12/2016	65	Deep Transect Wells	1									
RMD-5	RMD-5(2.0-2.5)		2.0-2.5 ft	45	7/30/2018	45	Additional Deep Riverside Wells	1			1		1	1	1		
RMD-5	RMD-5(7.5-8.0)		7.5-8.0 ft	45	7/31/2018	45	Additional Deep Riverside Wells	1			1		1	1	1		
RMD-5	RMD-5(29.5-30.0)		29.5-30.0 ft	45	7/31/2018	45	Additional Deep Riverside Wells	1			1		1	1	1		
RMD-5	RMD-5(49.5-50.0)		49.5-50.0 ft	45	7/31/2018	45	Additional Deep Riverside Wells	1			1		1	1	1		
RMD-6	RMD-6(2.0-2.5)		2.0-2.5 ft	65	7/30/2018	65	Additional Deep Riverside Wells	1			1		1	1	1		
RMD-6	RMD-6(9.5-10.0)		9.5-10.0 ft	65	8/1/2018	65	Additional Deep Riverside Wells	1			1		1	1	1		
RMD-6	RMD-6(44.5-45.0)		44.5-45.0 ft	65	8/1/2018	65	Additional Deep Riverside Wells	1			1		1	1	1		
RMD-6	RMD-6(70.5-71.0)		70.5-71.0 ft	65	8/3/2018	65	Additional Deep Riverside Wells	1			1		1	1	1		Y
RMD-6	DUP-01-20180801	RMD-6(70.5-71.0)	70.5-71.0 ft	65	8/1/2018	65	Additional Deep Riverside Wells	1			1		1	1	1		

SUMMARY OF REMEDIAL INVESTIGATION SOIL SAMPLES COLLECTED - AUGUST 2016 TO AUGUST 2018
BNSF Wishram Railyard, Wishram, Washington

Location ID	Sample ID	Parent ID	Soil Sampling Depth (feet bgs) [a]	Total Boring Depth (feet bgs)	Sample Date	Total Boring Depth (feet bgs)	Area/Description	Analytical Tests									
								NWTPH-Dx (Diesel and Oil) without SGC	NWTPH-Dx (Diesel and Oil) with SGC	NWTPH-Gx (Gasoline)	Polycyclic Aromatic Hydrocarbons (PAHs)	Semivolatile Organic Compounds (SVOCs)	BTEX Only	Volatile Organic Compounds (VOCs) including BTEX	Metals (RCRA 8)	Polychlorinated Biphenyls (PCBs)	Field Duplicate Collected?
WMW-12	MW-12-12		11.0-12.0 ft	25	10/11/2016	25	Additional Shallow Wells	1	1								
WMW-13	MW-13-12		11.0-12.0 ft	25	10/11/2016	25	Additional Shallow Wells	1	1								
WMW-14	MW-14-20		19.0-20.0 ft	30	10/18/2016	30	Shallow Transect Wells		1								
WMW-15	MW-15-20		20.0-21.0 ft	30	10/18/2016	30	Shallow Transect Wells		1								
WMW-17	MW-17-18		17.0-18.0 ft	30	10/12/2016	30	Shallow Transect Wells	1	1								
WMW-17	MW-17-20		19.0-20.0 ft	30	10/17/2016	30	Shallow Transect Wells		1								
WMW-18	MW-18-16		15.0-16.0 ft	30	10/11/2016	30	Shallow Transect Wells	1	1								
WMW-19	WMW-19(2.0-2.5)		2.0-2.5 ft	21.5	7/30/2018	21.5	Shallow Well Transect - Dissolved Phase Monitoring	1			1		1	1	1		
WMW-19	WMW-19(14.0-14.5)		14.0-14.5 ft	21.5	7/31/2018	21.5	Shallow Well Transect - Dissolved Phase Monitoring	1			1		1	1	1		
WMW-20	WMW-20(2.0-2.5)		2.0-2.5 ft	21.5	7/31/2018	21.5	Shallow Well Transect - Former Oil/Water Seperator	1			1		1	1	1		
WMW-20	WMW-20(14.5-15.0)		14.5-15.0 ft	21.5	8/2/2018	21.5	Shallow Well Transect - Former Oil/Water Seperator	1			1		1	1	1		
WMW-21	WMW-21(2.0-2.5)		2.0-2.5 ft	21.5	8/6/2018	21.5	Shallow Well Transect - Former Repair Shop	1			1		1	1	1		
WMW-21	WMW-21(9.5-10.0)		9.5-10.0 ft	21.5	8/7/2018	21.5	Shallow Well Transect - Former Repair Shop	1			1		1	1	1		
WMW-22	WMW-22(1.5-2.0)		1.5-2.0 ft	21.5	8/6/2018	21.5	Shallow Well Transect - Former Engine House	1			1		1	1	1		
WMW-22	WMW-22(13.0-13.5)		13.0-13.5 ft	21.5	8/7/2018	21.5	Shallow Well Transect - Former Engine House	1			1		1	1	1		
WMW-23	WMW-23(2.0-2.5)		2.0-2.5 ft	21.5	8/6/2018	21.5	Shallow Well Transect - Former Turntable	1			1		1	1	1		
WMW-23	WMW-23(5.5-6.0)		5.5-6.0 ft	21.5	8/7/2018	21.5	Shallow Well Transect - Former Turntable	1			1		1	1	1		
WMW-24	WMW-24(2.0-2.5)		2.0-2.5 ft	17	8/2/2018	17	Former Washrack	1			1		1	1	1		
WMW-24	WMW-24(9.5-10.0)		9.5-10.0 ft	17	8/2/2018	17	Former Washrack	1			1		1	1	1		
WMW-26	WMW-26(2.0-2.5)		2.0-2.5 ft	17	8/3/2018	17	Shallow Well Transect - Former Engine House	1			1		1	1	1		
WMW-26	WMW-26(9.5-10.0)		9.5-10.0 ft	17	8/3/2018	17	Shallow Well Transect - Former Engine House	1			1		1	1	1		

SUMMARY OF REMEDIAL INVESTIGATION SOIL SAMPLES COLLECTED - AUGUST 2016 TO AUGUST 2018
BNSF Wishram Railyard, Wishram, Washington

Location ID	Sample ID	Parent ID	Soil Sampling Depth (feet bgs) [a]	Total Boring Depth (feet bgs)	Sample Date	Total Boring Depth (feet bgs)	Area/Description	Analytical Tests: NWTPH-Dx (Diesel and Oil) without SGC	NWTPH-Dx (Diesel and Oil) with SGC	NWTPH-Gx (Gasoline)	Polycyclic Aromatic Hydrocarbons (PAHs)	Semivolatile Organic Compounds (SVOCs)	BTEX Only	Volatile Organic Compounds (VOCs) including BTEX	Metals (RCRA 8)	Polychlorinated Biphenyls (PCBs)	Field Duplicate Collected?
WMW-27	WMW-27(2.0-2.5)		2.0-2.5 ft	17	8/3/2018	17	Shallow Well Transect - Former Engine House	1			1		1	1	1		
WMW-27	WMW-27(9.5-10.0)		9.5-10.0 ft	17	8/3/2018	17	Shallow Well Transect - Former Engine House	1			1		1	1	1		
WMW-28	WMW-28(2.0-2.5)		2.0-2.5 ft	17	8/2/2018	17	Shallow Well Transect - Former Engine House	1			1		1	1	1		
WMW-28	WMW-28(13.0-13.5)		13.0-13.5 ft	17	8/2/2018	17	Shallow Well Transect - Former Engine House	1			1		1	1	1		
WMW-29	WMW-29(2.0-2.5)		2.0-2.5 ft	17	8/2/2018	17	Shallow Well Transect - Former Engine House	1			1		1	1	1		
WMW-29	WMW-29(9.5-10.0)		9.5-10.0 ft	17	8/3/2018	17	Shallow Well Transect - Former Engine House	1			1		1	1	1		
WMW-30	WMW-30(2.0-2.5)		2.0-2.5 ft	17	8/2/2018	17	Former Oil House (East of Signal Office)	1			1		1	1	1		
WMW-30	WMW-30(8.5-9.0)		8.5-9.0 ft	17	8/3/2018	17	Former Oil House (East of Signal Office)	1			1		1	1	1		
WMW-31	WMW-31(2.0-2.5)		2.0-2.5 ft	17	8/7/2018	17	Former 5,000-gallon UST	1			1		1	1	1		
WMW-31	WMW-31(9.0-9.5)		9.0-9.5 ft	17	8/8/2018	17	Former 5,000-gallon UST	1			1		1	1	1		Y
WMW-31	DUP-02-20180808	WMW-31(9.0-9.5)	9.0-9.5 ft	17	8/8/2018	17	Former 5,000-gallon UST	1			1		1	1	1		
WMW-32	WMW-32(2.0-2.5)		2.0-2.5 ft	17	8/8/2018	17	Former Oil House and 1,000-gallon Gasoline UST	1		1	1		1	1	1		
WMW-32	WMW-32(9.5-10.0)		9.5-10.0 ft	17	8/8/2018	17	Former Oil House and 1,000-gallon Gasoline UST	1		1	1		1	1	1		
							Total Count of Analyses	142	35	6	135	4	123	121	120	4	7

Notes

Sample depths in 2016 were based on the top of the sampling interval (maximum 1-foot interval).
bgs = feet below ground surface
BTEX = benzene, toluene, ethylbenzene, and total xylenes (o-xylene and m&p-xylene isomers)
RCRA 8 = Resource Conservation and Recovery Act (RCRA) 8 metals arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver.
Field duplicate samples listed under primary sample name.

SUMMARY OF REMEDIAL INVESTIGATION GROUNDWATER SAMPLES COLLECTED - AUGUST 2016 TO NOVEMBER 2019

BNSF Wishram Railyard, Wishram, Washington

Revised Location ID	Total Well/ Boring Depth (feet bgs)	Area/Description	Analytical Tests												Approximate Recon GW Sampling Depth or Screened Interval (feet bgs)	Count of Samples
			NWTPH-Dx (Diesel and Oil) without SGC	NWTPH-Dx (Diesel and Oil) with SGC	NWTPH-Gx (Gasoline)	Polycyclic Aromatic Hydrocarbons (PAHs)	Semivolatile Organic Compounds (SVOCs)	BTEX Only	Volatile Organic Compounds (VOCs) including BTEX	Arsenic	Lead	RCRA 8 Metals (including Arsenic and Lead)	MNA Parameters	Duplicate Collected?		
2016 Soil Borings																
B-16-09	20	Former Repair Shops		1	1	1		1	1	1	1	1			10 - 20	**1**
B-16-10	15	Former Repair Shops	1		1	1		1	1	1	1	1			10 - 15	**1**
B-16-11	15	Former Repairs Shops	1		1	1		1	1	1	1	1			10 - 15	**1**
B-16-12	15	Former Washrack		1	1	1		1	1	1	1	1			10 - 15	**1**
B-16-13	15	Former Oil House (E Store House)	1		1	1		1	1	1	1	1			10.1 - 15.1	**1**
B-16-14	15	Former Oil House (E Store House)	1		1	1		1	1	1	1	1			10 - 15	**1**
B-16-15	15	Former Oil House and 1,000-gallon Gasoline UST	1		1	1		1	1	1	1	1		1	10 - 15	**1**
B-16-16	20	Former Oil House and 1,000-gallon Gasoline UST	1		1	1		1	1	1	1	1			10 - 20	**1**
B-16-17	15	Former 5,000-gallon Oil UST	1		1	1					1				10 - 15	**1**
B-16-18	15	Former Engine House / Machine Shop		1	1	1		1	1	1	1	1			10 - 15	**1**
B-16-19	15	Former Engine House / Machine Shop	1		1	1		1	1	1	1	1			10 - 15	**1**
B-16-20	15	Former Engine House / Machine Shop	1		1	1		1	1	1	1	1			10 - 15	**1**
B-16-21	15	Former Engine House / Machine Shop	1		1	1		1	1	1	1	1			10 - 15	**1**
B-16-22	15	Former Engine House / Machine Shop	1		1	1		1	1	1	1	1			10 - 15	**1**
B-16-23	15	Former Engine House / Machine Shop	1		1	1		1	1	1	1	1			10 - 15	**1**
B-16-24	30	Former Engine House / Machine Shop		1	1	1		1	1	1	1	1			10 - 15	**1**
B-16-24	30	Former Engine House / Machine Shop		1	1	1		1	1	1	1	1			25 - 30	**1**
2018 Soil Borings																
B-18-01	15	Former Engine House	1	1		1		1	1	1	1	1			10 - 15	**1**
B-18-02	15	Former Engine House	1			1		1	1	1	1	1			10 - 15	**1**
B-18-03	15	Former Engine House	1			1		1	1	1	1	1			10 - 15	**1**
B-18-04	15	Former Engine House	1			1		1	1	1	1	1			10 - 15	**1**
B-18-05	15	Former Engine House	1			1		1	1	1	1	1			10 - 15	**1**
B-18-06	15	Former Engine House	1	1		1		1	1	1	1	1			10 - 15	**1**
B-18-07	15	Former Engine House	1			1		1	1	1	1	1			10 - 15	**1**
B-18-08	15	Former Engine House	1			1		1	1	1	1	1			5 -15	**1**
B-18-09	15	Former Engine House	1			1		1	1	1	1	1			10 - 15	**1**
B-18-10	15	Former Engine House	1			1		1	1	1	1	1			10 - 15	**1**
B-18-11	15	Former Engine House	1	1		1		1	1	1	1	1			10 - 15	**1**
B-18-12	15	Oil Drain Lines	1			1		1	1	1	1	1		1	10 - 15	**1**
B-18-13	15	Oil Drain Lines	1			1		1	1	1	1	1			5 - 15	**1**
B-18-14	27	Oil Drain Lines	1			1		1	1	1	1	1			10 - 15	**1**
B-18-15	15	Oil Drain Lines	1			1		1	1	1	1	1			10 - 15	**1**

SUMMARY OF REMEDIAL INVESTIGATION GROUNDWATER SAMPLES COLLECTED - AUGUST 2016 TO NOVEMBER 2019
BNSF Wishram Railyard, Wishram, Washington

Revised Location ID	Total Well/ Boring Depth (feet bgs)	Area/Description	Analytical Tests												Approximate Recon GW Sampling Depth or Screened Interval (feet bgs)	Count of Samples
			NWTPH-Dx (Diesel and Oil) without SGC	NWTPH-Dx (Diesel and Oil) with SGC	NWTPH-Gx (Gasoline)	Polycyclic Aromatic Hydrocarbons (PAHs)	Semivolatile Organic Compounds (SVOCs)	BTEX Only	Volatile Organic Compounds (VOCs) including BTEX	Arsenic	Lead	RCRA 8 Metals (including Arsenic and Lead)	MNA Parameters	Duplicate Collected?		
2018 Soil Borings																
B-18-16	20	Oil Drain Lines	1			1		1	1	1	1	1			10 - 15	**1**
B-18-17	15	Oil Drain Lines	1	1		1		1	1	1	1	1			10 - 15	**1**
B-18-18	68	Oil Drain Lines	1			1		1	1	1	1	1			10 - 20	**1**
B-18-19	15	Shallow Well Transect - Former Oil/Water Seperator	1			1		1	1	1	1	1			10 - 15	**1**
B-18-20	15	Shallow Well Transect - Former Oil/Water Seperator	Reconnaissance Groundwater Sample Not Collected - No Field Screening Impacts												--	**0**
B-18-21	20	Shallow Well Transect - Former Oil/Water Seperator	1			1		1	1	1	1	1			15 - 20	**1**
B-18-22	15	Former Repair Shop and Turntable	1			1		1	1	1	1	1			10 - 15	**1**
B-18-23	15	North of Former Washrack	1	1	1	1		1	1	1	1	1			10 - 15	**1**
B-18-24	27	Former Boiler House and Maintenance Shop	1			1		1	1	1	1	1			14 - 19	**1**
B-18-25	14	Former Boiler House and Maintenance Shop	Reconnaissance Groundwater Sample Not Collected - Insufficient Recharge												9 - 14	**0**
B-18-26	15	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1	1	1			10 - 15	**1**
B-18-27	15	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1	1	1			10 - 15	**1**
B-18-28	15	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1	1	1			10 - 15	**1**
B-18-29	15	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1	1	1			5 - 15	**1**
B-18-30	20	Former Septic Tanks and Septic Drain Fields	1			1		1	1	1	1	1			15 - 20	**1**
Shallow Monitoring Wells																
WMW-1	20	Former Power House	6	1	3			3			3		7		10 - 20	**7**
WMW-3	20	Former Fueling Area	6	5	3			3			3		7	1	10 - 20	**7**
WMW-5	25	Former Washrack	6	5	3			3			3		7		15 - 25	**7**
WMW-7	20	Maintenance Shop Area		1	1			1			1		1		10 - 20	**1**
WMW-8	22	Maintenance Shop Area	Groundwater Samples Not Collected - Sheen in Well												7 - 22	**0**
WMW-9	23.5	Former Fueling Area	6	5	3			3			3		7		8.5 - 23.5	**7**
WMW-10	22.5	Former Diesel Tanks	6	1	3			3			3		7		7.5 - 22.5	**7**
WMW-11	22	Former Diesel Tanks	6	1	3			3			3		7		7 - 22	**7**
WMW-12	25	Additional Shallow Wells	6	1	3	3	3	3			3		7	1	6 - 21	**7**
WMW-13	25	Additional Shallow Wells	6	1	3	3	3	3			3		7		6 - 21	**7**
WMW-14	30	Shallow Transect Wells	12	6	4			4			4		13		12 - 27	**13**
WMW-15	30	Shallow Transect Wells	12	2	4			4			4		13	1	12 - 27	**13**
WMW-16	30	Shallow Transect Wells	12	6	13	13	4	4			4		13		11.33 - 26.33	**13**
WMW-17	30	Shallow Transect Wells	12	2	13	4		4		13	4		13	10	12 - 27	**13**
WMW-18	30	Shallow Transect Wells	12	6	4	4	4	4		13	4		13		12 - 27	**13**
WMW-19	21.5	Shallow Well Transect - Dissolved Phase Monitoring	6			3		6			3		6		11.5 - 21.5	**6**

SUMMARY OF REMEDIAL INVESTIGATION GROUNDWATER SAMPLES COLLECTED - AUGUST 2016 TO NOVEMBER 2019
BNSF Wishram Railyard, Wishram, Washington

Revised Location ID	Total Well/ Boring Depth (feet bgs)	Area/Description	Analytical Tests: NWTPH-Dx (Diesel and Oil) without SGC	NWTPH-Dx (Diesel and Oil) with SGC	NWTPH-Gx (Gasoline)	Polycyclic Aromatic Hydrocarbons (PAHs)	Semivolatile Organic Compounds (SVOCs)	BTEX Only	Volatile Organic Compounds (VOCs) including BTEX	Arsenic	Lead	RCRA 8 Metals (including Arsenic and Lead)	MNA Parameters	Duplicate Collected?	Approximate Recon GW Sampling Depth or Screened Interval (feet bgs)	Count of Samples
Shallow Monitoring Wells																
WMW-20	21.5	Shallow Well Transect - Former Oil/Water Seperator	6			3		6		1	1	3	6		11.5 - 21.5	**6**
WMW-21	21.5	Shallow Well Transect - Former Repair Shop	6	4		3		6		1	1	3	6		11.5 - 21.5	**6**
WMW-22	21.5	Shallow Well Transect - Former Engine House	6	4		3		6		1	1	3	6		11.5 - 21.5	**6**
WMW-23	21.5	Shallow Well Transect - Former Turntable	6			3		6		1	1	3	6		11.5 - 21.5	**6**
WMW-24	17	Former Washrack	6			3			6	1	1	3	6	1	7 - 17	**6**
WMW-25	--	Shallow Well Transect - Former Engine House	Well not installed due to proximity to mainline track													**0**
WMW-26	17	Shallow Well Transect - Former Engine House	6	4		3		2	6	1	1	3	6		7 - 17	**6**
WMW-27	17	Shallow Well Transect - Former Engine House	6			3		2	6	1	1	3	6		7 - 17	**6**
WMW-28	17	Shallow Well Transect - Former Engine House	6			3		2	6	1	1	3	6	4	7 - 17	**6**
WMW-29	17	Shallow Well Transect - Former Engine House	6			3		2	6	1	1	3	6		7 - 17	**6**
WMW-30(b)	17	Former Oil House (East of Signal Office)	6	4		3		2	6	1	1	3	6		7 - 17	**6**
WMW-31	17	Former 5,000-gallon UST	6			3		2	6	1	1	3	6		7 - 17	**6**
WMW-32	17	Former Oil House and 1,000-gallon Gasoline UST	6		3	3		2	6	1	1	3	6		7 - 17	**6**
Deep Monitoring Wells																
RMD-1	44.6	Deep Riverside Wells	6	5	3	7		3			3		7		29.6 - 44.6	**7**
RMD-2	50	Deep Riverside Wells	6	5	3	7		3			3		7	4	30 - 50	**7**
RMD-3	60	Deep Riverside Wells	6	1	3	7		3			3		7		40 - 60	**7**
RMD-4	65	Deep Transect Wells	6	5	3	7		3			3		7		45 - 65	**7**
RMD-5	45	Additional Deep Riverside Wells	3	3		3		3			3		3		30 - 45	**3**
RMD-6	65	Additional Deep Riverside Wells	3	3		3		3		1	1	3	3		45 - 65	**3**
		Totals Sample Counts	**256**	**91**	**96**	**145**	**14**	**151**	**92**	**83**	**121**	**83**	**234**	**24**		**279**

Notes:

(a) bgs = feet below ground surface

(b) Samples from WMW-30 were analyzed for total and dissolved barium in November 2019 in addition to other scheduled analyses.

SUMMARY OF GROUNDWATER GAUGING DATA
BNSF Wishram Railyard, Wishram, Washington

Well ID	Notes	Date	Well Elevation (TOC)	Depth to LNAPL[a] (feet)	Depth to Groundwater (feet)	LNAPL Thickness (feet)[b]	Groundwater Elevation (feet above datum)	Corrected Groundwater Elevation[c] (feet above datum)
WMW-1	(d)	9/17/2003	172.51	--[e]	15.88	--	156.63	156.63
WMW-1		4/15/2004	172.51	--	10.46	--	162.05	162.05
WMW-1		7/13/2004	172.51	--	10.78	--	161.73	161.73
WMW-1		11/9/2006	172.51	--	9.60	--	162.91	162.91
WMW-1		7/3/2007	172.51	--	9.85	--	162.66	162.66
WMW-1		8/16/2007	172.51	--	10.55	--	161.96	161.96
WMW-1		4/16/2008	172.51	--	10.10	--	162.41	162.41
WMW-1		8/21/2008	172.51	--	10.59	--	161.92	161.92
WMW-1		3/12/2009	172.51	--	10.15	--	162.36	162.36
WMW-1		9/10/2009	172.51	--	10.44	--	162.07	162.07
WMW-1		7/7/2011	172.51	--	9.96	--	162.55	162.55
WMW-1	(f)	3/12/2012	172.48	--	10.36	--	162.12	162.12
WMW-1		3/14/2012	172.48	--	10.28	--	162.20	162.20
WMW-1		9/10/2012	172.48	--	10.27	--	162.21	162.21
WMW-1	(g)	10/12/2012	172.48	NM	10.32	--	162.16	162.16
WMW-1		3/14/2013	172.48	--	10.71	--	161.77	161.77
WMW-1		11/6/2013	172.48	--	10.69	--	161.79	161.79
WMW-1		4/9/2014	172.48	--	10.32	--	162.16	162.16
WMW-1		9/29/2014	172.48	--	10.57	--	161.91	161.91
WMW-1		4/27/2015	172.48	--	10.22	--	162.26	162.26
WMW-1	(m)	11/16/2016	172.42	--	10.92	--	161.50	161.50
WMW-1		2/27/2017	172.42	--	10.56	--	161.86	161.86
WMW-1		4/17/2017	172.42	--	9.93	--	162.49	162.49
WMW-1		9/18/2017	172.42	--	10.27	--	162.15	162.15
WMW-1		11/29/2017	172.42	--	10.26	--	162.16	162.16
WMW-1		2/27/2018	172.42	--	10.41	--	162.01	162.01
WMW-1		4/24/2018	172.42	--	10.55	--	161.87	161.87
WMW-1		8/21/2018	172.42	--	10.27	--	162.15	162.15
WMW-1		11/5/2018	172.42	--	10.13	--	162.29	162.29
WMW-1		3/1/2019	172.42	--	10.08	--	162.34	162.34
WMW-1		5/6/2019	172.42	--	9.51	--	162.91	162.91
WMW-1		8/19/2019	172.42	--	9.90	--	162.52	162.52
WMW-1		11/12/2019	172.42	--	10.49	--	161.93	161.93
WMW-2	(d)	9/18/2003	173.12	--	--	--	--	--
WMW-2		4/15/2004	173.12	LNAPL[j]	10.81	LNAPL	162.31	162.31
WMW-2	(h)	7/13/2004	173.12	--	11.08	0.00 (F)	162.04	162.04
WMW-3	(d)	9/17/2003	173.03	--	16.37	--	156.66	156.66
WMW-3		4/16/2004	173.03	--	10.32	--	162.71	162.71
WMW-3		7/13/2004	173.03	10.64	10.65	0.01	162.38	162.39
WMW-3		11/9/2006	173.03	--	10.20	--	162.83	162.83
WMW-3		7/3/2007	173.03	--	10.08	--	162.95	162.95
WMW-3		8/16/2007	173.03	--	10.65	--	162.38	162.38
WMW-3		4/16/2008	173.03	--	10.14	--	162.89	162.89
WMW-3		8/21/2008	173.03	--	10.89	--	162.14	162.14
WMW-3	(f)	3/12/2012	173.03	--	10.58	--	162.45	162.45
WMW-3		3/14/2012	173.03	--	10.67	--	162.36	162.36
WMW-3		9/11/2012	173.03	--	10.85	--	162.18	162.18
WMW-3		3/14/2013	173.03	--	11.12	--	161.91	161.91
WMW-3		11/6/2013	173.03	--	11.29	--	161.74	161.74
WMW-3		4/9/2014	173.03	--	10.76	--	162.27	162.27
WMW-3		9/29/2014	173.03	--	11.25	--	161.78	161.78
WMW-3		4/27/2015	173.03	--	--	--	--	--
WMW-3	(m)	11/17/2016	172.97	--	11.02	--	161.95	161.95
WMW-3		2/27/2017	172.97	--	10.55	--	162.42	162.42
WMW-3		4/17/2017	172.97	--	10.08	--	162.89	162.89
WMW-3		9/18/2017	172.97	--	10.68	--	162.29	162.29
WMW-3		11/29/2017	172.97	--	10.63	--	162.34	162.34

SUMMARY OF GROUNDWATER GAUGING DATA
BNSF Wishram Railyard, Wishram, Washington

Well ID	Notes	Date	Well Elevation (TOC)	Depth to LNAPL[a] (feet)	Depth to Groundwater (feet)	LNAPL Thickness (feet)[b]	Groundwater Elevation (feet above datum)	Corrected Groundwater Elevation[c] (feet above datum)
WMW-3		2/27/2018	172.97	--	10.73	--	162.24	162.24
WMW-3		4/24/2018	172.97	--	10.75	--	162.22	162.22
WMW-3		8/21/2018	172.97	--	10.80	--	162.17	162.17
WMW-3		11/5/2018	172.97	--	10.78	--	162.19	162.19
WMW-3		3/1/2019	172.97	--	NM	--	--	--
WMW-3		5/6/2019	172.97	--	9.95	--	163.02	163.02
WMW-3		8/19/2019	172.97	--	10.39	--	162.58	162.58
WMW-3		11/12/2019	172.97	--	10.95	--	162.02	162.02
WMW-4	(d)	9/18/2003	173.18	--	--	--	--	--
WMW-4		4/15/2004	173.18	--	11.10	--	162.08	162.08
WMW-4	(k)	7/13/2004	173.18	--	11.40	--	161.78	161.78
WMW-5	(d)	4/16/2004	172.60	--	10.12	--	162.48	162.48
WMW-5		7/13/2004	172.60	--	10.40	--	162.20	162.20
WMW-5		11/9/2006	172.60	--	11.00	--	161.60	161.60
WMW-5		7/3/2007	172.60	--	9.79	--	162.81	162.81
WMW-5		8/16/2007	172.60	--	10.35	--	162.25	162.25
WMW-5		4/16/2008	172.60	--	9.91	--	162.69	162.69
WMW-5		8/21/2008	172.60	--	10.53	--	162.07	162.07
WMW-5		3/12/2009	172.60	--	10.09	--	162.51	162.51
WMW-5		9/10/2009	172.60	--	10.62	--	161.98	161.98
WMW-5		7/7/2011	172.60	--	9.80	--	162.80	162.80
WMW-5	(f)	3/12/2012	172.67	--	10.18	--	162.49	162.49
WMW-5		3/14/2012	172.67	--	10.24	--	162.43	162.43
WMW-5		9/11/2012	172.67	--	10.37	--	162.30	162.30
WMW-5		3/14/2013	172.67	--	10.68	--	161.99	161.99
WMW-5		11/6/2013	172.67	--	10.79	--	161.88	161.88
WMW-5		4/9/2014	172.67	--	10.32	--	162.35	162.35
WMW-5		9/29/2014	172.67	--	10.72	--	161.95	161.95
WMW-5		4/27/2015	172.67	--	10.28	--	162.39	162.39
WMW-5	(m)	11/17/2016	172.61	--	10.61	--	162.00	162.00
WMW-5		2/27/2017	172.61	--	10.31	--	162.30	162.30
WMW-5		4/17/2017	172.61	--	9.74	--	162.87	162.87
WMW-5		9/18/2017	172.61	--	10.20	--	162.41	162.41
WMW-5		11/29/2017	172.61	--	10.20	--	162.41	162.41
WMW-5		2/28/2018	172.61	--	10.33	--	162.28	162.28
WMW-5		4/24/2018	172.61	--	10.41	--	162.20	162.20
WMW-5		8/21/2018	172.61	--	10.36	--	162.25	162.25
WMW-5		11/5/2018	172.61	--	10.31	--	162.30	162.30
WMW-5		3/1/2019	172.61	--	NM	--	--	--
WMW-5		5/6/2019	172.61	--	9.53	--	163.08	163.08
WMW-5		8/19/2019	172.61	--	9.94	--	162.67	162.67
WMW-5		11/12/2019	172.61	--	10.55	--	162.06	162.06
WMW-6	(d)	4/16/2004	173.08	LNAPL	10.46	LNAPL	162.62	162.62
WMW-6	(l)	7/13/2004	173.08	10.82	10.83	0.01	162.25	162.26
WMW-7	(d)	4/16/2004	174.12	--	10.43	0.00 (S)	163.69	163.69
WMW-7		7/13/2004	174.12	10.97	11.04	0.07	163.08	163.14
WMW-7		7/3/2007	174.12	10.40	10.58	0.18	163.54	163.69
WMW-7		8/16/2007	174.12	LNAPL	11.00	LNAPL	163.12	163.12
WMW-7		4/16/2008	174.12	10.50	10.66	0.16	163.46	163.60
WMW-7		8/21/2008	174.12	11.59	12.19	0.60	161.93	162.44
WMW-7		3/12/2009	174.12	11.31	11.45	0.14	162.67	162.79
WMW-7		9/10/2009	174.12	12.10	13.60	1.50	160.52	161.80
WMW-7		7/7/2011	174.12	11.10	11.10	<0.01	163.02	163.02
WMW-7	(f)	3/12/2012	174.13	11.52	11.66	0.14	162.47	162.59
WMW-7		3/14/2012	174.13	11.56	11.74	0.18	162.39	162.54
WMW-7		9/11/2012	174.13	12.08	12.17	0.09	161.96	162.04
WMW-7		3/14/2013	174.13	12.10	12.18	0.08	161.95	162.02

SUMMARY OF GROUNDWATER GAUGING DATA
BNSF Wishram Railyard, Wishram, Washington

Well ID	Notes	Date	Well Elevation (TOC)	Depth to LNAPL[a] (feet)	Depth to Groundwater (feet)	LNAPL Thickness (feet)[b]	Groundwater Elevation (feet above datum)	Corrected Groundwater Elevation[c] (feet above datum)
WMW-7		11/6/2013	174.13	12.66	12.76	0.10	161.37	161.46
WMW-7		4/9/2014	174.13	--	11.81	--	162.32	162.32
WMW-7		9/29/2014	174.13	--	12.72	--	161.41	161.41
WMW-7		4/27/2015	174.13	--	11.85	--	162.28	162.28
WMW-7		8/7/2015	174.13	12.43	12.45	0.02	161.68	161.70
WMW-7		9/30/2015	174.13	12.63	12.65	0.02	161.48	161.50
WMW-7		11/3/2015	174.13	12.74	12.75	0.01	161.38	161.39
WMW-7		12/16/2015	174.13	11.98	11.99	0.01	162.14	162.15
WMW-7		1/22/2016	174.13	11.58	11.58	0.00	162.55	162.55
WMW-7		2/12/2016	174.13	--	11.29	--	162.84	162.84
WMW-7		3/30/2016	174.13	--	11.24	--	162.89	162.89
WMW-7		4/29/2016	174.13	--	11.17	--	162.96	162.96
WMW-7		5/31/2016	174.13	--	11.32	--	162.81	162.81
WMW-7		6/30/2016	174.13	--	11.65	--	162.48	162.48
WMW-7		7/15/2016	174.13	--	11.72	--	162.41	162.41
WMW-7		9/16/2016	174.13	--	12.14	--	161.99	161.99
WMW-7	(m)	11/17/2016	174.12	--	12.28	--	161.84	161.84
WMW-7		2/27/2017	174.12	--	11.29	--	162.83	162.83
WMW-7		4/17/2017	174.12	--	10.91	--	163.21	163.21
WMW-7		9/18/2017	174.12	--	11.78	--	162.34	162.34
WMW-7		11/29/2017	174.12	--	11.74	--	162.38	162.38
WMW-7		2/28/2018	174.12	--	11.79	--	162.33	162.33
WMW-7		4/24/2018	174.12	--	11.64	--	162.48	162.48
WMW-7		8/21/2018	174.12	--	12.13	--	161.99	161.99
WMW-7		11/5/2018	174.12	--	12.14	--	161.98	161.98
WMW-7		3/1/2019	174.12	--	11.18	--	162.94	162.94
WMW-7		5/6/2019	174.12	--	10.87	--	163.25	163.25
WMW-7		8/19/2019	174.12	--	11.48	--	162.64	162.64
WMW-7		11/12/2019	174.12	--	11.98	--	162.14	162.14
WMW-8	(f)	3/12/2012	173.80	--	11.11	--	162.69	162.69
WMW-8		3/14/2012	173.80	--	11.17	--	162.63	162.63
WMW-8		9/11/2012	173.80	11.70	11.78	0.08	162.02	162.09
WMW-8		10/12/2012	173.80	NM	12.94	--	160.86	160.86
WMW-8		3/14/2013	173.80	11.67	11.82	0.15	161.98	162.11
WMW-8		11/6/2013	173.80	12.16	12.36	0.20	161.44	161.61
WMW-8		4/9/2014	173.80	--	11.36	--	162.44	162.44
WMW-8		9/29/2014	173.80	12.21	12.31	0.10	161.49	161.49
WMW-8		4/27/2015	173.80	11.38	11.40	0.02	162.40	162.42
WMW-8		8/7/2015	173.80	11.95	12.01	0.06	161.79	161.84
WMW-8		9/30/2015	173.80	12.10	12.18	0.08	161.62	161.69
WMW-8		11/3/2015	173.80	12.23	12.34	0.11	161.46	161.55
WMW-8		12/16/2015	173.80	11.46	11.54	0.08	162.26	162.33
WMW-8		1/22/2016	173.80	--	11.06	--	162.74	162.74
WMW-8		2/12/2016	173.80	--	10.68	--	163.12	163.12
WMW-8		3/30/2016	173.80	--	11.81	--	161.99	161.99
WMW-8		4/29/2016	173.80	--	10.71	--	163.09	163.09
WMW-8		5/31/2016	173.80	--	10.92	--	162.88	162.88
WMW-8		6/30/2016	173.80	--	11.27	--	162.53	162.53
WMW-8		7/15/2016	173.80	--	11.28	--	162.52	162.52
WMW-8		9/16/2016	173.80	--	11.69	--	162.11	162.11
WMW-8	(m)	11/16/2016	173.65	11.70	11.80	0.10	161.85	161.85
WMW-8		2/27/2017	173.65	--	10.83	--	162.82	162.82
WMW-8		4/17/2017	173.65	--	10.45	--	163.20	163.20
WMW-8		9/18/2017	173.65	--	11.41	--	162.24	162.24
WMW-8		11/29/2017	173.65	--	11.30	--	162.35	162.35
WMW-8		2/28/2018	173.65	--	11.27	--	162.38	162.38
WMW-8		4/24/2018	173.65	--	11.14	--	162.51	162.51

SUMMARY OF GROUNDWATER GAUGING DATA
BNSF Wishram Railyard, Wishram, Washington

Well ID	Notes	Date	Well Elevation (TOC)	Depth to LNAPL[a] (feet)	Depth to Groundwater (feet)	LNAPL Thickness (feet)[b]	Groundwater Elevation (feet above datum)	Corrected Groundwater Elevation[c] (feet above datum)
WMW-8		8/21/2018	173.65	--	11.65	--	162.00	162.00
WMW-8		11/5/2018	173.65	--	11.63	--	162.02	162.02
WMW-8		3/1/2019	173.65	--	10.81	--	162.84	162.84
WMW-8		5/6/2019	173.65	--	10.43	--	163.22	163.22
WMW-8		8/19/2019	173.65	--	11.09	--	162.56	162.56
WMW-8		11/12/2019	173.65	--	10.55	--	163.10	163.10
WMW-9	(f)	3/12/2012	173.21	--	10.83	--	162.38	162.38
WMW-9		3/14/2012	173.21	--	10.86	--	162.35	162.35
WMW-9		9/11/2012	173.21	--	11.07	--	162.14	162.14
WMW-9		10/12/2012	173.21	NM	11.15	--	162.06	162.06
WMW-9		3/14/2013	173.21	--	11.33	--	161.88	161.88
WMW-9		11/6/2013	173.21	--	11.47	--	161.74	161.74
WMW-9		4/9/2014	173.21	--	10.96	--	162.25	162.25
WMW-9		9/29/2014	173.21	--	11.42	--	161.79	161.79
WMW-9		2/27/2017	173.21	--	10.84	--	162.37	162.37
WMW-9		4/27/2015	173.21	LNAPL	10.90	LNAPL	162.31	162.31
WMW-9	(m)	11/16/2016	173.12	--	11.23	--	161.89	161.89
WMW-9		4/17/2017	173.12	--	10.30	--	162.82	162.82
WMW-9		9/18/2017	173.12	--	10.94	--	162.18	162.18
WMW-9		11/29/2017	173.12	--	10.85	--	162.27	162.27
WMW-9		2/28/2018	173.12	--	10.94	--	162.18	162.18
WMW-9		4/24/2018	173.12	--	11.01	--	162.11	162.11
WMW-9		8/21/2018	173.12	--	10.99	--	162.13	162.13
WMW-9		11/5/2018	173.12	--	10.93	--	162.19	162.19
WMW-9		3/1/2019	173.12	--	NM	--	--	--
WMW-9		5/6/2019	173.12	--	10.18	--	162.94	162.94
WMW-9		8/19/2019	173.12	--	10.54	--	162.58	162.58
WMW-9		11/12/2019	173.12	--	11.16	--	161.96	161.96
WMW-10	(f)	3/12/2012	173.07	--	10.91	--	162.16	162.16
WMW-10		3/14/2012	173.07	--	10.82	--	162.25	162.25
WMW-10		9/11/2012	173.07	--	10.82	--	162.25	162.25
WMW-10		10/12/2012	173.07	NM	10.94	--	162.13	162.13
WMW-10		3/14/2013	173.07	--	11.28	--	161.79	161.79
WMW-10		11/6/2013	173.07	--	11.24	--	161.83	161.83
WMW-10		4/9/2014	173.07	--	10.89	--	162.18	162.18
WMW-10		9/29/2014	173.07	--	11.18	--	161.89	161.89
WMW-10		4/27/2015	173.07	10.74	10.75	0.01	162.32	162.33
WMW-10	(m)	11/16/2016	172.96	--	11.05	--	161.91	161.91
WMW-10		2/27/2017	172.96	--	11.10	--	161.86	161.86
WMW-10		4/17/2017	172.96	--	10.44	--	162.50	162.50
WMW-10		9/18/2017	172.96	--	10.44	--	162.52	162.52
WMW-10		11/29/2017	172.96	--	10.88	--	162.08	162.08
WMW-10		2/28/2018	172.96	--	10.96	--	162.00	162.00
WMW-10		4/24/2018	172.96	--	11.13	--	161.83	161.83
WMW-10		8/21/2018	172.96	--	10.86	--	162.10	162.10
WMW-10		11/5/2018	172.96	--	10.73	--	162.23	162.23
WMW-10		3/1/2019	172.96	--	10.63	--	162.33	162.33
WMW-10		5/6/2019	172.96	--	10.06	--	162.90	162.90
WMW-10		8/19/2019	172.96	--	10.39	--	162.57	162.57
WMW-10		11/12/2019	172.96	--	11.05	--	161.91	161.91
WMW-11	(f)	3/12/2012	173.00	--	10.90	--	162.10	162.10
WMW-11		3/14/2012	173.00	--	10.81	--	162.19	162.19
WMW-11		9/11/2012	173.00	--	10.78	--	162.22	162.22
WMW-11		3/14/2013	173.00	--	11.23	--	161.77	161.77
WMW-11		11/6/2013	173.00	--	11.10	--	161.90	161.90
WMW-11		4/9/2014	173.00	--	10.84	--	162.16	162.16
WMW-11		9/29/2014	173.00	--	11.08	--	161.92	161.92

SUMMARY OF GROUNDWATER GAUGING DATA
BNSF Wishram Railyard, Wishram, Washington

Well ID	Notes	Date	Well Elevation (TOC)	Depth to LNAPL[a] (feet)	Depth to Groundwater (feet)	LNAPL Thickness (feet)[b]	Groundwater Elevation (feet above datum)	Corrected Groundwater Elevation[c] (feet above datum)
WMW-11		4/27/2015	173.00	--	10.69	--	162.31	162.31
WMW-11	(m)	11/16/2016	172.89	--	10.98	--	161.91	161.91
WMW-11		2/27/2017	172.89	--	11.08	--	161.81	161.81
WMW-11		4/17/2017	172.89	--	10.39	--	162.50	162.50
WMW-11		9/18/2017	172.89	--	10.77	--	162.12	162.12
WMW-11		11/29/2017	172.89	--	10.79	--	162.10	162.10
WMW-11		2/28/2018	172.89	--	10.92	--	161.97	161.97
WMW-11		4/24/2018	172.89	--	11.06	--	161.83	161.83
WMW-11		8/21/2018	172.89	--	10.74	--	162.15	162.15
WMW-11		11/5/2018	172.89	--	10.64	--	162.25	162.25
WMW-11		3/1/2019	172.89	--	NM	--	--	--
WMW-11		5/6/2019	172.89	--	10.00	--	162.89	162.89
WMW-11		8/19/2019	172.89	--	10.32	--	162.57	162.57
WMW-11		11/12/2019	172.89	--	10.98	--	161.91	161.91
WMW-12	(m)	11/16/2016	173.25	--	11.35	--	161.90	161.90
WMW-12		2/27/2017	173.25	--	10.46	--	162.79	162.79
WMW-12		4/17/2017	173.25	--	10.13	--	163.12	163.12
WMW-12		9/18/2017	173.25	--	11.10	--	162.15	162.15
WMW-12		11/29/2017	173.25	--	10.89	--	162.36	162.36
WMW-12		2/28/2018	173.25	--	10.89	--	162.36	162.36
WMW-12		4/24/2018	173.25	--	10.83	--	162.42	162.42
WMW-12		8/21/2018	173.25	--	11.28	--	161.97	161.97
WMW-12		11/5/2018	173.25	--	11.16	--	162.09	162.09
WMW-12		3/1/2019	173.25	--	10.32	--	162.93	162.93
WMW-12		5/6/2019	173.25	--	10.09	--	163.16	163.16
WMW-12		8/19/2019	173.25	--	10.74	--	162.51	162.51
WMW-12		11/12/2019	173.25	--	NM	--	NM	NM
WMW-13	(m)	11/16/2016	173.58	--	11.66	--	161.92	161.92
WMW-13		2/27/2017	173.58	--	11.37	--	162.21	162.21
WMW-13		4/17/2017	173.58	--	10.81	--	162.77	162.77
WMW-13		9/18/2017	173.58	--	11.41	--	162.17	162.17
WMW-13		11/29/2017	173.58	--	11.35	--	162.23	162.23
WMW-13		2/28/2018	173.58	--	10.43	--	163.15	163.15
WMW-13		4/24/2018	173.58	--	11.53	--	162.05	162.05
WMW-13		8/21/2018	173.58	--	11.47	--	162.11	162.11
WMW-13		11/5/2018	173.58	--	11.39	--	162.19	162.19
WMW-13		3/1/2019	173.58	--	11.07	--	162.51	162.51
WMW-13		5/6/2019	173.58	--	10.66	--	162.92	162.92
WMW-13		8/19/2019	173.58	--	11.02	--	162.56	162.56
WMW-13		11/12/2019	173.58	--	11.64	--	161.94	161.94
WMW-14	(m)	11/16/2016	177.15	--	15.31	--	161.84	161.84
WMW-14		1/27/2017	177.15	--	15.11	--	162.04	162.04
WMW-14		2/27/2017	177.15	--	15.41	--	161.74	161.74
WMW-14		4/17/2017	177.15	--	14.74	--	162.41	162.41
WMW-14		9/18/2017	177.15	--	15.09	--	162.06	162.06
WMW-14		11/29/2017	177.15	--	15.11	--	162.04	162.04
WMW-14		2/28/2018	177.15	--	15.20	--	161.95	161.95
WMW-14		4/24/2018	177.15	--	15.39	--	161.76	161.76
WMW-14		8/21/2018	177.15	--	15.07	--	162.08	162.08
WMW-14		11/5/2018	177.15	--	14.89	--	162.26	162.26
WMW-14		3/1/2019	177.15	--	14.89	--	162.26	162.26
WMW-14		5/6/2019	177.15	--	14.22	--	162.93	162.93
WMW-14		8/19/2019	177.15	--	14.62	--	162.53	162.53
WMW-14		11/12/2019	177.15	--	14.23	--	162.92	162.92
WMW-15	(m)	11/16/2016	176.99	--	14.98	--	162.01	162.01
WMW-15		1/27/2017	176.99	--	14.96	--	162.03	162.03
WMW-15		2/27/2017	176.99	--	15.29	--	161.70	161.70

SUMMARY OF GROUNDWATER GAUGING DATA
BNSF Wishram Railyard, Wishram, Washington

Well ID	Notes	Date	Well Elevation (TOC)	Depth to LNAPL[a] (feet)	Depth to Groundwater (feet)	LNAPL Thickness (feet)[b]	Groundwater Elevation (feet above datum)	Corrected Groundwater Elevation[c] (feet above datum)
WMW-15		4/17/2017	176.99	--	14.60	--	162.39	162.39
WMW-15		9/18/2017	176.99	--	14.93	--	162.06	162.06
WMW-15		11/29/2017	176.99	--	14.92	--	162.07	162.07
WMW-15		2/28/2018	176.99	--	15.06	--	161.93	161.93
WMW-15		4/24/2018	176.99	--	15.25	--	161.74	161.74
WMW-15		8/21/2018	176.99	--	14.91	--	162.08	162.08
WMW-15		11/5/2018	176.99	--	14.73	--	162.26	162.26
WMW-15		3/1/2019	176.99	--	14.78	--	162.21	162.21
WMW-15		5/6/2019	176.99	--	14.08	--	162.91	162.91
WMW-15		8/19/2019	176.99	--	14.48	--	162.51	162.51
WMW-15		11/12/2019	176.99	--	15.11	--	161.88	161.88
WMW-16	(m)	11/16/2016	176.74	--	14.90	--	161.84	161.84
WMW-16		1/27/2017	176.74	--	14.70	--	162.04	162.04
WMW-16		2/27/2017	176.74	--	15.05	--	161.69	161.69
WMW-16		4/17/2017	176.74	--	14.36	--	162.38	162.38
WMW-16		9/18/2017	176.74	--	14.62	--	162.12	162.12
WMW-16		11/29/2017	176.74	--	14.70	--	162.04	162.04
WMW-16		2/28/2018	176.74	--	14.81	--	161.93	161.93
WMW-16		4/24/2018	176.74	--	15.02	--	161.72	161.72
WMW-16		8/21/2018	176.74	--	14.62	--	162.12	162.12
WMW-16		11/5/2018	176.74	--	14.50	--	162.24	162.24
WMW-16		3/1/2019	176.74	--	14.50	--	162.24	162.24
WMW-16		5/6/2019	176.74	--	13.82	--	162.92	162.92
WMW-16		8/19/2019	176.74	--	14.25	--	162.49	162.49
WMW-16		11/12/2019	176.74	--	14.84	--	161.90	161.90
WMW-17	(m)	11/16/2016	176.54	--	14.55	--	161.99	161.99
WMW-17		1/27/2017	176.54	--	14.58	--	161.96	161.96
WMW-17		2/27/2017	176.54	--	15.11	--	161.43	161.43
WMW-17		4/17/2017	176.54	--	14.54	--	162.00	162.00
WMW-17		9/18/2017	176.54	--	14.64	--	161.90	161.90
WMW-17		11/29/2017	176.54	--	14.71	--	161.83	161.83
WMW-17		2/28/2018	176.54	--	14.74	--	161.80	161.80
WMW-17		4/24/2018	176.54	--	14.98	--	161.56	161.56
WMW-17		8/21/2018	176.54	--	14.55	--	161.99	161.99
WMW-17		11/5/2018	176.54	--	14.23	--	162.31	162.31
WMW-17		3/1/2019	176.54	--	14.48	--	162.06	162.06
WMW-17		5/6/2019	176.54	--	13.63	--	162.91	162.91
WMW-17		8/19/2019	176.54	--	14.14	--	162.40	162.40
WMW-17		11/12/2019	176.54	--	14.70	--	161.84	161.84
WMW-18	(m)	11/16/2016	176.72	--	14.85	--	161.87	161.87
WMW-18		2/27/2017	176.72	--	15.02	--	161.70	161.70
WMW-18		4/17/2017	176.72	--	14.41	--	162.31	162.31
WMW-18		9/18/2017	176.72	--	14.67	--	162.05	162.05
WMW-18		11/29/2017	176.72	--	14.71	--	162.01	162.01
WMW-18		1/27/2018	176.72	--	14.69	--	162.03	162.03
WMW-18		2/28/2018	176.72	--	14.81	--	161.91	161.91
WMW-18		4/24/2018	176.72	--	14.99	--	161.73	161.73
WMW-18		8/21/2018	176.72	--	14.65	--	162.07	162.07
WMW-18		11/5/2018	176.72	--	14.43	--	162.29	162.29
WMW-18		3/1/2019	176.72	--	14.51	--	162.21	162.21
WMW-18		5/6/2019	176.72	--	13.79	--	162.93	162.93
WMW-18		8/19/2019	176.72	--	14.24	--	162.48	162.48
WMW-18		11/12/2019	176.72	--	14.82	--	161.90	161.90
WMW-19		8/21/2018	176.99	--	14.93	--	162.06	162.06
WMW-19		11/5/2018	176.99	--	14.78	--	162.21	162.21
WMW-19		3/1/2019	176.99	--	14.73	--	162.26	162.26
WMW-19		5/6/2019	176.99	--	14.09	--	162.90	162.90

SUMMARY OF GROUNDWATER GAUGING DATA
BNSF Wishram Railyard, Wishram, Washington

Well ID	Notes	Date	Well Elevation (TOC)	Depth to LNAPL[(a)] (feet)	Depth to Groundwater (feet)	LNAPL Thickness (feet)[(b)]	Groundwater Elevation (feet above datum)	Corrected Groundwater Elevation[(c)] (feet above datum)
WMW-19		8/19/2019	176.99	--	14.57	--	162.42	162.42
WMW-19		11/12/2019	176.99	--	15.11	--	161.88	161.88
WMW-20		8/21/2018	176.92	--	14.83	--	162.09	162.09
WMW-20		11/5/2018	176.92	--	14.64	--	162.28	162.28
WMW-20		3/1/2019	176.92	--	14.69	--	162.23	162.23
WMW-20		5/6/2019	176.92	--	13.98	--	162.94	162.94
WMW-20		8/19/2019	176.92	--	14.41	--	162.51	162.51
WMW-20		11/12/2019	176.92	--	15.05	--	161.87	161.87
WMW-21		8/21/2018	176.06	--	14.00	--	162.06	162.06
WMW-21		11/5/2018	176.06	--	13.84	--	162.22	162.22
WMW-21		3/1/2019	176.06	--	13.88	--	162.18	162.18
WMW-21		5/6/2019	176.06	--	13.17	--	162.89	162.89
WMW-21		8/19/2019	176.06	--	13.56	--	162.50	162.50
WMW-21		11/12/2019	176.06	--	14.19	--	161.87	161.87
WMW-22		8/21/2018	176.37	--	14.39	--	161.98	161.98
WMW-22		11/5/2018	176.37	--	14.04	--	162.33	162.33
WMW-22		3/1/2019	176.37	--	14.39	--	161.98	161.98
WMW-22		5/6/2019	176.37	--	13.48	--	162.89	162.89
WMW-22		8/19/2019	176.37	--	13.98	--	162.39	162.39
WMW-22		11/12/2019	176.37	--	14.43	--	161.94	161.94
WMW-23		8/21/2018	176.15	--	14.19	--	161.96	161.96
WMW-23		11/5/2018	176.15	--	13.85	--	162.30	162.30
WMW-23		3/1/2019	176.15	--	14.19	--	161.96	161.96
WMW-23		5/6/2019	176.15	--	13.25	--	162.90	162.90
WMW-23		8/19/2019	176.15	--	13.79	--	162.36	162.36
WMW-23		11/12/2019	176.15	--	14.19	--	161.96	161.96
WMW-24		8/21/2018	173.20	--	10.92	--	162.28	162.28
WMW-24		11/5/2018	173.20	--	10.91	--	162.29	162.29
WMW-24		3/1/2019	173.20	--	10.55	--	162.65	162.65
WMW-24		5/6/2019	173.20	--	10.08	--	163.12	163.12
WMW-24		8/19/2019	173.20	--	10.50	--	162.70	162.70
WMW-24		11/12/2019	173.20	--	11.11	--	162.09	162.09
WMW-26		8/21/2018	173.48	--	11.07	--	162.41	162.41
WMW-26		11/5/2018	173.48	--	11.14	--	162.34	162.34
WMW-26		3/1/2019	173.48	--	10.51	--	162.97	162.97
WMW-26		5/6/2019	173.48	--	10.14	--	163.34	163.34
WMW-26		8/19/2019	173.48	--	10.61	--	162.87	162.87
WMW-26		11/12/2019	173.48	--	11.20	--	162.28	162.28
WMW-27		8/21/2018	172.14	--	9.81	--	162.33	162.33
WMW-27		11/5/2018	172.14	--	9.88	--	162.26	162.26
WMW-27		3/1/2019	i	--	NM	--	--	--
WMW-27		5/6/2019	172.14	--	9.05	--	163.09	163.09
WMW-27		8/19/2019	172.14	--	9.41	--	162.73	162.73
WMW-27		11/12/2019	172.14	--	10.04	--	162.10	162.10
WMW-28		8/21/2018	172.22	--	9.95	--	162.27	162.27
WMW-28		11/5/2018	172.22	--	9.93	--	162.29	162.29
WMW-28		3/1/2019	172.22	--	NM	--	--	--
WMW-28		5/6/2019	172.22	--	9.18	--	163.04	163.04
WMW-28		8/19/2019	172.22	--	9.55	--	162.67	162.67
WMW-28		11/12/2019	172.22	--	10.17	--	162.05	162.05
WMW-29		8/21/2018	173.49	--	11.04	--	162.45	162.45
WMW-29		11/5/2018	173.49	--	11.1	--	162.39	162.39
WMW-29		3/1/2019	173.49	--	10.50	--	162.99	162.99
WMW-29		5/6/2019	173.49	--	10.07	--	163.42	163.42
WMW-29		8/19/2019	173.49	--	10.56	--	162.93	162.93
WMW-29		11/12/2019	173.49	--	11.15	--	162.34	162.34

SUMMARY OF GROUNDWATER GAUGING DATA
BNSF Wishram Railyard, Wishram, Washington

Well ID	Notes	Date	Well Elevation (TOC)	Depth to LNAPL[a] (feet)	Depth to Groundwater (feet)	LNAPL Thickness (feet)[b]	Groundwater Elevation (feet above datum)	Corrected Groundwater Elevation[c] (feet above datum)
WMW-30		8/21/2018	172.94	--	10.43	--	162.51	162.51
WMW-30		11/5/2018	172.94	--	10.55	--	162.39	162.39
WMW-30		3/1/2019	172.94	--	9.72	--	163.22	163.22
WMW-30		5/6/2019	172.94	--	9.33		163.61	163.61
WMW-30		8/19/2019	172.94	--	9.94		163.00	163.00
WMW-30		11/12/2019	172.94	--	10.46	--	162.48	162.48
WMW-31		8/21/2018	173.24	--	10.45	--	162.79	162.79
WMW-31		11/5/2018	173.24	--	10.67	--	162.57	162.57
WMW-31		3/1/2019	173.24	--	NM	--	--	--
WMW-31		5/6/2019	173.24	--	8.72	--	164.52	164.52
WMW-31		8/19/2019	173.24	--	9.52	--	163.72	163.72
WMW-31		11/12/2019	173.24	--	10.09	--	163.15	163.15
WMW-32		8/21/2018	173.78	--	11.12	--	162.66	162.66
WMW-32		11/5/2018	173.78	--	11.30	--	162.48	162.48
WMW-32		3/1/2019	173.78	--	NM	--	--	--
WMW-32		5/6/2019	173.78	--	8.79	--	164.99	164.99
WMW-32		8/19/2019	173.78	--	10.35	--	163.43	163.43
WMW-32		11/12/2019	173.78	--	10.71	--	163.07	163.07
RMD-1		11/16/2016	176.89	--	14.93	--	161.96	161.96
RMD-1		2/27/2017	176.89	--	15.24	--	161.65	161.65
RMD-1		4/17/2017	176.89	--	14.58	--	162.31	162.31
RMD-1		9/18/2017	176.89	--	14.82	--	162.07	162.07
RMD-1		11/29/2017	176.89	--	14.75	--	162.14	162.14
RMD-1		2/28/2018	176.89	--	14.82	--	162.07	162.07
RMD-1		4/24/2018	176.89	--	15.06	--	161.83	161.83
RMD-1		8/21/2018	176.89	--	14.76	--	162.13	162.13
RMD-1		11/5/2018	176.89	--	14.61	--	162.28	162.28
RMD-1		3/1/2019	176.89	--	15.03	--	161.86	161.86
RMD-1		5/6/2019	176.89	--	14.58	--	162.31	162.31
RMD-1		8/19/2019	176.89	--	14.49	--	162.40	162.40
RMD-1		11/12/2019	176.89	--	15.04	--	161.85	161.85
RMD-2	(m)	11/16/2016	176.59	--	14.65	--	161.94	161.94
RMD-2		2/27/2017	176.59	--	14.92	--	161.67	161.67
RMD-2		4/17/2017	176.59	--	14.28	--	162.31	162.31
RMD-2		9/18/2017	176.59	--	14.57	--	162.02	162.02
RMD-2		11/29/2017	176.59	--	14.52	--	162.07	162.07
RMD-2		2/28/2018	176.59	--	14.69	--	161.90	161.90
RMD-2		4/24/2018	176.59	--	14.88	--	161.71	161.71
RMD-2		8/21/2018	176.59	--	14.53	--	162.06	162.06
RMD-2		11/5/2018	176.59	--	14.32	--	162.27	162.27
RMD-2		3/1/2019	176.59	--	14.70	--	161.89	161.89
RMD-2		5/6/2019	176.59	--	13.68	--	162.91	162.91
RMD-2		8/19/2019	176.59	--	14.12	--	162.47	162.47
RMD-2		11/12/2019	176.59	--	14.69	--	161.90	161.90
RMD-3	(m)	11/16/2016	176.90	--	15.06	--	161.84	161.84
RMD-3		2/27/2017	176.90	--	15.19	--	161.71	161.71
RMD-3		4/17/2017	176.90	--	14.53	--	162.37	162.37
RMD-3		9/18/2017	176.90	--	14.85	--	162.05	162.05
RMD-3		11/29/2017	176.90	--	14.85	--	162.05	162.05
RMD-3		2/28/2018	176.90	--	14.93	--	161.97	161.97
RMD-3		4/24/2018	176.90	--	15.10	--	161.80	161.80
RMD-3		8/21/2018	176.90	--	14.81	--	162.09	162.09
RMD-3		11/5/2018	176.90	--	14.63	--	162.27	162.27
RMD-3		3/1/2019	176.90	--	14.95	--	161.95	161.95
RMD-3		5/6/2019	176.90	--	13.95	--	162.95	162.95
RMD-3		8/19/2019	176.90	--	14.39	--	162.51	162.51
RMD-3		11/12/2019	176.90	--	14.97	--	161.93	161.93

SUMMARY OF GROUNDWATER GAUGING DATA
BNSF Wishram Railyard, Wishram, Washington

Well ID	Notes	Date	Well Elevation (TOC)	Depth to LNAPL[a] (feet)	Depth to Groundwater (feet)	LNAPL Thickness (feet)[b]	Groundwater Elevation (feet above datum)	Corrected Groundwater Elevation[c] (feet above datum)
RMD-4	(m)	11/15/2016	176.79	--	14.91	--	161.88	161.88
RMD-4		2/27/2017	176.79	--	15.00	--	161.79	161.79
RMD-4		4/17/2017	176.79	--	14.42	--	162.37	162.37
RMD-4		9/18/2017	176.79	--	14.70	--	162.09	162.09
RMD-4		11/29/2017	176.79	--	14.68	--	162.11	162.11
RMD-4		2/28/2018	176.79	--	14.79	--	162.00	162.00
RMD-4		4/24/2018	176.79	--	14.97	--	161.82	161.82
RMD-4		8/21/2018	176.79	--	14.69	--	162.10	162.10
RMD-4		11/5/2018	176.79	--	14.52	--	162.27	162.27
RMD-4		3/1/2019	176.79	--	14.80	--	161.99	161.99
RMD-4		5/6/2019	176.79	--	13.82	--	162.97	162.97
RMD-4		8/19/2019	176.79	--	14.28	--	162.51	162.51
RMD-4		11/12/2019	176.79	--	14.86	--	161.93	161.93
RMD-5		8/21/2018	176.65	--	14.59	--	162.06	162.06
RMD-5		11/5/2018	176.65	--	14.38	--	162.27	162.27
RMD-5		3/1/2019	176.65	--	14.74	--	161.91	161.91
RMD-5		5/6/2019	176.65	--	13.76	--	162.89	162.89
RMD-5		8/19/2019	176.65	--	14.19	--	162.46	162.46
RMD-5		11/12/2019	176.65	--	14.78	--	161.87	161.87
RMD-6		8/21/2018	176.55	--	14.42	--	162.13	162.13
RMD-6		11/5/2018	176.55	--	14.28	--	162.27	162.27
RMD-6		3/1/2019	176.55	--	NM	--	--	--
RMD-6		5/6/2019	176.55	--	13.59	--	162.96	162.96
RMD-6		8/19/2019	176.55	--	14.05	--	162.50	162.50
RMD-6		11/12/2019	176.55	--	14.63	--	161.92	161.92

Notes:

(a) LNAPL = light non-aqueous phase liquid
(b) The following symbols indicate observed conditions of groundwater:
LNAPL = presence of LNAPL (thickness not measured); (S) = sheen; (F) = film
(c) Corrected Groundwater Elevation - corrected by adding 85% of LNAPL thickness to groundwater table elevation.
(d) Groundwater elevations are based on a wellhead top-of-casing (TOC) survey conducted in 2003.
(e) "--" indicates not applicable.
(f) Groundwater elevations are based on a wellhead TOC survey conducted in 2012 and tied to North American Vertical Datum-1988 (NAVD88).
(g) NM = not measured
(h) Monitoring well WMW-2 was removed during excavation in November 2005.
(i) Monitoring well was dry.
(j) LNAPL observed in well, but no depth or thickness measurement provided.
(k) Monitoring well WMW-4 destroyed in summer 2006.
(l) Monitoring well WMW-6 was removed in 2006.
(m) Groundwater elevations are based on a wellhead TOC survey conducted in December 2016 and tied to North American Vertical Datum-1988 (NAVD88).

SUMMARY OF OHM WELL GAUGING DATA
BNSF Wishram Railyard, Wishram, Washington

Well Number	Screened Interval (feet bgs)	Top of Casing Elevation (AMSL) [(a)]	Date	Depth to Oil (feet)	Depth to Water (feet)	Top of Oil Elevation (amsl)	Oil/Water Interface Elevation (amsl)	Corrected Groundwater Elevation[(b)] (amsl)	Oil Thickness (feet)	Maximum Oil Thickness[(c)] (feet)
OHM-1	15' - 80'	172.68	12/13/2016	10.40	12.72	162.28	159.96	162.19	2.32	21.54
OHM-1	15' - 80'	172.68	2/27/2017	10.20	17.52	162.48	155.16	162.19	7.32	
OHM-1	15' - 80'	172.68	3/16/2017	10.79	19.95	161.89	152.73	161.52	9.16	
OHM-1	15' - 80'	172.68	3/28/2017	9.48	18.59	163.20	154.09	162.84	9.11	
OHM-1	15' - 80'	172.68	4/18/2017	9.36	18.64	163.32	154.04	162.95	9.28	
OHM-1	15' - 80'	172.68	5/12/2017	9.38	20.55	163.30	152.13	162.85	11.17	
OHM-1	15' - 80'	172.68	6/2/2017	9.61	21.72	163.07	150.96	162.59	12.11	
OHM-1	15' - 80'	172.68	6/23/2017	9.58	19.94	163.10	152.74	162.69	10.36	
OHM-1	15' - 80'	172.68	7/11/2017	10.16	24.55	162.52	148.13	161.94	14.39	
OHM-1	15' - 80'	172.68	8/2/2017	9.82	23.46	162.86	149.22	162.31	13.64	
OHM-1	15' - 80'	172.68	9/20/2017	9.71	26.33	162.97	146.35	162.31	16.62	
OHM-1	15' - 80'	172.68	11/30/2017	9.55	28.18	163.13	144.50	162.38	18.63	
OHM-1	15' - 80'	172.68	12/21/2017	9.52	27.60	163.16	145.08	162.44	18.08	
OHM-1	15' - 80'	172.68	2/28/2018	9.79	27.40	162.89	145.28	162.19	17.61	
OHM-1	15' - 80'	172.68	4/24/2018	9.77	30.24	162.91	142.44	162.09	20.47	
OHM-1	15' - 80'	172.68	8/21/2018	9.47	31.01	163.21	141.67	162.35	21.54	
OHM-1	15' - 80'	172.68	11/5/2018	9.40	30.09	163.28	142.59	162.45	20.69	
OHM-1	15' - 80'	172.68	3/14/2019	9.38	31.19	163.30	141.49	162.43	21.81	
OHM-1	15' - 80'	172.68	5/6/2019	8.73	39.29	163.95	133.39	162.73	30.56	
OHM-1	15' - 80'	172.68	7/22/2019	9.11	46.06	163.57	126.62	162.09	36.95	
OHM-1	15' - 80'	172.68	7/28/2019	10.10	14.79	162.58	157.89	162.39	4.69	
OHM-1	15' - 80'	172.68	8/8/2019	9.66	16.18	163.02	156.50	162.76	6.52	
OHM-1	15' - 80'	172.68	8/19/2019	9.76	18.10	162.92	154.58	162.59	8.34	
OHM-1	15' - 80'	172.68	9/23/2019	9.02	20.51	163.66	152.17	163.20	11.49	
OHM-1	15' - 80'	172.68	11/12/2019	10.10	23.19	162.58	149.49	162.06	13.09	
OHM-2	16' - 51'	172.73	12/13/2016	10.60	10.60	162.13	162.13	162.13	Sheen	11.98
OHM-2	16' - 51'	172.73	2/27/2017	10.53	17.80	162.20	154.93	161.91	7.27	
OHM-2	16' - 51'	172.73	3/16/2017	11.06	12.34	161.67	160.39	161.62	1.28	
OHM-2	16' - 51'	172.73	3/28/2017	9.74	11.47	162.99	161.26	162.92	1.73	
OHM-2	16' - 51'	172.73	4/18/2017	9.67	17.85	163.06	154.88	162.73	8.18	
OHM-2	16' - 51'	172.73	5/12/2017	9.66	14.99	163.07	157.74	162.86	5.33	
OHM-2	16' - 51'	172.73	6/2/2017	9.93	17.05	162.80	155.68	162.52	7.12	
OHM-2	16' - 51'	172.73	6/23/2017	9.99	14.96	162.74	157.77	162.54	4.97	
OHM-2	16' - 51'	172.73	7/11/2017	10.56	18.03	162.17	154.70	161.87	7.47	
OHM-2	16' - 51'	172.73	8/2/2017	10.29	16.90	162.44	155.83	162.18	6.61	
OHM-2	16' - 51'	172.73	9/20/2017	10.21	17.78	162.52	154.95	162.22	7.57	
OHM-2	16' - 51'	172.73	11/30/2017	10.12	15.88	162.61	156.85	162.38	5.76	
OHM-2	16' - 51'	172.73	12/21/2017	10.15	18.50	162.58	154.23	162.25	8.35	
OHM-2	16' - 51'	172.73	2/28/2018	10.27	21.33	162.46	151.40	162.02	11.06	
OHM-2	16' - 51'	172.73	4/24/2018	10.30	17.06	162.43	155.67	162.16	6.76	
OHM-2	16' - 51'	172.73	8/21/2018	10.06	22.04	162.67	150.69	162.19	11.98	
OHM-2	16' - 51'	172.73	11/5/2018	9.99	21.95	162.74	150.78	162.26	11.96	
OHM-2	16' - 51'	172.73	3/14/2019	9.88	18.03	162.85	154.70	162.52	8.15	
OHM-2	16' - 51'	172.73	5/6/2019	9.27	21.54	163.46	151.19	162.97	12.27	
OHM-2	16' - 51'	172.73	7/22/2019	9.75	23.74	162.98	148.99	162.42	13.99	
OHM-2	16' - 51'	172.73	7/24/2019	12.31	14.18	160.42	158.55	160.35	1.87	
OHM-2	16' - 51'	172.73	7/28/2019	12.03	16.26	160.70	156.47	160.53	4.23	
OHM-2	16' - 51'	172.73	8/19/2019	9.94	16.68	162.79	156.05	162.52	6.74	
OHM-2	16' - 51'	172.73	9/23/2019	12.23	19.85	160.50	152.88	160.20	7.62	
OHM-2	16' - 51'	172.73	11/12/2019	12.45	22.07	160.28	150.66	159.90	9.62	

SUMMARY OF OHM WELL GAUGING DATA
BNSF Wishram Railyard, Wishram, Washington

Well Number	Screened Interval (feet bgs)	Top of Casing Elevation (AMSL) (a)	Date	Depth to Oil (feet)	Depth to Water (feet)	Top of Oil Elevation (amsl)	Oil/Water Interface Elevation (amsl)	Corrected Groundwater Elevation(b) (amsl)	Oil Thickness (feet)	Maximum Oil Thickness(c) (feet)
OHM-3	16.8' - 41.8'	172.82	12/13/2016	10.70	10.70	162.12	162.12	162.12	Sheen	12.17
OHM-3	16.8' - 41.8'	172.82	2/27/2017	10.38	15.40	162.44	157.42	162.24	5.02	
OHM-3	16.8' - 41.8'	172.82	3/16/2017	10.61	10.97	162.21	161.85	162.20	0.36	
OHM-3	16.8' - 41.8'	172.82	3/28/2017	9.93	10.24	162.89	162.58	162.88	0.31	
OHM-3	16.8' - 41.8'	172.82	4/18/2017	9.81	10.88	163.01	161.94	162.97	1.07	
OHM-3	16.8' - 41.8'	172.82	5/12/2017	9.64	10.82	163.18	162.00	163.13	1.18	
OHM-3	16.8' - 41.8'	172.82	6/2/2017	10.01	11.30	162.81	161.52	162.76	1.29	
OHM-3	16.8' - 41.8'	172.82	6/23/2017	10.11	12.32	162.71	160.50	162.62	2.21	
OHM-3	16.8' - 41.8'	172.82	7/11/2017	10.66	13.04	162.16	159.78	162.06	2.38	
OHM-3	16.8' - 41.8'	172.82	8/2/2017	10.43	11.95	162.39	160.87	162.33	1.52	
OHM-3	16.8' - 41.8'	172.82	9/20/2017	10.36	12.07	162.46	160.75	162.39	1.71	
OHM-3	16.8' - 41.8'	172.82	11/30/2017	10.26	14.12	162.56	158.70	162.41	3.86	
OHM-3	16.8' - 41.8'	172.82	12/21/2017	10.35	16.00	162.47	156.82	162.24	5.65	
OHM-3	16.8' - 41.8'	172.82	2/28/2018	10.30	14.60	162.52	158.22	162.35	4.30	
OHM-3	16.8' - 41.8'	172.82	4/24/2018	10.05	16.80	162.77	156.02	162.50	6.75	
OHM-3	16.8' - 41.8'	172.82	8/21/2018	10.29	22.46	162.53	150.36	162.04	12.17	
OHM-3	16.8' - 41.8'	172.82	11/5/2018	10.26	11.24	162.56	161.58	162.52	0.98	
OHM-3	16.8' - 41.8'	172.82	3/14/2019	9.99	18.78	162.83	154.04	162.48	8.79	
OHM-3	16.8' - 41.8'	172.82	5/6/2019	9.40	19.19	163.42	153.63	163.03	9.79	
OHM-3	16.8' - 41.8'	172.82	7/23/2019	9.83	17.80	162.99	155.02	162.67	7.97	
OHM-3	16.8' - 41.8'	172.82	7/28/2019	11.80	13.50	161.02	159.32	160.95	1.70	
OHM-3	16.8' - 41.8'	172.82	8/8/2019	11.63	14.12	161.19	158.70	161.09	2.49	
OHM-3	16.8' - 41.8'	172.82	8/19/2019	10.14	12.18	162.68	160.64	162.60	2.04	
OHM-3	16.8' - 41.8'	172.82	9/23/2019	11.89	15.09	160.93	157.73	160.80	3.20	
OHM-3	16.8' - 41.8'	172.82	11/12/2019	12.15	14.49	160.67	158.33	160.58	2.34	
OHM-4	20.4' - 25.4'	173.51	12/13/2016	11.44	11.45	162.07	162.06	162.07	0.01	0.01
OHM-4	20.4' - 25.4'	173.51	2/27/2017	10.23	10.23	163.28	163.28	163.28	Sheen	
OHM-4	20.4' - 25.4'	173.51	3/16/2017	11.76	11.76	161.75	161.75	161.75	Sheen	
OHM-4	20.4' - 25.4'	173.51	3/28/2017	10.71	10.71	162.80	162.80	162.80	Sheen	
OHM-4	20.4' - 25.4'	173.51	4/18/2017	10.63	10.63	162.88	162.88	162.88	Sheen	
OHM-4	20.4' - 25.4'	173.51	5/12/2017	--	10.61	--	162.90	162.90	0.00	
OHM-4	20.4' - 25.4'	173.51	6/2/2017	--	10.88	--	162.63	162.63	0.00	
OHM-4	20.4' - 25.4'	173.51	6/23/2017	11.02	11.02	162.49	162.49	162.49	0.00	
OHM-4	20.4' - 25.4'	173.51	7/11/2017	11.64	11.64	161.87	161.87	161.87	0.00	
OHM-4	20.4' - 25.4'	173.51	8/2/2017	11.39	11.39	162.12	162.12	162.12	0.00	
OHM-4	20.4' - 25.4'	173.51	9/20/2017	11.28	11.28	162.23	162.23	162.23	0.00	
OHM-4	20.4' - 25.4'	173.51	11/30/2017	--	11.20	--	162.31	162.31	0.00	
OHM-4	20.4' - 25.4'	173.51	12/21/2017	--	11.25	--	162.26	162.26	0.00	
OHM-4	20.4' - 25.4'	173.51	2/28/2018	--	11.39	--	162.12	162.12	0.00	
OHM-4	20.4' - 25.4'	173.51	4/24/2018	--	11.48	--	162.03	162.03	0.00	
OHM-4	20.4' - 25.4'	173.51	8/21/2018	--	11.34	--	162.17	162.17	0.00	
OHM-4	20.4' - 25.4'	173.51	11/5/2018	--	11.25	--	162.26	162.26	0.00	
OHM-4	20.4' - 25.4'	173.51	3/14/2019	--	11.06	--	162.45	162.45	0.00	
OHM-4	20.4' - 25.4'	173.51	5/6/2019	--	10.58	--	162.93	162.93	0.00	
OHM-4	20.4' - 25.4'	173.51	8/19/2019	--	10.88	--	162.63	162.63	0.00	
OHM-4	20.4' - 25.4'	173.51	11/12/2019	--	11.55	--	161.96	161.96	0.00	

Notes:

(a) Oil and groundwater elevations are based on a wellhead top-of-casing (TOC) survey conducted in December 2016 and tied to North American Vertical Datum - 1988 (NAVD88).

(b) Water level elevation corrected by adding 96% of LNAPL thickness to elevation.

(c) Maximum oil thickness on top of water column. Field measurements have not detected non-aqueous phase liquid (NAPL) at bottom of any OHM wells.

amsl above mean sea level

btoc below top of casing

bgs below ground surface

-- Oil not detected in well

SUMMARY OF COLUMBIA RIVER BANK INSPECTIONS
BNSF Wishram Railyard, Wishram, Washington

Date of Inspection	Sheen Observed?	Comments	Sheen/NAPL Samples Collected	Laboratory Analyses	Water Conditions	Wind Speed (mph)	Temperature (°F)	Lake Elevation (feet AMSL)	Precipitation (in)	Concurrent Field Activities
7/12/2013	No	No Sheen observed	--	--	--	--	70 (Avg)	--	0	Laser-induced fluorescence (LIF) point surveying
7/13/2013	Yes	Observance of sheen coincident with drilling CR/G-06 (40-90') and CR/G-07 (0-45')	None	--	--	--	70 (Avg)	--	0	Laser-induced fluorescence (LIF) point surveying
12/30/2013	No	No sheen observed	--	--	--	--	34 (Avg)	--	0	
1/27/2014	No	Overcast, very calm (no wind) with a relatively low Columbia River stage.	--	--	--	0	34	158.4	0	
2/25/2014	No	Overcast, moderately calm (some wave action in river), and a relatively high Columbia River stage.	--	--	choppy	2-3	36	158.7	0.07	
3/27/2014	No	Overcast, moderately calm (some wave action in river), and a relatively high Columbia River stage. Recent aquatic vegetation growing in river.	--	--	--	--	45	158.6	0.05	
4/30/2014	No	Partly sunny, very calm (low breeze), and a moderately high Columbia River stage. Recent aquatic vegetation growing in river.	--	--	calm	0	60	158.8	0	
5/29/2014	No	Partly sunny, moderate wind and gusts (wave action with white-capping), and a moderately high Columbia River stage. Continued aquatic vegetation growth in the river.	--	--	choppy	20	73	158.5	0	
6/24/2014	No	Sunny, high wind and gusts (heavy wave action with near-shore white-capping), and a moderately high Columbia River Stage. Continued aquatic vegetation growth.	--	--	--	17	73	158.5	0	
7/20/2014	No	No Sheen observed	--	--	--	--	70 (Avg)	--	0	Mark LIF survey grid locations
7/21/2014	Yes	Sheen observed intermittenly throughout the day	None	--	--	--	72 (Avg)	--	0	Utility Locates
7/22/2014	Yes	Sheen observed intermittenly throughout the day	None	--	--	--	72 (Avg)	--	0.14	Soil sampling
7/23/2014	Yes	Sheen observed intermittenly throughout the day	None	--	--	--	62 (Avg)	--	0.48	Soil sampling
7/24/2014	Yes	Sheen observed intermittenly throughout the day	None	--	--	--	64 (Avg)	--	0	Soil sampling
7/25/2014	Yes	Sheen observed intermittenly throughout the day	None	--	--	--	70 (Avg)	--	0	Soil sampling
7/28/2014	No	No Sheen observed	--	--	--	--	82 (Avg)	--	0	Soil sampling
7/29/2014	Yes	Sheen observed intermittenly throughout the day	None	--	--	--	82 (Avg)	--	0	Soil sampling
7/31/2014	No	Sunny, high wind and gusts (heavy wave action with near-shore white-capping), and a moderately high Columbia River Stage. Low green vegetation, continued surface-emerged aquatic vegetation.	--	--	--	--	91	--	0	
8/27/2014	No	Sunny, moderately calm (some wave action in river), and a relatively high Columbia River stage. Low green vegetation, continued surface-emerged aquatic vegetation.	--	--	--	0-5	85	159.5	0	
9/29/2014	No	Partly cloudy, high wind and gusts (heavy wave action with near-shore white-capping) and relatively low Columbia River stage. Low green vegetation, discontinued surface-emerged aquatic vegetation.	--	--	--	--	65 (Avg)	--	0	
10/29/2014	No	--	--	--	calm	--	54 (Avg)	158.7	0.02	
11/26/2014	No	--	--	--	calm	--	54 (Avg)	158.6	0	
12/9/2014	No	--	--	--	calm	--	42 (Avg)	158.7	0.15	
2/25/2015	No	--	--	--	--	--	50 (Avg)	--	0	
3/27/2015	No	--	--	--	--	--	60 (Avg)	--	0	
4/27/2015	No	--	--	--	--	--	64 (Avg)	--	0	
5/28/2015	No	--	--	--	--	--	75	158.5	0	
6/26/2015	Yes	Sheen observed on river during monthly bank/river inspection about 20 feet along bank across from railroad crossing, approximately 10 feet from shoreline	None	--	--	--	85	--	0	
6/30/2015	No	--	--	--	--	--	80	--	0	
7/9/2015	No	--	--	--	--	10-15	75	--	0	
8/7/2015	No	--	--	--	--	--	80	--	0	
9/2/2015	No	--	--	--	--	--	66 (Avg)	--	0	
9/30/2015	No	--	--	--	calm	0-5	85	159.1	0	Groundwater sampling
10/1/2015	No	Pressure transducer from river had been stolen	--	--	calm	0-5	85	158.9	0	
11/3/2015	No	--	--	--	--	--	50 (Avg)	--	0	
12/16/2015	No	Overcast, temperature 45 F, winds 5-10 mph, gusty from the NE	--	--	--	5-10	45	--	0	
12/17/2015	No	Snow/ice. Property boundary survey.	--	--	--	--	36 (Avg)	--	1.32	
1/22/2016	No	--	--	--	Calm	0-5	70	159.21	0	--

SUMMARY OF COLUMBIA RIVER BANK INSPECTIONS
BNSF Wishram Railyard, Wishram, Washington

Date of Inspection	Sheen Observed?	Comments	Sheen/NAPL Samples Collected	Laboratory Analyses	Water Conditions	Wind Speed (mph)	Temperature (°F)	Lake Elevation (feet AMSL)	Precipitation (in)	Concurrent Field Activities
2/12/2016	No	--	--	--	Calm	0	70	158.96	0.05	--
3/30/2016	No	--	--	--	Calm	0-5	70	158.91	0	--
4/29/2016	No	--	--	--	Choppy	15-20	55	159.14	0	--
5/31/2016	No	--	--	--	Ripples	10	90	158.61	0	--
6/30/2016	No	--	--	--	Choppy	20-25	90	158.67	0	--
7/15/2016	No	--	--	--	Choppy	20	85	159.1	0	--
8/1/2016	No	Nodule mapping	--	--	--	--	74 (Avg)	158.94	0	Drilling and soil sampling
8/2/2016	No	--	--	--	--	--	69 (Avg)	158.79	0	Drilling and soil sampling
8/3/2016	No	--	--	--	--	--	72 (Avg)	159.15	0	Drilling and soil sampling
8/4/2016	Yes	Observance of droplet sheen coincident with drilling RMD-3 (40-60'). Sheen observed from approximately 5 feet west of boring MWD-1 to RMD-3 and migrating east.	RIVER-NAPL	VOCs	--	--	78 (Avg)	158.89	0	Drilling and soil sampling
8/5/2016	No	--	--	--	--	--	78 (Avg)	158.86	0	Drilling and soil sampling
8/8/2016	No	--	--	--	--	--	67 (Avg)	158.68	0	Drilling and soil sampling
8/12/2016	Yes	--	RIVER NODULE	NWTPH-Dx w/SGC	--	--	80 (Avg)	159.01	0	Drilling and soil sampling
9/16/2016	No	--	--	--	Ripples	10	90	158.95	0	--
10/11/2016	No	--	--	--	--	--	51 (Avg)	158.31	0	Monitoring well construction
10/12/2016	No	--	--	--	--	--	49 (Avg)	158.21	0	Monitoring well construction
10/13/2016	Yes	Sheen and nodule observed	River Sheen 02 River NAPL 03	NWTPH-Dx w/o SGC	--	--	50 (Avg)	157.97	0.3	Monitoring well construction
10/14/2016	Yes	Sheen observed	River NAPL 04	NWTPH-Dx w/o SGC	--	--	56 (Avg)	158.82	0.11	Monitoring well construction
10/17/2016	No	--	--	--	--	--	57 (Avg)	158.66	0.13	Monitoring well construction
10/21/2016	Yes	Sheen observed	None	--	--	--	52 (Avg)	158.97	0.04	Oilhead monitoring well construction
11/17/2016	No	--	--	--	--	--	42 (Avg)	158.77	0	Groundwater monitoring
12/12/2016	No	--	--	--	--	--	36 (Avg)	159.11	0.04	Deployment of pressure transducers in river
1/27/2017	No	--	--	--	Calm	0	34	158.9	0	Groundwater monitoring
2/24/2017	No	--	--	--	Calm	0	45	158.7	0	Redevelopment of OHM-3R
3/15/2017	No	--	--	--	Choppy	10	50	156.2	0.02	--
4/18/2017	No	--	--	--	Calm	0	70	158.2	0.02	Groundwater sampling
5/12/2017	No	--	--	--	Calm	5-10	70	157.8	0.02	Oil thickness monitoring
6/2/2017	No	--	--	--	Calm	5-10	80	157.03	0	Bathymetric survey, oil thickness monitoring
6/23/2017	No	--	--	--	Light ripples	10	75	158.25	0	Oil thickness monitoring
7/11/2017	No	--	--	--	Light ripples	10	82	158.18	0	Oil thickness monitoring, recovery of river pressure transducers
8/2/2017	Yes	Droplets and sheen observed, visible from just east of the concrete slab (Former Pump House) to approximately 100 yards downstream to the southwest.	Riversheen-08022017 RiverNAPL-08022017	NWTPH-Dx w/o SGC	Calm	0-5	107	158.71	0	Oil thickness monitoring, transducer recovery
8/3/2017	Yes	Droplets and sheen observed , visible from just east of the concrete slab (Former Pump House) to approximately 100 yards downstream to the southwest.	RiverNAPL-08032017	NWTPH-Dx w/o SGC, PAHs	Calm	0-5	105	158.86	0	--
8/4/2017	No	--	--	--	Choppy	10-15	101	158.46	0	--
8/5/2017	No	--	--	--	Calm	8-10	70	158.69	0	--
9/20/2017	Yes	Droplets and sheen observed less than 5 feet from the shore from approximatley 30 feet west of the Former Pump House pad, extending approximately 100 feet west	RIVERNAPL-20170920	WA EPH	Calm	5	70	159.09	0.4	Groundwater monitoring
9/21/2017	No	--	--	--	Choppy	windy	50	159.13	0.01	Groundwater monitoring
10/19/2017	No	--	--	--	choppy	8	60	159.22	0.06	--
11/8/2017	No	--	--	--	Calm	3	38	158.79	0.13	--
12/21/2017	No	--	--	--	Calm	1	35	158.85	0.17	Oil thickness monitoring, pressure transducer recovery
1/18/2018	No	--	--	--	Calm	3.5	45	158.9	0	
2/27/2018	No	--	--	--	--	0	39	158.29	0	Groundwater monitoring
2/28/2018	No	--	--	--	--	5	38	158.62	0.03	Oil thickness monitoring
3/26/2018	No	--	--	--	--	--	--	158.21	0	--
4/24/2018	No	--	--	--	Calm	0	50	157.92	0	Groundwater monitoring
4/25/2018	No	--	--	--	Calm	2	50	157.75	0	Groundwater monitoring
4/26/2018	No	--	--	--	--	--	--	158.24	0	Groundwater monitoring
5/15/2018	No	--	--	--	Calm	0-5	85	159	0	--

SUMMARY OF COLUMBIA RIVER BANK INSPECTIONS
BNSF Wishram Railyard, Wishram, Washington

Date of Inspection	Sheen Observed?	Comments	Sheen/NAPL Samples Collected	Laboratory Analyses	Water Conditions	Wind Speed (mph)	Temperature (°F)	Lake Elevation (feet AMSL)	Precipitation (in)	Concurrent Field Activities
6/18/2018	No	--	--	--	Calm	0-5	77	159.46	0	--
6/19/2018	No	--	--	--	Calm	0-2	75	159.18	0	Near-shore sediment probing
6/20/2018	Yes	Sheen observed; appeared to rise during sediment probing. Observations occurred at two locations just offshore of monitoring well WMW-17: one to the southeast and one to the southwest of WMW-17, both approximately 20 to 25 feet away from the shoreline.	None	--	Calm	0-2	70	159.25	0	Near-shore sediment probing
6/21/2018	No	--	--	--	Choppy	10-15	76	159.04	0	Removal of near-shore sediment probe "darts"
6/22/2018	No	--	--	--	Choppy	15-22	68	159.06	0	--
6/24/2018	Yes	Sheen observed approximately 2 feet from shore near well WMW-16. Oil droplet and sheen were observed later approximately 20 feet from shore and 1 foot from shore in the vicinity of WMW-17.	None	--	Calm	0-2	95	158.6	0	Near-shore sediment probing
6/25/2018	No	--	--	--	Choppy	17-27	75	158.39	0	--
6/28/2018	No	--	--	--	Choppy	24-30	67	158.37	0	--
7/26/2018	No	--	--	--	Light ripples	10-15	100	159.3	0	Bank monitoring
8/1/2018	No	--	--	--	--	--	--	158.55	0	Drilling and soil sampling
8/2/2018	No	--	--	--	--	--	--	159.15	0	Drilling and soil sampling
8/3/2018	No	--	--	--	--	--	--	158.73	0	Drilling and soil sampling
8/6/2018	No	--	--	--	--	--	--	157.99	0	Drilling and soil sampling
8/7/2018	Yes	Sheen and oil droplets observed southwest of WMW-16 approximately 20 feet south of the shoreline; southwest of WMW-15 approximately 60-65 feet south of the shoreline; between WMW-18 and the Former Pump House #2 concrete pad to the east of WMW-18 approximately 5 feet from the shoreline; between wells WMW-15 and WMW-16 approximately 15 feet south of the shoreline; near well WMW-18 approximately 5 feet from the shore; between wells WMW-15 and WMW-17 approximately 150 feet south of the shore.	RIVERSHEEN-20180807	NWTPH-Dx w/o SGC, PAHs, VOCs	Calm	--	--	157.65	0	Drilling and soil sampling
8/8/2018	Yes	Sheen and oil droplets observed approximately 10 feet east of WMW-17 and 20 feet south of the shoreline; 10 feet west of WMW-18 and 5 feet from the shore; mutliple small areas in line with well WMW-18 about 5 feet from the shore; 20 feet to the east and 20 feet to the west of the concrete pad (Former Pump House #2). The sheen appeared to be moving on the water surface from the west to east, toward the shore near the concrete pad.	RIVERSHEEN-20180808	WA EPH, NWTPH-Dx w/o SGC	Calm	4	90	158.76	0	Drilling and soil sampling
8/9/2018	No	--	--	--	--	--	--	159.18	0	Drilling and soil sampling
8/10/2018	No	--	--	--	--	--	--	158.86	0	Drilling and soil sampling
8/13/2018	No	--	--	--	--	--	--	159.18	0	Drilling and soil sampling
8/14/2018	No	--	--	--	--	--	--	159.14	0	Drilling and soil sampling
8/15/2018	No	--	--	--	--	--	--	158.41	0	Drilling and soil sampling
8/16/2018	No	--	--	--	--	--	--	158.71	0	Drilling and soil sampling
8/17/2018	No	--	--	--	--	--	--	159.17	0	Drilling and soil sampling
8/20/2018	No	--	--	--	--	--	--	159.21	0	Drilling and soil sampling
8/21/2018	No	--	--	--	--	--	--	158.71	0	Groundwater monitoring
8/22/2018	Yes	Sheen and oil droplets observed between well WMW-17 and the Former Pump House #2 concrete pad from the shoreline to approximately 20 feet south of the shoreline.	None	--	--	--	--	158.95	0	Groundwater monitoring
8/23/2018	No	--	--	--	--	--	--	158.77	0	Groundwater monitoring
8/24/2018	No	--	--	--	--	--	--	159.2	0	Groundwater monitoring
8/27/2018	No	--	--	--	--	--	--	158.38	0	Groundwater monitoring
8/28/2018	No	--	--	--	--	--	--	158.31	0	Groundwater monitoring
8/29/2018	No	--	--	--	--	--	--	158.63	0	Groundwater monitoring
8/30/2018	No	--	--	--	--	--	--	158.69	0	Groundwater monitoring
9/20/2018	No	--	--	--	Very choppy	10-20	60	159	0	Well #1 Excavation
10/17/2018	No	--	--	--	Calm	2	40	159.11	0	Bank Inspection

SUMMARY OF COLUMBIA RIVER BANK INSPECTIONS
BNSF Wishram Railyard, Wishram, Washington

Date of Inspection	Sheen Observed?	Comments	Sheen/NAPL Samples Collected	Laboratory Analyses	Water Conditions	Wind Speed (mph)	Temperature (°F)	Lake Elevation (feet AMSL)	Precipitation (in)	Concurrent Field Activities
11/5/2018	No	--	--	--	Very choppy	12	60	158.57	0	Groundwater monitoring
11/6/2018	No	--	--	--	Very choppy	13	53	158.46	0	Groundwater monitoring
11/7/2018	No	--	--	--	Light ripples	2	42	158.18	0	Groundwater monitoring
12/5/2018	No	--	--	--	Choppy	10	34	159.13	0	Bank Inspection
2/22/2019	N	--	--	--	Small ripples	4	34	157.83	0	Bank Inspection
2/27/2019	N	--	--	--	Calm	0	29	157.88	0	Groundwater monitoring
2/28/2019	N	--	--	--	Small ripples	0	18	158.19	0.11	Groundwater monitoring
3/1/2019	N	--	--	--	Small ripples	10	33	158.6	0	Groundwater monitoring
3/14/2019	N	--	--	--	Calm	--	34	158.1	0	Transducer deployment
6/4/2019	N	--	--	--	Choppy	Strong winds	69 (Avg)	158.94	0	Site visit
6/5/2019	N	--	--	--	--	--	--	158.63	0	Site visit
7/22/2019	N	--	--	--	Choppy	15	90	158.75	0	FS Field Work
7/23/2019	N	--	--	--	Choppy	15	90	158.41	0	FS Field Work
7/24/2019	N	--	--	--	Choppy with whitecaps	15	90	158.33	0	FS Field Work
7/25/2019	N	--	--	--	Calm	Calm	95	159.04	0	FS Field Work
7/26/2019	N	--	--	--	Small ripples	Calm	80	158.53	0	FS Field Work
7/27/2019	N	--	--	--	Small ripples	16	68	158.25	0	FS Field Work
7/28/2019	N	--	--	--	Calm	6	85	158.22	0	FS Field Work
7/29/2019	N	--	--	--	Small ripples	7	68	157.63	0	FS Field Work
8/7/2019	N	--	--	--	Small ripples	14	85	159.29	0	FS Field Work
8/8/2019	N	--	--	--	Choppy	15	70	158.98	0	FS Field Work
8/9/2019	N	--	--	--	Small ripples	Light winds	85	159.24	0	FS Field Work
8/12/2019	N	--	--	--	Calm	9	82	158.99	0	FS Field Work
8/13/2019	N	--	--	--	Calm	1	68	158.56	0	FS Field Work
8/19/2019	N	--	--	--	Small ripples	17	89	158.88	0	Debris removal, groundwater monitoring
8/20/2019	N	--	--	--	Small ripples	Light to moderate wind	90	158.96	0	Groundwater monitoring
8/21/2019	N	--	--	--	Choppy	Windy	90	159.02	0	Groundwater monitoring
8/22/2019	N	--	--	--	Small to moderate ripples	Moderate to light winds	Warm	158.89	0.06	Groundwater monitoring
9/23/2019	N	--	--	--	Choppy	Windy	63	158.78	0.2	FS Field Work
11/12/2019	N	--	--	--	Moderate ripples	Moderately windy	50	158.6	0	Groundwater Monitoring
11/13/2019	N	--	--	--	Choppy	Strong winds	45	158.66	0	Groundwater Monitoring
11/14/2019	N	Biofilm observed from WMW-23 to WMW-21	--	--	Light ripples	Little wind	--	158.61	0	Groundwater Monitoring

Notes:

mph = miles per hour °F = degrees Fahrenheit AMSL = above mean sea level

Meteorological data recorded in the field or obtained from weather station (KDLS) at Columbia Gorge Regional Airport (The Dalles Airport in Dallesport,WA) on the State of Washington side of the Columbia River. (Avg) = Daily average from KDLS.

Methods

Samples analyzed for gasoline-range organics (GRO) using Northwest Total Petroleum Hydrocarbon (NWTPH)-Gx and diesel- and oil-range organics (DRO and ORO) using NWTPH-Dx (with or without silica gel cleanup as indicated).

Samples analyzed for Volatile Organic Compounds (VOCs) using EPA Method 8260.

Samples analyzed for Extractable Petroleum Hydrocarbons (EPH) using NWTPH-EPH.

Samples analyzed for Polycyclic Aromatic Hydrocarbons (PAHs) using EPA Method 8270 with selective ion monitoring (SIM).

TABLE 12

SUMMARY OF SLUG TEST RESULTS
BNSF Wishram Railyard, Wishram, Washington

Monitoring Well Designation	Falling Head Test: Hydraulic Conductivity (ft/day)			Rising Head Test: Hydraulic Conductivity (ft/day)			Falling Head Test: Hydraulic Conductivity (ft/day)			Rising Head Test: Hydraulic Conductivity (ft/day)			Falling Head Test: Hydraulic Conductivity (ft/day)			Rising Head Test: Hydraulic Conductivity (ft/day)			Mean Hydraulic Conductivity (K) (ft/day)	Mean Hydraulic Conductivity (K) (cm/s)
	Hvorslev-1[(a)]	Bouwer-Rice[(b)]	KGS[(c)]	Hvorslev-1	Bouwer-Rice	KGS	Hvorslev-1[(a)]	Bouwer-Rice[(b)]	KGS[(c)]	Hvorslev-1	Bouwer-Rice	KGS	Hvorslev-1[(a)]	Bouwer-Rice[(b)]	KGS[(c)]	Hvorslev-1	Bouwer-Rice	KGS		
RMD-1	0.6	0.5	0.3	0.9	0.7	0.7	0.7	0.5	--	0.8	0.6	0.7	0.8	0.6	0.7	0.7	--	0.7	0.7	2.3E-04
RMD-4	18.1	14.1	14.3	27.6	21.5	23.7	24.6	19.1	20.8	27.0	21.0	24.2	29.0	22.6	26.4	25.0	19.4	24.7	22.4	7.9E-03
RMD-6	21.1	15.5	18.7	16.7	13.6	18.4	16.1	12.4	11.3	16.2	97.4	21.5	13.4	88.6	19.7	17.5	108.8	27.8	30.8	1.1E-02
	Rising Head Test: Hydraulic Conductivity (ft/day)			Rising Head Test: Hydraulic Conductivity (ft/day)			Rising Head Test: Hydraulic Conductivity (ft/day)			Falling Head Test: Hydraulic Conductivity (ft/day)			Falling Head Test: Hydraulic Conductivity (ft/day)			Falling Head Test: Hydraulic Conductivity (ft/day)				
WMW-5	25.1	17.4	30.4	24.2	16.8	18.2	21.5	15.1	23.9	16.3	11.3	12.6	22.9	15.9	19.8	14.8	10.2	17.7	18.6	6.5E-03
WMW-7	8.4	4.1	4.6	7.1	3.5	4.0	7.0	3.4	3.9										5.1	1.8E-03
WMW-9	4.2	2.4	4.3	4.5	2.5	7.0	7.3	4.0	9.0										5.0	1.8E-03
WMW-15	2.5	1.5	1.3	2.5	1.3	1.8	2.9	1.5	2.2										1.9	6.8E-04
WMW-18	22.3	12.6	13.6	22.8	12.9	12.7	18.2	10.3	10.9										15.1	5.3E-03
WMW-20	3.8	1.9	2.2	4.7	2.2	2.5	4.5	2.2	2.8										3.0	1.1E-03
WMW-22	508.1	490.8	249.4	846.9	436.0	647.7	1401.4	581.4	711.2										652.5	2.3E-01
WMW-23	54.4	32.3	15.4	175.5	180.2	175.5	351.6	210.0	117.1										145.8	5.1E-02
WMW-26	0.4	0.2	0.1	0.3	0.2	0.2	--	--	--										0.2	8.7E-05
WMW-28	6.8	3.9	8.0	7.2	4.2	13.3	7.1	4.1	7.9										7.0	2.5E-03
WMW-30	0.3	0.2	0.3	0.4	0.2	0.3	--	--	--										0.3	1.0E-04
WMW-31	1.4	0.8	1.8	1.5	0.9	1.9	1.6	0.9	1.5										1.4	4.8E-04
																		Site Geometric Mean:	**6.39**	**2.3E-03**

Notes:

(a) AQTESOLV analysis. Hvorslev, M.J., 1951. Time Lag and Soil Permeability in Ground-Water Observations, Bull. No. 36, Waterways Exper. Sta. Corps of Engrs, U.S. Army, Vicksburg, Mississippi, pp. 1-50.

(b) AQTESOLV analysis. Bouwer, H. and R.C. Rice, 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, vol. 12, no. 3, pp. 423-428.

(c) AQTESOLV analysis. Hyder, Z, J.J. Butler, Jr., C.D. McElwee and W. Liu, 1994. Slug tests in partially penetrating wells, Water Resources Research, vol. 30, no. 11, pp. 2945-2957.

(d) -- = Slug test analysis not included due to non-ideal non-linear fit to data set

ft/day = feet per day

TABLE 13A AND 13B

MONTHLY MEASURED AND MODELLED RIVER AND GROUNDWATER ELEVATIONS
BNSF Wishram Railyard, Wishram, Washington

Table 13A: Monthly Average Measured River and Groundwater Elevations

Month	River	WMW-1	WMW-3	WMW-5	WMW-8	WMW-9	WMW-10	WMW-11	WMW-14	WMW-16	WMW-18
Apr	162.68	162.70	162.74	162.77	163.04	162.80	162.63	162.56	162.64	162.64	162.58
May	162.75	162.76	162.84	162.95	163.24	162.95	162.75	162.69	162.93	162.93	162.86
Jun	162.17	162.23	162.43	162.47	162.94	162.49	162.25	162.16	162.40	162.38	162.31
Jul	162.04	161.94	162.20	162.19	162.60	162.16	161.93	161.90	161.96	161.99	162.01
Aug	162.31	162.05	162.22	162.27	162.16	162.13	162.01	162.04	161.99	162.06	162.11
Sep	162.34	162.01	162.22	162.36	162.04	162.14	162.03	162.09	162.02	162.11	162.15
Oct	162.26	161.79	162.07	162.19	161.87	162.04	161.93	162.00	161.96	162.02	162.06
Nov	162.27	161.82	162.06	162.17	161.94	162.07	161.94	162.01	161.97	162.03	162.07
Dec	162.37	162.14	162.28	162.35	162.25	162.18	162.11	162.13	162.12	162.23	162.21
Jan	162.17	162.02	162.27	162.37	162.19	162.14	162.09	162.06	162.09	162.15	162.14
Feb	162.21	162.03	162.32	162.40	162.24	162.19	162.12	162.08	162.12	162.20	162.18
Mar	162.33	162.25	162.32	162.42	162.39	162.21	162.17	162.13	162.18	162.26	162.23

Table 13B: Monthly Average Modeled River and Groundwater Elevations

Month	River	WMW-1	WMW-3	WMW-5	WMW-8	WMW-9	WMW-10	WMW-11	WMW-14	WMW-16	WMW-18
Apr	162.68	162.58	162.49	162.46	162.42	162.53	162.60	162.61	162.64	162.64	162.63
May	162.76	162.72	162.67	162.65	162.61	162.70	162.73	162.74	162.75	162.75	162.75
Jun	162.17	162.26	162.33	162.36	162.39	162.30	162.24	162.23	162.21	162.20	162.21
Jul	162.03	162.06	162.12	162.14	162.19	162.09	162.05	162.05	162.04	162.04	162.04
Aug	162.31	162.28	162.26	162.25	162.24	162.27	162.29	162.29	162.30	162.30	162.30
Sep	162.35	162.35	162.36	162.35	162.35	162.36	162.35	162.35	162.35	162.35	162.35
Oct	162.25	162.27	162.28	162.29	162.29	162.28	162.27	162.27	162.26	162.26	162.26
Nov	162.27	162.27	162.27	162.27	162.28	162.27	162.27	162.27	162.27	162.27	162.27
Dec	162.37	162.35	162.34	162.34	162.33	162.35	162.36	162.36	162.36	162.36	162.36
Jan	162.17	162.22	162.25	162.26	162.28	162.24	162.21	162.20	162.19	162.19	162.19
Feb	162.21	162.21	162.22	162.23	162.24	162.22	162.21	162.21	162.21	162.21	162.21
Mar	162.33	162.32	162.30	162.30	162.29	162.31	162.32	162.33	162.33	162.33	162.33

Note:
All data results presented in elevation units of feet above mean sea level.

TABLE 14A AND 14B

MONTHLY AVERAGE RIVER VERSUS GROUNDWATER ELEVATIONS
BNSF Wishram Railyard, Wishram, Washington

Table14A: Monthly Average Measured Groundwater Elevation Minus River Elevation

Month	WMW-1	WMW-3	WMW-5	WMW-8	WMW-9	WMW-10	WMW-11	WMW-14	WMW-16	WMW-18
Apr	0.02	0.07	0.10	0.37	0.13	-0.05	-0.12	-0.04	-0.03	-0.09
May	0.01	0.09	0.20	0.49	0.19	0.00	-0.06	0.18	0.17	0.10
Jun	0.06	0.26	0.30	0.76	0.32	0.07	-0.02	0.23	0.20	0.14
Jul	-0.10	0.17	0.16	0.56	0.12	-0.11	-0.13	-0.08	-0.05	-0.02
Aug	-0.26	-0.10	-0.04	-0.16	-0.19	-0.31	-0.27	-0.33	-0.25	-0.20
Sep	-0.33	-0.13	0.01	-0.31	-0.20	-0.31	-0.26	-0.32	-0.23	-0.19
Oct	-0.46	-0.19	-0.07	-0.39	-0.21	-0.32	-0.25	-0.30	-0.24	-0.19
Nov	-0.45	-0.21	-0.10	-0.33	-0.20	-0.33	-0.26	-0.30	-0.24	-0.19
Dec	-0.22	-0.09	-0.02	-0.12	-0.19	-0.25	-0.24	-0.24	-0.13	-0.15
Jan	-0.15	0.10	0.20	0.02	-0.03	-0.08	-0.11	-0.08	-0.02	-0.03
Feb	-0.19	0.11	0.18	0.03	-0.03	-0.09	-0.14	-0.09	-0.02	-0.04
Mar	-0.08	-0.01	0.09	0.05	-0.12	-0.16	-0.21	-0.15	-0.07	-0.10

Table14B: Monthly Average Measured Groundwater Minus Modeled Groundwater Elevation

Month	WMW-1	WMW-3	WMW-5	WMW-8	WMW-9	WMW-10	WMW-11	WMW-14	WMW-16	WMW-18
Apr	0.12	0.25	0.31	0.62	0.28	0.03	-0.05	0.00	0.00	-0.05
May	0.04	0.16	0.30	0.64	0.25	0.02	-0.05	0.18	0.18	0.11
Jun	-0.03	0.09	0.12	0.55	0.19	0.01	-0.08	0.19	0.17	0.10
Jul	-0.13	0.08	0.05	0.41	0.06	-0.13	-0.15	-0.08	-0.05	-0.03
Aug	-0.23	-0.04	0.02	-0.09	-0.14	-0.28	-0.25	-0.31	-0.24	-0.19
Sep	-0.34	-0.14	0.00	-0.31	-0.22	-0.32	-0.26	-0.33	-0.24	-0.20
Oct	-0.48	-0.22	-0.10	-0.42	-0.24	-0.34	-0.26	-0.31	-0.25	-0.20
Nov	-0.45	-0.21	-0.10	-0.33	-0.20	-0.32	-0.26	-0.29	-0.24	-0.19
Dec	-0.21	-0.06	0.01	-0.08	-0.17	-0.24	-0.23	-0.24	-0.13	-0.15
Jan	-0.20	0.02	0.10	-0.10	-0.09	-0.12	-0.14	-0.10	-0.04	-0.06
Feb	-0.18	0.10	0.17	0.00	-0.03	-0.09	-0.13	-0.09	-0.01	-0.03
Mar	-0.07	0.02	0.12	0.10	-0.10	-0.16	-0.20	-0.15	-0.07	-0.10

Notes:

Values in Table 14A represent measured (Table 13A) monthly average groundwater elevations minus monthly average river elevations. Results are presented in units of feet.

Values in Table 14B represent measured (Table 13A) minus modeled (Table 13B) monthly average groundwater elevations. Results are presented in units of feet.

Cell shading indicates the following conditions with respect to the Columbia River.

- [green shading] Losing stream condition (negative result from groundwater elevation minus river elevation)
- [blue shading] Gaining stream condition (positive result from groundwater elevation minus river elevation)

TABLE 15

VERTICAL HYDRAULIC GRADIENT MEASUREMENTS
BNSF Wishram Railyard, Wishram Washington

Deep and shallow well pairs	Measurement Date	Shallow Midpoint water depth (feet btoc)	Deep Midpoint water depth (feet btoc)	Shallow Corrected Groundwater Elevation (feet amsl)	Deep Corrected Groundwater Elevation (feet amsl)	Difference Midpoint Groundwater Depth (shallow - deep)	Difference Groundwater Elevation (shallow - deep)	Vertical Gradient (ft/ft)	Gradient Direction
RMD-5 and WMW-14	8/21/2018	21.04	37.50	162.08	162.06	-16.47	0.02	-0.0012	down
	11/5/2018	20.95	37.50	162.26	162.27	-16.56	-0.01	0.0006	up
RMD-1 and WMW-15	11/16/2016	20.99	36.50	162.01	161.96	-15.51	0.05	-0.0032	down
	4/17/2017	20.80	36.50	162.39	162.31	-15.70	0.08	-0.0051	down
	9/18/2017	20.97	36.50	162.06	162.07	-15.54	-0.01	0.0006	up
	11/29/2017	20.96	36.50	162.07	162.14	-15.54	-0.07	0.0045	up
	2/28/2018	21.03	36.50	161.93	162.07	-15.47	-0.14	0.0090	up
	4/24/2018	21.13	36.50	161.74	161.83	-15.38	-0.09	0.0059	up
	8/21/2018	20.96	36.50	162.08	162.13	-15.55	-0.05	0.0033	up
	11/5/2018	20.87	36.50	162.26	162.28	-15.64	-0.02	0.0013	up
RMD-2 and WMW-16	11/16/2016	20.60	40.00	161.84	161.94	-19.40	-0.10	0.0052	up
	4/17/2017	20.33	40.00	162.38	162.31	-19.67	0.07	-0.0036	down
	9/18/2017	20.46	40.00	162.12	162.02	-19.54	0.10	-0.0051	down
	11/29/2017	20.50	40.00	162.04	162.07	-19.50	-0.03	0.0015	up
	2/28/2018	20.56	40.00	161.93	161.90	-19.45	0.03	-0.0015	down
	4/24/2018	20.66	40.00	161.72	161.71	-19.34	0.01	-0.0005	down
	8/21/2018	20.46	40.00	162.12	162.06	-19.54	0.06	-0.0030	down
	11/5/2018	20.40	40.00	162.24	162.27	-19.60	-0.03	0.0016	up
RMD-3 and WMW-17	11/16/2016	20.78	50.00	161.99	161.84	-29.23	0.15	-0.0051	down
	4/17/2017	20.77	50.00	162.00	162.37	-29.23	-0.37	0.0127	up
	9/18/2017	20.82	50.00	161.90	162.05	-29.18	-0.15	0.0051	up
	11/29/2017	20.86	50.00	161.83	162.05	-29.15	-0.22	0.0075	up
	2/28/2018	20.87	50.00	161.80	161.97	-29.13	-0.17	0.0058	up
	4/24/2018	20.99	50.00	161.56	161.80	-29.01	-0.24	0.0083	up
	8/21/2018	20.78	50.00	161.99	162.09	-29.23	-0.10	0.0034	up
	11/5/2018	20.62	50.00	162.31	162.27	-29.39	0.04	-0.0014	down

TABLE 15

VERTICAL HYDRAULIC GRADIENT MEASUREMENTS
BNSF Wishram Railyard, Wishram Washington

Deep and shallow well pairs	Measurement Date	Shallow Midpoint water depth (feet btoc)	Deep Midpoint water depth (feet btoc)	Shallow Corrected Groundwater Elevation (feet amsl)	Deep Corrected Groundwater Elevation (feet amsl)	Difference Midpoint Groundwater Depth (shallow - deep)	Difference Groundwater Elevation (shallow - deep)	Vertical Gradient (ft/ft)	Gradient Direction
RMD-4 and WMW-18	11/16/2016	20.93	55.00	161.87	161.88	-34.08	-0.01	0.0003	up
	4/17/2017	20.71	55.00	162.31	162.37	-34.30	-0.06	0.0017	up
	9/18/2017	20.84	55.00	162.05	162.09	-34.17	-0.04	0.0012	up
	11/29/2017	20.86	55.00	162.01	162.11	-34.15	-0.10	0.0029	up
	2/28/2018	20.91	55.00	161.91	162.00	-34.10	-0.09	0.0026	up
	4/24/2018	21.00	55.00	161.73	161.82	-34.01	-0.09	0.0026	up
	8/21/2018	20.83	55.00	162.07	162.10	-34.18	-0.03	0.0008	up
	11/5/2018	20.72	55.00	162.29	162.27	-34.29	0.02	-0.0007	down
RMD-6 and WMW-20	8/21/2018	18.17	55.00	162.09	162.13	-36.84	-0.04	0.0012	up
	11/5/2018	18.07	55.00	162.28	162.27	-36.93	0.01	-0.0002	down

Notes

btoc = below top of casing

amsl = above mean sea level

ft/ft = foot per foot

Vertical gradient calculations presented for shallow and deep paired monitoring wells along the Columbia River transect. Vertical gradient calculated by dividing the difference between groundwater elevations in paired wells (shallow minus deep) divided by the difference in depths to the midpoint of the screened water column (shallow minus deep).

Positive value indicates upward vertical gradient (green shading). up

Negative value indicates downward vertical gradient (blue shading). down

TABLE 16

SUMMARY OF FORMER WATER WELLS CONSTRUCTION
BNSF Wishram Railyard, Wishram, Washington

Well ID	Installation Date	Well Completion Details (depths, diameter, casing)	Total Well Depth (feet bgs)	Open Hole (feet bgs)	Location	Abandoned Date	Lithology (Interval Depth and Description)	Notes	2018 Investigation Observations
Well 1	1918	0-79': 13.5" diam. casing 79-107: 12" diam. casing 107-301': 10" diam. hole; Open hole	301	107 - 301	14 feet south and 3 feet west from southeastern corner of power house near Wishram roundhouse	1928	Alluvium: 0-92': Sand and gravel Yakima basalt: 92-172': Rock 172-176': Sand, water bearing; static level 38 feet 176-195': Shale, sandy 195-301': Basalt, creviced	Letter from 16 January 1926 indicated that difficulties were encountered when installating the well, including crooked and damaged casing. The letter included a proposition to "thoroughly seal the present well to prevent further surface water contamination." Historical railyard documents indicate the well was abandoned on 20 December 1928.	An area of approximately 30 feet long (west to east) by 20 feet wide (north to south) by depths ranging from 2 to 3 feet bgs was excavated with a track-mounted excavator in the vicinity of a former pump house and approximate location of the former well. A second area of approximately 10 feet long (north to south) by 6 feet wide (west to east) near a suspected former utility pole, based on a historical aerial photograph from 1951, was also excavated to a depth of approximately 4 feet bgs. No evidence of Well #1 was observed in the excavated areas.
Well 2	23 Dec. 1926	0-75': 15.5" diam. casing 75-122': Open hole 122-154': 12.5" diam. casing 154-170': Open hole 170-220': 10" diam. casing 220-399': Open hole	399	75 - 122 154 - 170 220 - 399	About 285 feet east of power house near Wishram roundhouse	Unknown Pump house visible in 1973 aerial but not 1996	Alluvium: 0-75': Sand Yakima basalt: 75-132': Basalt, black, hard 132-154': Clay, blue 154-180': Basalt, black, water bearing 180-215': Sandy shale and clay 215-325': Basalt, black, soft 325-367': Basalt, gray, hard 367-399': Basalt, black, porous, water bearing; static level 36 feet	Well 2 was located on 11 July 2017, photographs of well included in Appendix B. Measured depth to water at 9.15 feet below top of steel casing (btoc). A solid bottom was measured at 51.5 feet btoc. Reported yield of 900 gallons per minue with drawdown of 19 feet.	A video log of Well #2 was recorded using a WellVu downhole camera with LED lights. The casing appeared to be solid and undamaged, but there was significant buildup on the well casing from the top of the water column to the total depth at 51.5 feet btoc. The buildup appeared to become thicker near the bottom of the well. A solid bottom to the well was observed with the camera at approximately 51.5 feet btoc.
Well 3	1930	0-38.6': 12" diam. casing 38.6-185': Open hole 185-242': 8" diam. casing 242-475': Open hole	475	38.6 - 185 242 - 475	About 400 feet east of power house near Wishram roundhouse	Unknown Pump house visible in 1973 aerial but not 1996	Alluvium: 0-28': Sand and gravel. Yakima basalt: 28-189': Basalt, varying between black and gray, dense at 50 to 61 feet 189-219': Clay, blue 219-221': Basalt 221-230': Sandstone, blue 230-457': Basalt, varying between black and gray, dense to very dense 457-467': Basalt, black, soft 467-472': Basalt, black, porous, water bearing; static level 49.5 feet bgs 472-475': Basalt, black, dense	Well 3 was located on 11 July 2017, photograph of well included in Appendix B. Steel casing in a concrete pad, well filled to surface with sand/gravel material. Reported yield of 750 gallons per minute with drawdown of 18 feet.	Well #3 was excavated with hand tools to approximately 2 feet btoc. The well was filled with sand and gravel material from 0 - 2' btoc.

Notes:
Casing material for Wells 1, 2, and 3 was not identified in available records. Wells 2 and 3 located 11 July 2017 had steel casing to the surface.
bgs = below ground surface
btoc = below top of casing
Well construction data compiled from the following resources:
Piper, Arthur M. 1932. Geology and ground-water resources of the Dalles Region, Oregon. Water Supply Paper 659-B. U.S. Department of the Interior, Geological Survey.
State of Washington Department of Conservation and Development. 1927. Well Log for well drilled 23 December 1926 for Spokane, Portland & Seattle Railway Company.

TABLE 17

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN SOIL SAMPLES
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A Unrestricted then Lowest B		Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
NWTPH-Gx													
Gasoline-Range Organics	mg/kg	30	Method A	53()	12(0)	19()	36%	0.004-7.29	1.5	1,300	B-12-3-13,B-12-4-40	Yes	The maximum concentration exceeds MTCA Method A screening level.
NWTPH-Dx - without silica gel cleanup													
Diesel-Range Organics	mg/kg	2,000	Method A	138(6)	4(0)	19(0)	13%	4.13-88.9	5.3	65,000	B-12-4-40	Yes	The maximum concentration exceeds MTCA Method A screening level.
Oil-Range Organics	mg/kg	2,000	Method A	138(6)	3(0)	21(0)	15%	10.2-1270	13.3	67,000	B-12-4-40	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A	138(6)	6(0)	26(0)	18%	2.07-42.6	10.4	132,000	B-12-4-40	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A	138(6)	6(0)	26(0)	18%	--	5.3	132,000	B-12-4-40	Yes	The maximum concentration exceeds MTCA Method A screening level.
NWTPH-Dx - with silica gel cleanup													
Diesel-Range Organics	mg/kg	2,000	Method A	236(2)	65(0)	123(0)	52%	0.025-30	12	60,600	E-15-14.5	Yes	The maximum concentration exceeds MTCA Method A screening level.
Oil-Range Organics	mg/kg	2,000	Method A	236(2)	59(0)	103(0)	43%	0.05-285	11.5	71,000	B-12-2-12	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A	236(2)	73(0)	130(0)	55%	0.0125-15	13.8	113,000	#9-12,B-12-11-35	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A	236(2)	73(0)	130(0)	55%	--	11.5	113,000	#9-12,B-12-11-35	Yes	The maximum concentration exceeds MTCA Method A screening level.
BTEX													
Benzene	mg/kg	0.03	Method A	177(6)	2(0)	11(1)	7%	0.00103-0.18	0.00135	0.14	B-12-11-35	Yes	The maximum concentration exceeds MTCA Method A screening level.
Toluene	mg/kg	7	Method A	177(6)	0(0)	13(1)	8%	0.00153-0.99	0.0065	0.16	B-12-2-12	No	Maximum concentration does not exceed the cleanup level.
Ethylbenzene	mg/kg	6	Method A	177(6)	0(0)	10(0)	5%	0.00107-0.99	0.00336	1.31	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
Xylene, m,p-	mg/kg	--		118(4)	0(0)	19(1)	16%	0.00413-0.2	0.00485	1.26	B-18-24(13.5-14.0)	No	Cleanup level not available for parameter.
Xylene, o-	mg/kg	16,000	Method B Non cancer	118(4)	0(0)	14(1)	12%	0.00258-0.99	0.0034	0.34	B-12-2-12	No	Maximum concentration does not exceed the cleanup level.
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A	118(4)	0(0)	21(1)	18%	0.00129-0.05	0.00584	1.4	B-12-11-35	No	Maximum concentration does not exceed the cleanup level.
Xylene, total	mg/kg	9	Method A	77(2)	0(0)	10(0)	13%	0.00322-0.146	0.0817	1.395	B-12-11-35	No	Maximum concentration does not exceed the cleanup level.
NWEPH													
C8-C10 Aliphatics	mg/kg	--		10()	0(0)	9()	90%	130	16	660	TG-D4-37	No	Cleanup level not available for parameter.
C10-C12 Aliphatic Hydrocarbons	mg/kg	--		10()	0(0)	9()	90%	12	54	2,600	TG-D4-37	No	Cleanup level not available for parameter.
C12-C16 Aliphatics	mg/kg	--		10()	0(0)	10()	100%	--	230	10,000	TG-A6-36	No	Cleanup level not available for parameter.
C16-C21 Aliphatics	mg/kg	--		10()	0(0)	10()	100%	--	240	11,000	TG-F6-29	No	Cleanup level not available for parameter.
C21-C34 Aliphatics	mg/kg	--		10()	0(0)	10()	100%	--	400	17,000	TG-A6-36,TG-F6-29	No	Cleanup level not available for parameter.
C8-C10 Aromatics	mg/kg	--		10()	0(0)	0()	0%	2.6-130	--	--	--	No	Cleanup level not available for parameter.
C10-C12 Aromatics	mg/kg	--		10()	0(0)	7()	70%	62-130	3.5	340	TG-E8-24	No	Cleanup level not available for parameter.
C12-C16 Aromatics	mg/kg	--		10()	0(0)	10()	100%	--	40	2,600	TG-E8-24	No	Cleanup level not available for parameter.
C16-C21 Aromatics	mg/kg	--		10()	0(0)	10()	100%	--	220	8,800	TG-A6-36	No	Cleanup level not available for parameter.
C21-C34 Aromatics	mg/kg	--		10()	0(0)	10()	100%	--	350	16,000	TG-A6-36	No	Cleanup level not available for parameter.
Semi Volatile Organic Compounds													
2-Methylphenol (o-Cresol)	mg/kg	4,000	Method B Non cancer	7()	0(0)	0()	0%	0.408-356	--	--	--	No	Detection frequency is 0%.
3&4-Methylphenol (m&p-Cresol)	mg/kg	--		7()	0(0)	0()	0%	0.408-356	--	--	--	No	Cleanup level not available for parameter.
Polycyclic Aromatic Hydrocarbons using SIM													
1-Methylnaphthalene	mg/kg	34	Method B Cancer	137(6)	4(0)	12(1)	9%	0.0203-1.3	0.0274	260	TG-D1-12	Yes	The maximum concentration exceeds MTCA Method B Cancer screening level.
2-Methylnaphthalene	mg/kg	320	Method B Non cancer	147(6)	1(0)	14(1)	10%	0.0134-0.526	0.0279	410	TG-D1-12	Yes	The maximum concentration exceeds MTCA Method B Non cancer screening level.
Acenaphthene	mg/kg	4,800	Method B Non cancer	153(6)	0(0)	14(0)	9%	0.0061-35.3	0.00807	18	TG-D1-12	No	Maximum concentration does not exceed the cleanup level.
Acenaphthylene	mg/kg	--		153(6)	0(0)	4(0)	3%	0.0061-35.3	0.28	3.8	TG-D1-12	No	Cleanup level not available for parameter.
Anthracene	mg/kg	24,000	Method B Non cancer	153(6)	0(0)	20(1)	13%	0.0061-35.3	0.00781	8.1	TG-D0-12	No	Maximum concentration does not exceed the cleanup level.
Benzo(a)anthracene	mg/kg	--		154(6)	0(0)	20(1)	13%	0.00619-35.3	0.00791	4.3	TG-D0-12	No	Cleanup level not available for parameter.
Benzo(a)pyrene	mg/kg	0.1	Method A (Sum cPAHs)	154(6)	5(0)	19(1)	13%	0.00619-35.3	0.00868	3.07	B-18-18(1.5-2.0)	Yes	The maximum concentration exceeds MTCA Method A (Sum cPAHs) screening level.
Benzo(b)Fluoranthene	mg/kg	--		154(6)	0(0)	22(1)	14%	0.00619-35.3	0.0078	4.24	B-18-18(1.5-2.0)	No	Cleanup level not available for parameter.
Benzo(g,h,i)Perylene	mg/kg	--		153(6)	0(0)	24(1)	16%	0.00619-35.3	0.00774	1.9	B-18-18(1.5-2.0)	No	Cleanup level not available for parameter.
Benzo(k)Fluoranthene	mg/kg	--		154(6)	0(0)	12(1)	8%	0.00614-35.3	0.00783	1.17	B-18-18(1.5-2.0)	No	Cleanup level not available for parameter.
Chrysene	mg/kg	--		154(6)	0(0)	23(1)	15%	0.00619-35.3	0.00746	10	TG-D0-12	No	Cleanup level not available for parameter.
Dibenz(a,h)Anthracene	mg/kg	--		154(6)	0(0)	10(0)	6%	0.00614-35.3	0.00719	0.582	B-18-18(1.5-2.0)	No	Cleanup level not available for parameter.
Fluoranthene	mg/kg	3,200	Method B Non cancer	153(6)	0(0)	24(1)	16%	0.00619-35.3	0.0077	6.61	B-18-18(1.5-2.0)	No	Maximum concentration does not exceed the cleanup level.
Fluorene	mg/kg	3,200	Method B Non cancer	153(6)	0(0)	15(0)	9%	0.0061-35.3	0.0105	24	TG-D1-12	No	Maximum concentration does not exceed the cleanup level.
Indeno(1,2,3-c,d)Pyrene	mg/kg	--		154(6)	0(0)	17(1)	11%	0.00619-35.3	0.00737	1.72	B-18-18(1.5-2.0)	No	Cleanup level not available for parameter.
Naphthalene	mg/kg	5	Method A	154(6)	4(0)	11(1)	8%	0.0134-35.3	0.0233	23.8	WSB-2-14	Yes	The maximum concentration exceeds MTCA Method A screening level.
Phenanthrene	mg/kg	--		153(6)	0(0)	29(1)	19%	0.00614-35.3	0.00744	41	WSB-2-14,TG-D0-12,TG-D1-12	No	Cleanup level not available for parameter.
Pyrene	mg/kg	2,400	Method B Non cancer	153(6)	0(0)	34(1)	22%	0.00619-35.3	0.00699	19	TG-D0-12	No	Maximum concentration does not exceed the cleanup level.
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A	154(6)	7(0)	17(1)	11%	0.0067-17.7	0.0542	679	TG-D1-12	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A	154(6)	7(0)	17(1)	11%	0	0.0281	679	TG-D1-12	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A (Sum cPAHs)	154(6)	12(0)	29(1)	19%	0.0031-17.7	0.0053	4.25	B-18-18(1.5-2.0)	Yes	The maximum concentration exceeds MTCA Method A (Sum cPAHs) screening level.
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A (Sum cPAHs)	154(6)	8(0)	29(1)	19%	0	0.00067	4.25	B-18-18(1.5-2.0)	Yes	The maximum concentration exceeds MTCA Method A (Sum cPAHs) screening level.

TABLE 17

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN SOIL SAMPLES
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A Unrestricted then Lowest B		Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
Volatile Organic Compounds													
1,1-Dichloropropene	mg/kg	--		122(6)	0(0)	1(0)	1%	0.00107-0.1	0.0454	0.0454	B-18-10(2.0-2.5)	No	Cleanup level not available for parameter.
1,2,3-Trimethylbenzene	mg/kg	800	Method B Non cancer	115(6)	0(0)	6(1)	6%	0.00107-0.00712	0.0043	8.52	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
1,2,4-Trimethylbenzene	mg/kg	800	Method B Non cancer	121(6)	0(0)	7(1)	6%	0.00107-0.1	0.00813	19	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
1,2-Dichloropropane	mg/kg	27	Method B Cancer	122(6)	0(0)	1(0)	1%	0.00107-0.127	0.0184	0.0184	B-18-18(52.5-53.0)	No	Maximum concentration does not exceed the cleanup level.
1,3,5-Trimethylbenzene	mg/kg	800	Method B Non cancer	122(6)	0(0)	2(0)	2%	0.00107-0.1	0.00961	0.942	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
Acetone	mg/kg	72,000	Method B Non cancer	122(6)	0(0)	9(0)	7%	0.0258-2.5	0.0313	0.106	B-18-29(2.0-2.5)	No	Maximum concentration does not exceed the cleanup level.
Chloroethane	mg/kg	--		122(6)	0(0)	1(0)	1%	0.0051-0.127	0.0248	0.0248	B-18-10(2.0-2.5)	No	Cleanup level not available for parameter.
Cymene (p-Isopropyltoluene)	mg/kg	--		122(6)	0(0)	2(0)	2%	0.00107-0.2	0.011	2.82	B-18-24(13.5-14.0)	No	Cleanup level not available for parameter.
Dibromomethane	mg/kg	800	Method B Non cancer	122(6)	0(0)	1(0)	1%	0.00107-0.127	0.00611	0.00611	B-18-10(2.0-2.5)	No	Maximum concentration does not exceed the cleanup level.
Isopropylbenzene	mg/kg	8,000	Method B Non cancer	122(6)	0(0)	1(0)	1%	0.00107-0.2	1.11	1.11	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
Methyl ethyl ketone (2-Butanone)	mg/kg	48,000	Method B Non cancer	122(6)	0(0)	11(0)	9%	0.0107-1	0.0185	0.0566	B-18-23(3.0-3.5)	No	Maximum concentration does not exceed the cleanup level.
Naphthalene	mg/kg	5	Method A	121(6)	1(0)	6(0)	5%	0.0051-0.2	0.016	19.7	B-18-24(13.5-14.0)	Yes	The maximum concentration exceeds MTCA Method A screening level.
n-Butylbenzene	mg/kg	4,000	Method B Non cancer	122(6)	0(0)	1(0)	1%	0.00107-0.5	2.68	2.68	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
n-Propylbenzene	mg/kg	8,000	Method B Non cancer	122(6)	0(0)	1(0)	1%	0.00107-0.1	2.39	2.39	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
Sec-Butylbenzene	mg/kg	8,000	Method B Non cancer	122(6)	0(0)	1(0)	1%	0.00107-0.1	1.82	1.82	B-18-24(13.5-14.0)	No	Maximum concentration does not exceed the cleanup level.
trans-1,3-Dichloropropene	mg/kg	10	Method B Cancer (Total)	122(6)	0(0)	1(0)	1%	0.00107-0.127	0.00897	0.00897	B-18-10(2.0-2.5)	No	Maximum concentration does not exceed the cleanup level.
Metals													
Arsenic	mg/kg	20	Method A	121(6)	0(0)	29(1)	24%	2.07-2.7	1.16	9.65	B-18-18(1.5-2.0)	No	Maximum concentration does not exceed the cleanup level.
Barium	mg/kg	16,000	Method B Non cancer	121(6)	0(0)	121(6)	100%	--	36.5	6,500	WSB-2-14	No	Maximum concentration does not exceed the cleanup level.
Cadmium	mg/kg	2	Method A	121(6)	0(0)	0(0)	0%	0.289-0.709	--	--	--	No	Detection frequency is 0%.
Chromium, Hexavalent	mg/kg	19	Method A	4()	0(0)	0()	0%	10	--	--	--	No	Detection frequency is 0%.
Chromium, total	mg/kg	2,000	Method A	121(6)	0(0)	121(6)	100%	--	3.83	28.8	B-18-03(2.0-2.5)	No	Maximum concentration does not exceed the cleanup level.
Lead	mg/kg	250	Method A	126(6)	1(0)	126(6)	100%	--	0.969	387	WSB-2-8	Yes	The maximum concentration exceeds MTCA Method A screening level.
Mercury	mg/kg	2	Method A	121(6)	0(0)	17(0)	13%	0.0206-0.0806	0.0249	0.156	B-18-30(2.0-2.5)	No	Maximum concentration does not exceed the cleanup level.
Selenium	mg/kg	400	Method B Non cancer	121(6)	0(0)	2(0)	2%	0.345-2.83	0.411	0.457	WSB-2-8	No	Maximum concentration does not exceed the cleanup level.
Silver	mg/kg	400	Method B Non cancer	121(6)	0(0)	0(0)	0%	0.345-1.42	--	--	--	No	Detection frequency is 0%.
Metals - TCLP													
Barium	µg/L	100,000	TCLP Haz Waste Limit	4	0(0)	4(0)	100%	--	579	815	WSB-04-30-5	No	Maximum concentration does not exceed the TCLP level.

Abbreviations and Symbols:

" - -" denotes not measured, not available, or not applicable.
mg/kg = milligrams per kilogram
µg/L = milligrams per liter
BTEX = benzene, toluene, ethylbenzene, and xylenes compounds
EPH = Extractable Petroleum Hydrocarbons
NWTPH = Northwest Total Petroleum Hydrocarbon Method
SIM = selective ion monitoring
Total TPH-Dx = Total TPH-Dx concentrations were calculated by summing diesel-range organics (DRO) and oil-range organics (ORO) concentrations. Non-detects were included as noted.
Total cPAHs = Possible Total Carcinogenic Polycyclic Aromatic hydrocarbons (cPAHs) are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. Non-detects were included as noted.
Total Naphthalenes = Total Naphthalenes concentrations were calculated by summing 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene concentrations. Non-detects were included as noted.
Total Xylenes = Total Xylenes concentrations were calculated by summing Xylene, m,p- and Xylene, o- concentrations. Non-detects were included as noted.
(HitsOnly) = If an individual chemical was not detected, it was not included in the calculation.
(HalfDL) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation.
(HalfDL_WA) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration.

Notes:

Above CUL. Yes (Y) or No (N) based on reported resulted in at least one groundwater sample at a concentration above an applicable cleanup level (CUL).
If "Yes", the cell is shaded blue. Yes
Number of Analyses. Normal sample analyses are followed by duplicate sample analyses in parentheses.

Cleanup Levels (CUL)

Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for unrestricted land use (Method A) based on Washington State Administrative Code (WAC) 173-340-900 Table 740-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2020).

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
Location ID						#1	#1	#1	#2	#4	#4	#5	#6	#7	#7	#8	#8	#8
Sample ID						#1-10	#1-14	#1-18	#2-11.5	#4-10	#4-14	#5-12	#6-12	#7-10	#7-16	#8-15	#8-18	#8-24
Parent Sample ID																		
Sample Date						1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002
Sample Depth						10 ft	14 ft	18 ft	11.5 ft	10 ft	14 ft	12 ft	12 ft	10 ft	16 ft	15 ft	18 ft	24 ft
Water Table Note						AWT	AWT	BWT	AWT	AWT	AWT	AWT	AWT	AWT	BWT	BWT	BWT	BWT
Notes																		
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 25	< 25	< 25	**5,120**	< 25	< 25	**1,190**	**260**	**3,740**	**7,750**	**1,560**	**85**	**4,520**
Oil-Range Organics	mg/kg	2,000	Method A			< 100	< 100	< 100	**7,850**	< 100	< 100	< 100	< 100	**2,730**	< 100	**1,210**	< 100	**4,680**
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 12.5	< 12.5	< 12.5	**13,000**	< 12.5	< 12.5	**1,240**	**310**	**6,470**	**7,800**	**2,770**	**135**	**9,200**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	ND	ND	**13,000**	ND	ND	**1,190**	**260**	**6,470**	**7,750**	**2,770**	**85.0**	**9,200**
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	7	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
Location ID						#9	#9	#9	#10	#10	#12	#12	#13	#13	#14	WSB-1	WSB-1	WSB-2
Sample ID						#9-10	#9-12	#9-14	#10-12	#10-14	#12-12	#12-16	#13-12	#13-16	#14-8	WSB-1-10	WSB-1-15	WSB-2-8
Parent Sample ID																		
Sample Date						1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	9/2/2003	9/2/2003	9/2/2003
Sample Depth						10 ft	12 ft	14 ft	12 ft	14 ft	12 ft	16 ft	12 ft	16 ft	8 ft	10 ft	15 ft	8 ft
Water Table Note						AWT	AWT	AWT	AWT	AWT	AWT	BWT	AWT	BWT	AWT	AWT	BWT	AWT
Notes																		
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**31,000**	**50,200**	**29,900**	**567**	**43,200**	< 25	**187**	< 25	< 25	**445**	**47.6**	< 0.0250	**6,900**
Oil-Range Organics	mg/kg	2,000	Method A			**36,800**	**62,900**	**35,200**	**1,700**	**34,300**	< 100	**976**	< 100	< 100	**2,480**	**359**	< 0.0500	**4,710**
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**67,800**	**113,000**	**65,100**	**2,270**	**77,500**	< 12.5	**1,160**	< 12.5	< 12.5	**2,930**	**407**	< 0.0125	**11,600**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**67,800**	**113,000**	**65,100**	**2,270**	**77,500**	ND	**1,160**	ND	ND	**2,930**	**407**	ND	**11,600**
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	--	--	--	--	--	--	--	*< 0.05*	*< 0.05*	*< 0.1*
Toluene	mg/kg	7	Method A			--	--	--	--	--	--	--	--	--	--	**0.0147**	< 0.05	< 0.1
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	--	--	--	--	--	--	< 0.05	< 0.05	**0.178**
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	< 0.1	< 0.1	**0.0817**
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	**4.3**
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	**4,680**
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	**387**

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	WSB-2	WSB-3	WSB-3	WSB-4	WSB-6	WSB-6	WSB-7	WSB-04-1	WSB-04-1	WSB-04-2	WSB-04-2	WSB-04-11	WSB-04-11
					Sample ID	WSB-2-14	WSB-3-10	WSB-3-16	WSB-4-10	WSB-6-10	WSB-6-14	WSB-7-10	WSB-04-1-2	WSB-04-1-12	WSB-04-2-2	WSB-04-2-12	WSB-04-11-2	WSB-04-11-10
					Parent Sample ID													
					Sample Date	9/2/2003	9/2/2003	9/2/2003	9/2/2003	9/2/2003	9/2/2003	9/2/2003	2/26/2004	2/26/2004	2/26/2004	2/26/2004	2/24/2004	2/24/2004
					Sample Depth	14 ft	10 ft	16 ft	10 ft	10 ft	14 ft	10 ft	2 ft	12 ft	2 ft	12 ft	2 ft	10 ft
					Water Table Note	AWT	AWT	BWT	AWT	AWT	BWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT
					Notes	PAHs SW8270 without SIM												
Chemical	**Units**	**MTCA A then Lowest B**		**Soil Protective of GW (Vadose)**	**Soil Protective of GW (Saturated)**													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	< 0.00400	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**15,700**	< 0.0250	< 0.0250	< 0.0250	< 0.0250	**265**	**240**	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250
Oil-Range Organics	mg/kg	2,000	Method A			**10,500**	< 0.0500	< 0.0500	< 0.0500	< 0.0500	**75.4**	**72.3**	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**26,200**	< 0.0125	< 0.0125	< 0.0125	< 0.0125	**340**	**312**	< 0.0125	< 0.0125	< 0.0125	< 0.0125	< 0.0125	< 0.0125
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**26,200**	ND	ND	ND	ND	**340**	**312**	ND	ND	ND	ND	ND	ND
BTEX																		
Benzene	mg/kg	0.03	Method A			*< 0.1*	*< 0.05*	*< 0.05*	*< 0.1*	*< 0.05*	*< 0.05*	*< 0.05*	--	--	--	*< 0.05*	--	--
Toluene	mg/kg	7	Method A			< 0.1	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	< 0.05	--	--	--	< 0.05	--	--
Ethylbenzene	mg/kg	6	Method A			**0.687**	< 0.05	< 0.05	**0.299**	< 0.05	< 0.05	< 0.05	--	--	--	< 0.05	--	--
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			**0.739**	< 0.1	< 0.1	**1.36**	< 0.1	< 0.1	< 0.1	--	--	--	< 0.1	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			< 16.5	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			**61.9**	--	--	--	--	--	--	--	< 0.0134	--	--	--	< 0.0134
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 16.5	--	--	--	--	--	--	--	< 0.0134	--	--	--	< 0.0134
Benzo(a)anthracene	mg/kg					< 16.5	--	--	< 0.0134	--	--	--	--	< 0.0134	--	--	--	< 0.0134
Benzo(a)pyrene	mg/kg	0.1	Method A			*< 16.5*	--	--	< 0.0134	--	--	--	--	< 0.0134	--	--	--	< 0.0134
Benzo(b)Fluoranthene	mg/kg					< 16.5	--	--	< 0.0134	--	--	--	--	< 0.0134	--	--	--	< 0.0134
Benzo(k)Fluoranthene	mg/kg					< 16.5	--	--	< 0.0134	--	--	--	--	< 0.0134	--	--	--	< 0.0134
Chrysene	mg/kg					< 16.5	--	--	< 0.0134	--	--	--	--	< 0.0134	--	--	--	< 0.0134
Dibenz(a,h)Anthracene	mg/kg					< 16.5	--	--	< 13.4	--	--	--	--	< 0.0134	--	--	--	< 0.0134
Indeno(1,2,3-c,d)Pyrene	mg/kg					< 16.5	--	--	< 0.0134	--	--	--	--	< 0.0134	--	--	--	< 0.0134
Naphthalene	mg/kg	5	Method A			**23.8**	--	--	--	--	--	--	--	< 0.0134	--	--	--	< 0.0134
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			**85.7**	--	--	--	--	--	--	--	< 0.00670	--	--	--	< 0.00670
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			**85.7**	--	--	--	--	--	--	--	< 0.00	--	--	--	< 0.00
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			*< 8.25*	--	--	< 0.00670	--	--	--	--	< 0.00670	--	--	--	< 0.00670
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			**< 0.00**	--	--	< 0.00	--	--	--	--	< 0.00	--	--	--	< 0.00
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			**5.27**	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	**6,500**	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			**37.1**	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 18

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
					Location ID	WSB-04-12	WSB-04-12	WSB-04-13	WSB-04-14	WSB-04-14	WSB-04-15	WSB-04-17	WSB-04-18	WSB-04-20	WSB-04-25	WSB-04-25	WSB-04-27	WSB-04-29
					Sample ID	WSB-04-12-5	WSB-04-12-10	WSB-04-13-16	WSB-04-14-5	WSB-04-14-10	WSB-04-15-10	WSB-04-17-9	WSB-04-18-10	WSB-04-20-10	WSB-04-25-5	WSB-04-25-10	WSB-04-27-10	WSB-04-29-2
					Parent Sample ID													
					Sample Date	2/26/2004	2/26/2004	2/24/2004	2/24/2004	2/24/2004	2/25/2004	2/24/2004	2/24/2004	2/24/2004	2/25/2004	2/25/2004	2/26/2004	2/25/2004
					Sample Depth	5 ft	10 ft	16 ft	5 ft	10 ft	10 ft	9 ft	10 ft	10 ft	5 ft	10 ft	10 ft	2 ft
					Water Table Note	AWT	AWT	BWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT
					Notes													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			< 0.00400	< 0.00400	--	--	< 0.00400	< 0.00400	--	--	**4.48**	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250
Oil-Range Organics	mg/kg	2,000	Method A			< 0.0500	< 0.0500	< 0.0500	**50.7**	< 0.0500	< 0.0500	< 0.0500	**110**	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 0.0125	< 0.0125	< 0.0125	**50.7**	< 0.0125	< 0.0125	< 0.0125	**110**	< 0.0125	< 0.0125	< 0.0125	< 0.0125	< 0.0125
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	ND	ND	**50.7**	ND	ND	ND	**110**	ND	ND	ND	ND	ND
BTEX																		
Benzene	mg/kg	0.03	Method A			*< 0.05*	*< 0.05*	--	--	*< 0.05*	*< 0.05*	--	--	*< 0.05*	--	--	--	--
Toluene	mg/kg	7	Method A			< 0.05	**0.012**	--	--	< 0.05	< 0.05	--	--	< 0.05	--	--	--	--
Ethylbenzene	mg/kg	6	Method A			< 0.05	< 0.05	--	--	< 0.05	< 0.05	--	--	< 0.05	--	--	--	--
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			< 0.1	< 0.1	--	--	< 0.1	< 0.1	--	--	< 0.1	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			< 0.0134	< 0.0134	--	--	< 0.0134	--	< 0.0335	--	--	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 0.0134	< 0.0134	--	--	< 0.0134	--	< 0.0335	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg					< 0.0134	**0.0262**	--	--	< 0.0134	--	< 0.0335	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			< 0.0134	**0.0365**	--	--	< 0.0134	--	< 0.0335	--	--	--	--	--	--
Benzo(b)Fluoranthene	mg/kg					< 0.0134	**0.0463**	--	--	< 0.0134	--	< 0.0335	--	--	--	--	--	--
Benzo(k)Fluoranthene	mg/kg					< 0.0134	**0.0336**	--	--	< 0.0134	--	< 0.0335	--	--	--	--	--	--
Chrysene	mg/kg					< 0.0134	**0.039**	--	--	< 0.0134	--	< 0.0335	--	--	--	--	--	--
Dibenz(a,h)Anthracene	mg/kg					< 0.0134	< 0.0134	--	--	< 0.0134	--	< 0.0335	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					< 0.0134	**0.0197**	--	--	< 0.0134	--	< 0.0335	--	--	--	--	--	--
Naphthalene	mg/kg	5	Method A			< 0.0134	< 0.0134	--	--	< 0.0134	--	< 0.0335	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			< 0.00670	**< 0.00670**	--	--	< 0.00670	--	< 0.0168	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			< 0.00	**< 0.00**	--	--	< 0.00	--	< 0.00	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			< 0.00670	**0.0501**	--	--	< 0.00670	--	< 0.0168	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			< 0.00	**0.0495**	--	--	< 0.00	--	< 0.00	--	--	--	--	--	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	WSB-04-29	WSB-04-29	WSB-04-30	WSB-04-30	WSB-04-31	WSB-04-31	WSB-04-33	WSB-04-33	WSB-04-33	WSB-04-34	WSB-04-35	WSB-04-36	WSB-04-38
					Sample ID	WSB-04-29-5	WSB-04-29-10	WSB-04-30-5	WSB-04-30-10	WSB-04-31-2	WSB-04-31-5	WSB-04-33-2	WSB-04-33-5	WSB-04-33-10	WSB-04-34-5	WSB-04-35-5	WSB-04-36-10	WSB-04-38-10
					Parent Sample ID													
					Sample Date	2/25/2004	2/25/2004	2/25/2004	2/25/2004	2/25/2004	2/25/2004	2/25/2004	2/25/2004	2/25/2004	2/25/2004	2/25/2004	2/25/2004	4/5/2004
					Sample Depth	5 ft	10 ft	5 ft	10 ft	2 ft	5 ft	2 ft	5 ft	10 ft	5 ft	5 ft	10 ft	10 ft
					Water Table Note	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT
					Notes													
Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	< 0.00400	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 0.0250	< 0.0250	< 0.0250	--	< 0.0250	--	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250
Oil-Range Organics	mg/kg	2,000	Method A			< 0.0500	< 0.0500	< 0.0500	--	**111**	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 0.0125	< 0.0125	< 0.0125	--	**111**	--	< 0.0125	< 0.0125	< 0.0125	< 0.0125	< 0.0125	< 0.0125	< 0.0125
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	ND	ND	--	**111**	--	ND	ND	ND	ND	ND	ND	ND
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	< 0.00444	--	< 0.00444	--	--	< 0.00444	--	--	< 0.00444	--
Toluene	mg/kg	7	Method A			--	--	--	< 0.00629	--	**0.0118**	--	--	< 0.00629	--	--	< 0.00629	--
Ethylbenzene	mg/kg	6	Method A			--	--	--	< 0.0094	--	< 0.0094	--	--	< 0.0094	--	--	< 0.0094	--
Xylene, m,p-	mg/kg					--	--	--	< 0.2	--	< 0.2	--	--	< 0.2	--	--	< 0.2	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	< 0.1	--	< 0.1	--	--	< 0.1	--	--	< 0.1	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	< 0.0500	--	< 0.0500	--	--	< 0.0500	--	--	< 0.0500	--
Xylene, total	mg/kg	9	Method A			--	--	--	< 0.023	--	< 0.023	--	--	< 0.023	--	--	< 0.023	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	< 0.0134	--	< 0.0134	--	--	--	--	--	< 0.0134	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	< 0.0134	--	< 0.0134	--	--	--	--	--	< 0.0134	--
Benzo(a)anthracene	mg/kg					--	--	--	< 0.0134	--	< 0.0134	--	--	--	--	--	< 0.0134	--
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	< 0.0134	--	< 0.0134	--	--	--	--	--	< 0.0134	--
Benzo(b)Fluoranthene	mg/kg					--	--	--	< 0.0134	--	< 0.0134	--	--	--	--	--	< 0.0134	--
Benzo(k)Fluoranthene	mg/kg					--	--	--	< 0.0134	--	< 0.0134	--	--	--	--	--	< 0.0134	--
Chrysene	mg/kg					--	--	--	< 0.0134	--	< 0.0134	--	--	--	--	--	< 0.0134	--
Dibenz(a,h)Anthracene	mg/kg					--	--	--	< 0.0134	--	< 0.0134	--	--	--	--	--	< 0.0134	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	< 0.0134	--	< 0.0134	--	--	--	--	--	< 0.0134	--
Naphthalene	mg/kg	5	Method A			--	--	--	< 0.0134	--	< 0.0134	--	--	< 0.2	--	--	< 0.0134	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	< 0.00670	--	< 0.00670	--	--	< 0.100	--	--	< 0.00670	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	< 0.00	--	< 0.00	--	--	< 0.00	--	--	< 0.00	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	< 0.00670	--	< 0.00670	--	--	--	--	--	< 0.00670	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	< 0.00	--	< 0.00	--	--	--	--	--	< 0.00	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	< 0.2	--	< 0.2	--	--	--	--	--	< 0.2	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	**1.16**	**1.89**	--	**1.72**	--	--	**1.85**	--	--	**1.69**	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	**79.1**	**98.6**	--	**89.7**	--	--	**92.8**	--	--	**83.7**	--
Lead	mg/kg	250	Method A			--	--	**3.13**	**5.72**	--	**3.8**	--	--	**4.21**	--	--	**3.34**	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
					Location ID	T-1	T-2	T-3	T-4	T-5	T-6	T-7	T-8	T-9	T-10	B-12-1	B-12-1	B-12-2
					Sample ID	T-1-12	T-2-11	T-3-12	T-4-13.5	T-5-14.5	T-6-10.5	T-7-12	T-8-11	T-9-14	T-10-11.5	B-12-1-32	B-12-1-59	B-12-2-12
					Parent Sample ID													
					Sample Date	5/20/2010	5/20/2010	5/20/2010	5/20/2010	5/20/2010	5/20/2010	5/20/2010	5/20/2010	5/20/2010	5/20/2010	1/10/2012	1/10/2012	1/10/2012
					Sample Depth	12 ft	11 ft	12 ft	13.5 ft	14.5 ft	10.5 ft	12 ft	11 ft	14 ft	11.5 ft	32 ft	59 ft	12 ft
					Water Table Note	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT
					Notes													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			**62.7**	**161**	**67.7**	**210**	< 6.2	**8.10**	< 5.9	< 5.4	< 6.3	< 6.1	**700 B**	**1.5 J**	**1,000 B**
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**545**	**314**	**314**	**683**	< 24.9	< 24.5	< 24.5	< 20.4	< 21.9	< 24.8	**12,000 Y**	< 28 U	**38,000 Y**
Oil-Range Organics	mg/kg	2,000	Method A			< 99.6	< 91.9	< 97.3	< 98.3	< 99.7	< 97.8	< 98.1	< 81.6	< 87.4	< 99.3	**14,000 Y**	**20 J**	**71,000 Y**
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**595**	**360**	**363**	**732**	< 12.5	< 12.3	< 12.3	< 10.2	< 11.0	< 12.4	**26,000**	**34.0**	**109,000**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**545**	**314**	**314**	**683**	ND	ND	ND	ND	ND	ND	**26,000**	**20.0**	**109,000**
BTEX																		
Benzene	mg/kg	0.03	Method A			< 0.0253	< 0.0253	< 0.0228	< 0.021	< 0.0248	< 0.0273	< 0.0235	< 0.0217	< 0.0253	< 0.0242	< 0.025	< 0.017	**0.089 J**
Toluene	mg/kg	7	Method A			< 0.0316	< 0.0316	< 0.0284	< 0.0262	< 0.031	< 0.0342	< 0.0294	< 0.0271	< 0.0316	< 0.0303	< 0.062	< 0.043	**0.16 J**
Ethylbenzene	mg/kg	6	Method A			< 0.0316	< 0.0316	< 0.0284	< 0.0262	< 0.031	< 0.0342	< 0.0294	< 0.0271	< 0.0316	< 0.0303	< 0.062	< 0.043	**0.17 J**
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	**0.66**	< 0.043	**0.47 J**
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	< 0.062	< 0.043	**0.34 J**
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	**0.691**	< 0.0215	**0.810**
Xylene, total	mg/kg	9	Method A			< 0.0947	< 0.0949	< 0.0853	< 0.0786	< 0.093	< 0.102	< 0.0882	< 0.0814	< 0.0947	< 0.0909	**0.691**	< 0.086	**0.81 J**
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	B-12-2	B-12-2	B-12-3	B-12-4	B-12-4	B-12-5	B-12-6	B-12-7	B-12-8	B-12-9	B-12-10	B-12-11	B-12-12
					Sample ID	B-12-2-40	B-12-2-55	B-12-3-13	B-12-4-40	B-12-4-68	B-12-5-45	B-12-6-45	B-12-7-24	B-12-8-37	B-12-9-40	B-12-10-40	B-12-11-35	B-12-12-12
					Parent Sample ID													
					Sample Date	1/10/2012	1/11/2012	1/11/2012	1/11/2012	1/12/2012	1/17/2012	1/31/2012	1/31/2012	2/1/2012	2/1/2012	2/1/2012	2/2/2012	2/4/2012
					Sample Depth	40 ft	55 ft	13 ft	40 ft	68 ft	45 ft	45 ft	24 ft	37 ft	40 ft	40 ft	35 ft	12 ft
					Water Table Note	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT
					Notes	PAHs SW8270 without SIM			PAHs SW8270 without SIM									
Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			**380**	< 4.6	**1,300 B**	**1,300 B**	**4.1 J**	--	< 5.5	**25**	**1.9 J**	< 4.9	< 4.7	**1,100**	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**5,800 BY**	--	--	**65,000 B**	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			**5,500 Y**	--	--	**67,000**	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**11,300**	--	--	**132,000**	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**11,300**	--	--	**132,000**	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**5,400 Y**	**33 Y**	**28,000 Y**	**45,000 Y**	**14 J**	< 30	**12 J**	**470 B**	**340 B**	**12 J**	**14 J**	**52,000 B**	**30,000 B**
Oil-Range Organics	mg/kg	2,000	Method A			**6,300 Y**	**54 J**	**2,700 Y**	**53,000 Y**	**24 J**	< 61	< 63	**530 Y**	**1,700 Y**	< 59	< 61	**61,000 Y**	**1,700 Y**
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**11,700**	**87.0**	**30,700**	**98,000**	**38.0**	< 15.0	**43.5**	**1,000**	**2,040**	**41.5**	**44.5**	**113,000**	**31,700**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**11,700**	**87.0**	**30,700**	**98,000**	**38.0**	ND	**12.0**	**1,000**	**2,040**	**12.0**	**14.0**	**113,000**	**31,700**
BTEX																		
Benzene	mg/kg	0.03	Method A			< 0.018	< 0.018	*< 0.18*	*< 0.16*	< 0.018	--	< 0.022	< 0.018	< 0.02	< 0.02	< 0.019	**0.14 J**	--
Toluene	mg/kg	7	Method A			< 0.045	< 0.046	< 0.45	< 0.41	< 0.045	--	< 0.055	< 0.045	< 0.049	< 0.049	< 0.047	< 0.99	--
Ethylbenzene	mg/kg	6	Method A			< 0.045	< 0.046	< 0.45	< 0.41	< 0.045	--	< 0.055	< 0.045	< 0.049	< 0.049	< 0.047	< 0.99	--
Xylene, m,p-	mg/kg					< 0.045	< 0.046	**0.49**	**0.85**	< 0.045	--	< 0.055	< 0.045	< 0.049	< 0.049	< 0.047	**0.9 J**	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	< 0.045	< 0.046	< 0.45	< 0.41	< 0.045	--	< 0.055	< 0.045	< 0.049	< 0.049	< 0.047	< 0.99	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			< 0.0225	< 0.0230	**0.715**	**1.06**	< 0.0225	--	< 0.0275	< 0.0225	< 0.0245	< 0.0245	< 0.0235	**1.40**	--
Xylene, total	mg/kg	9	Method A			< 0.09	< 0.092	**0.715**	**1.055**	< 0.09	--	< 0.11	< 0.09	< 0.098	< 0.098	< 0.094	**1.395 J**	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			**2.4**	--	--	**22**	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			**3.1**	--	--	**27**	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	**0.19**	--	--	< 0.056	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg					**0.055 J**	--	--	< 0.056	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			**0.029 J**	--	--	**0.32**	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	mg/kg					**0.12**	--	--	**1.2**	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	mg/kg					< 0.065	--	--	< 0.056	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg					**0.42**	--	--	**4.5**	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	mg/kg					< 0.065	--	--	**0.2**	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					< 0.065	--	--	**0.23**	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	5	Method A			**0.1**	--	--	**4.5**	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			**5.60**	--	--	**53.5**	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			**5.60**	--	--	**53.5**	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			**0.0605**	--	--	**0.534**	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			**0.0507**	--	--	**0.528**	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	B-12-12	B-12-13	NT-10	TG-A6	TG-CR1	TG-CR2	TG-CR3	TG-CR-6	TG-D0	TG-D1	TG-D2	TG-D4	TG-D5
					Sample ID	B-12-12-23	B-12-13-30	NT-10-10	TG-A6-36	TG-CR1-32	TG-CR2-12	TG-CR3-12	CR-6-25 (LR-6-25)	TG-D0-12	TG-D1-12	TG-D2-24	TG-D4-37	TG-D5-33
					Parent Sample ID													
					Sample Date	2/4/2012	2/4/2012	8/1/2013	7/31/2013	7/31/2013	7/24/2013	7/24/2013	8/1/2013	7/24/2013	7/24/2013	7/24/2013	7/30/2013	7/30/2013
					Sample Depth	23 ft	30 ft	10 ft	36 ft	32 ft	12 ft	12 ft	25 ft	12 ft	12 ft	24 ft	37 ft	33 ft
					Water Table Note	BWT	BWT	AWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT
					Notes													
Chemical	**Units**	**MTCA A then Lowest B**		**Soil Protective of GW (Vadose)**	**Soil Protective of GW (Saturated)**													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**42,000 B**	**7,200 B**	< 4.8	**30,000**	**5,300**	**16,000**	**17,000**	< 5	**30,000**	**43,000**	**16,000**	**7,100**	**24,000**
Oil-Range Organics	mg/kg	2,000	Method A			**52,000 Y**	**10,000 Y**	< 12	**38,000**	**280**	**1,800**	**1,400**	< 12	**33,000**	**10,000**	**46,000**	**8,000**	**32,000**
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**94,000**	**17,200**	< 2.40	**68,000**	**5,580**	**17,800**	**18,400**	< 2.50	**63,000**	**53,000**	**62,000**	**15,100**	**56,000**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**94,000**	**17,200**	ND	**68,000**	**5,580**	**17,800**	**18,400**	ND	**63,000**	**53,000**	**62,000**	**15,100**	**56,000**
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	7	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	**140**	**260**	--	< 1.3	**36**
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	< 2.2	< 2.3	--	< 1.3	< 4.4
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	--	--	**230**	**410**	--	1.7	**52**
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--	--	--	--	**8.1**	**2.9**	--	< 0.39	**7.7**
Benzo(a)anthracene	mg/kg					--	--	--	--	--	--	--	--	**4.3**	< 0.68	--	< 0.39	< 1.3
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	**2.6**	< 0.68	--	< 0.39	< 1.3
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	**1.9**	< 0.68	--	< 0.39	**1.7**
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	< 0.66	< 0.68	--	< 0.39	< 1.3
Chrysene	mg/kg					--	--	--	--	--	--	--	--	**10**	**1.5**	--	< 0.39	**3.6**
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--	--	--	--	< 0.66	< 0.68	--	< 0.39	< 1.3
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--	--	--	--	< 0.66	< 0.68	--	< 0.39	< 1.3
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	**8.7**	**9.4**	--	< 1.3	< 4.4
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	**379**	**679**	--	**3.00**	**90.2**
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	**379**	**679**	--	**1.70**	**88.0**
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	**3.42**	**0.525**	--	*< 0.195*	**1.12**
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	**3.32**	**0.0150**	--	< 0.00	**0.206**
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	TG-D6	TG-D6	TG-D6	TG-E0	TG-E1	TG-E8	TG-F1	TG-F2	TG-F6	TG-F6	MWD-1	MWD-1	MWD-2
					Sample ID	TG-D6-17	TG-D6-29	TG-D6-48	TG-E0-22	TG-E1-23	TG-E8-24	TG-F1-25	TG-F2-36	TG-F6-25	TG-F6-29	MWD-1-25	MWD-1-33-2	MWD-2-20
					Parent Sample ID													
					Sample Date	7/30/2013	7/31/2013	7/30/2013	7/24/2013	7/24/2013	7/30/2013	7/24/2013	7/31/2013	7/30/2013	8/1/2013	7/24/2014	7/24/2014	7/23/2014
					Sample Depth	17 ft	29 ft	48 ft	22 ft	23 ft	24 ft	25 ft	36 ft	25 ft	29 ft	25 ft	33 ft	20 ft
					Water Table Note	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT
					Notes												PAHs SW8270 without SIM	
Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**1,000**	**27,000**	**3,800**	**8,800**	**24,000**	**31,000**	**450**	**320**	**2,200**	**23,000**	**1,000**	**44**	< 5.2
Oil-Range Organics	mg/kg	2,000	Method A			**1,400**	**31,000**	**4,900**	**2,800**	**39,000**	**41,000**	**480**	**370**	**3,800**	**29,000**	**73**	< 13	< 13
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**2,400**	**58,000**	**8,700**	**11,600**	**63,000**	**72,000**	**930**	**690**	**6,000**	**52,000**	**1,070**	**50.5**	< 2.60
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**2,400**	**58,000**	**8,700**	**11,600**	**63,000**	**72,000**	**930**	**690**	**6,000**	**52,000**	**1,070**	**44.0**	ND
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	7	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			< 0.13	--	**1.8**	--	--	--	--	--	< 0.48	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			< 0.13	--	< 1.3	--	--	--	--	--	< 0.48	--	--	< 0.042	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			< 0.13	--	**1.3**	--	--	--	--	--	< 0.48	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 0.038	--	**0.62**	--	--	--	--	--	< 0.14	--	--	< 0.042	--
Benzo(a)anthracene	mg/kg					< 0.038	--	< 0.38	--	--	--	--	--	**0.40**	--	--	< 0.042	--
Benzo(a)pyrene	mg/kg	0.1	Method A			< 0.038	--	< 0.38	--	--	--	--	--	< 0.14	--	--	< 0.042	--
Benzo(b)Fluoranthene	mg/kg					< 0.038	--	< 0.38	--	--	--	--	--	**0.24**	--	--	< 0.042	--
Benzo(k)Fluoranthene	mg/kg					< 0.038	--	< 0.38	--	--	--	--	--	< 0.14	--	--	< 0.042	--
Chrysene	mg/kg					**0.067**	--	**0.50**	--	--	--	--	--	< 0.14	--	--	< 0.042	--
Dibenz(a,h)Anthracene	mg/kg					< 0.038	--	< 0.38	--	--	--	--	--	< 0.14	--	--	< 0.042	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					< 0.038	--	< 0.38	--	--	--	--	--	< 0.14	--	--	< 0.042	--
Naphthalene	mg/kg	5	Method A			< 0.038	--	< 1.3	--	--	--	--	--	< 0.48	--	--	< 0.042	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			**< 0.0190**	--	**3.75**	--	--	--	--	--	< 0.240	--	--	< 0.0210	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			**< 0.00**	--	**3.10**	--	--	--	--	--	< 0.00	--	--	< 0.00	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			**0.0292**	--	**0.290**	--	--	--	--	--	**0.156**	--	--	< 0.0210	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			**0.000670**	--	**0.00500**	--	--	--	--	--	**0.0640**	--	--	< 0.00	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	MWD-2	MWD-2	MWD-3	MWD-3	MWD-3	MWD-4	MWD-4	OHM-1	OHM-1	OHM-1	OHM-1	OHM-1	OHM-2
					Sample ID	MWD-2-33-2	MWD-2-43	MWD-3-39	MWD-3-42.5-2	MWD-3-69.5	MWD-4-35	MWD-4-70	OHM-1-19	OHM-1-36-2	OHM-1-43	OHM-1-50	OHM-1-75	OHM-2-17
					Parent Sample ID													
					Sample Date	7/23/2014	7/23/2014	7/24/2014	7/25/2014	7/25/2014	7/22/2014	7/23/2014	7/29/2014	7/30/2014	7/30/2014	7/30/2014	7/30/2014	7/28/2014
					Sample Depth	33 ft	43 ft	39 ft	42.5 ft	69.5 ft	35 ft	70 ft	19 ft	36 ft	43 ft	50 ft	75 ft	17 ft
					Water Table Note	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT
					Notes	PAHs SW8270 without SIM			PAHs SW8270 without SIM					PAHs SW8270 without SIM				
Chemical	**Units**	**MTCA A then Lowest B**		**Soil Protective of GW (Vadose)**	**Soil Protective of GW (Saturated)**													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**900**	< 5.5	**4,600**	**2,400**	**74**	< 5.5	< 4.4	**2,600**	**29,000**	**18,000**	**22,000**	**2,400**	**7,600**
Oil-Range Organics	mg/kg	2,000	Method A			**930**	< 14	**5,100**	**2,700**	**89**	< 14	< 11	**2,800**	**29,000**	**22,000**	**23,000**	**2,500**	**8,100**
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**1,830**	< 2.75	**9,700**	**5,100**	**163**	< 2.75	< 2.20	**5,400**	**58,000**	**40,000**	**45,000**	**4,900**	**15,700**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**1,830**	ND	**9,700**	**5,100**	**163**	ND	ND	**5,400**	**58,000**	**40,000**	**45,000**	**4,900**	**15,700**
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	7	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			< 0.089	--	--	< 0.41	--	--	--	--	< 2	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 0.089	--	--	**0.68**	--	--	--	--	< 2	--	--	--	--
Benzo(a)anthracene	mg/kg					< 0.089	--	--	< 0.41	--	--	--	--	< 2	--	--	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			< 0.089	--	--	*< 0.41*	--	--	--	--	*< 2*	--	--	--	--
Benzo(b)Fluoranthene	mg/kg					< 0.089	--	--	< 0.41	--	--	--	--	< 2	--	--	--	--
Benzo(k)Fluoranthene	mg/kg					< 0.089	--	--	< 0.41	--	--	--	--	< 2	--	--	--	--
Chrysene	mg/kg					< 0.089	--	--	< 0.41	--	--	--	--	< 2	--	--	--	--
Dibenz(a,h)Anthracene	mg/kg					< 0.089	--	--	< 0.41	--	--	--	--	< 2	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					< 0.089	--	--	< 0.41	--	--	--	--	< 2	--	--	--	--
Naphthalene	mg/kg	5	Method A			< 0.089	--	--	< 0.41	--	--	--	--	**2.6**	--	--	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			< 0.0445	--	--	**< 0.205**	--	--	--	--	**2.60**	--	--	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			< 0.00	--	--	**< 0.00**	--	--	--	--	**2.60**	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			< 0.0445	--	--	*< 0.205*	--	--	--	--	*< 1.00*	--	--	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			< 0.00	--	--	**< 0.00**	--	--	--	--	< 0.00	--	--	--	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	OHM-2	OHM-2	OHM-3	OHM-3	OHM-4	B-16-01	B-16-02	B-16-03	B-16-04	B-16-04	B-16-05	B-16-05	B-16-06
					Sample ID	OHM-2-34	OHM-2-36.5	OHM-3-4	OHM-3-34-2	OHM-4-25-2	B-16-01-07	B-16-02-19	B-16-03-22	B-16-04-04	B-16-04-10	B-16-05-04	B-16-05-10	B-16-06-05
					Parent Sample ID													
					Sample Date	7/28/2014	7/28/2014	7/28/2014	7/28/2014	7/28/2014	10/18/2016	10/13/2016	10/13/2016	8/11/2016	8/11/2016	8/11/2016	8/11/2016	8/5/2016
					Sample Depth	34 ft	36.5 ft	4 ft	34 ft	25 ft	7-8 ft	18-19 ft	21-22 ft	4-5 ft	9-10 ft	3-4 ft	9-10 ft	4-5 ft
					Water Table Note	BWT	BWT	AWT	BWT	BWT	AWT	BWT	BWT	AWT	AWT	AWT	AWT	AWT
					Notes				PAHs SW8270 without SIM		PAHs SW8270 without SIM							
Chemical	**Units**	**MTCA A then Lowest B**		**Soil Protective of GW (Vadose)**	**Soil Protective of GW (Saturated)**													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	**441**	**1,480**	--	--	--	--	< 42.1
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	**233**	**136**	--	--	--	--	**113**
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	**674**	**1,620**	--	--	--	--	**134**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	**674**	**1,620**	--	--	--	--	**113**
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**42,000**	**29,000**	**26,000**	**5,400**	**5,500**	**4,610**	**183**	**1,210**	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			**44,000**	**30,000**	**20,000**	**5,600**	**5,600**	**12,600**	**103**	**121**	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**86,000**	**59,000**	**46,000**	**11,000**	**11,100**	**17,200**	**286**	**1,330**	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**86,000**	**59,000**	**46,000**	**11,000**	**11,100**	**17,200**	**286**	**1,330**	--	--	--	--	--
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	--	--	**0.00181**	--	--	--	--	--	--	--
Toluene	mg/kg	7	Method A			--	--	--	--	--	< 0.00583	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	--	< 0.00117	--	--	--	--	--	--	--
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	< 0.00350	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	< 0.526	< 0.498	--	--	--	--	< 0.105
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	< 4.4	--	< 35.3	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	< 0.526	< 0.498	--	--	--	--	< 0.105
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	< 4.4	--	< 35.3	**0.0294**	**0.250**	--	--	--	--	< 0.0315
Benzo(a)anthracene	mg/kg					--	--	--	< 4.4	--	< 35.3	< 0.00789	**0.0136**	--	--	--	--	< 0.0315
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	*< 4.4*	--	*< 35.3*	< 0.00789	< 0.00747	--	--	--	--	< 0.0315
Benzo(b)Fluoranthene	mg/kg					--	--	--	< 4.4	--	< 35.3	< 0.00789	< 0.00747	--	--	--	--	< 0.0315
Benzo(k)Fluoranthene	mg/kg					--	--	--	< 4.4	--	< 35.3	< 0.00789	< 0.00747	--	--	--	--	< 0.0315
Chrysene	mg/kg					--	--	--	< 4.4	--	< 35.3	< 0.00789	**0.0155**	--	--	--	--	< 0.0315
Dibenz(a,h)Anthracene	mg/kg					--	--	--	< 4.4	--	< 35.3	< 0.00789	< 0.00747	--	--	--	--	< 0.0315
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	< 4.4	--	< 35.3	< 0.00789	< 0.00747	--	--	--	--	< 0.0315
Naphthalene	mg/kg	5	Method A			--	--	--	< 4.4	--	*< 35.3*	< 0.526	< 0.498	--	--	--	--	< 0.105
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	< 2.20	--	< 17.7	**< 0.263**	**< 0.249**	--	--	--	--	< 0.0525
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	< 0.00	--	< 0.00	**< 0.00**	**< 0.00**	--	--	--	--	< 0.00
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	*< 2.20*	--	< 17.7	**< 0.00395**	**0.00674**	--	--	--	--	< 0.0158
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	< 0.00	--	< 0.00	**< 0.00**	**0.00152**	--	--	--	--	< 0.00
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	< 0.00583	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
					Location ID	B-16-06	B-16-07	B-16-07	B-16-08	B-16-08	B-16-09	B-16-10	B-16-11	B-16-12	B-16-13	B-16-14	B-16-15	B-16-16
					Sample ID	B-16-06-07	B-16-07-11	B-16-07-17	B-16-08-14	B-16-08-25	B-16-09-15	B-16-10-10FT	B-16-11-12FT	B-16-12-10	B-16-13-11FT	B-16-14FT	B-16-15-12FT	B-16-16-12FT
					Parent Sample ID													
					Sample Date	8/5/2016	8/5/2016	8/5/2016	8/5/2016	8/5/2016	8/9/2016	8/8/2016	8/8/2016	8/9/2016	8/8/2016	8/8/2016	8/9/2016	8/9/2016
					Sample Depth	6-7 ft	10-11 ft	16-17 ft	13-14 ft	24-25 ft	14-15 ft	9-10 ft	11-12 ft	9-10 ft	10-11 ft	9-10 ft	11-12 ft	11-12 ft
					Water Table Note	AWT	AWT	BWT	AWT	BWT	BWT	AWT	BWT	AWT	AWT	AWT	BWT	BWT
					Notes													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	< 0.125	< 0.124
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 4.22	< 4.21	< 4.88	< 4.93	< 5.21	--	< 4.33	< 5.03	--	< 5.28	< 5.22	< 5.00	< 4.96
Oil-Range Organics	mg/kg	2,000	Method A			< 10.6	< 10.5	< 12.2	< 12.3	< 13.0	--	< 10.8	< 12.6	--	< 13.2	< 13.1	< 12.5	< 12.4
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 2.11	< 2.11	< 2.44	< 2.47	< 2.61	--	< 2.17	< 2.52	--	< 2.64	< 2.61	< 2.50	< 2.48
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	ND	ND	ND	ND	--	ND	ND	--	ND	ND	ND	ND
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	< 4.94	--	--	< 4.80	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	< 12.4	--	--	< 12.0	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	< 2.47	--	--	< 2.40	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	ND	--	--	ND	--	--	--	--
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	--	--	< 0.00124	< 0.00108	< 0.00126	**0.00167**	**0.00148**	**0.00180**	< 0.00125	< 0.00124
Toluene	mg/kg	7	Method A			--	--	--	--	--	< 0.00618	< 0.00541	< 0.00628	< 0.00600	< 0.00660	< 0.00653	< 0.00625	< 0.00620
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	--	< 0.00124	< 0.00108	< 0.00126	< 0.00120	< 0.00132	< 0.00131	< 0.00125	< 0.00124
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	< 0.00371	< 0.00325	< 0.00377	< 0.00360	< 0.00396	< 0.00392	< 0.00375	< 0.00372
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			< 0.0211	< 0.0211	< 0.0244	< 0.0247	< 0.0260	< 0.0247	< 0.0216	< 0.0251	< 0.0240	< 0.0264	< 0.0261	< 0.0250	< 0.0248
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			< 0.0211	< 0.0211	< 0.0244	< 0.0247	< 0.0260	< 0.0247	< 0.0216	< 0.0251	< 0.0240	< 0.0264	< 0.0261	< 0.0250	< 0.0248
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 0.00633	< 0.00632	< 0.00732	< 0.00740	< 0.00781	< 0.00742	< 0.00649	< 0.00754	< 0.00720	< 0.00792	< 0.00784	< 0.00750	< 0.00744
Benzo(a)anthracene	mg/kg					< 0.00633	< 0.00632	< 0.00732	< 0.00740	< 0.00781	< 0.00742	< 0.00649	< 0.00754	< 0.00720	< 0.00792	< 0.00784	< 0.00750	< 0.00744
Benzo(a)pyrene	mg/kg	0.1	Method A			< 0.00633	< 0.00632	< 0.00732	< 0.00740	< 0.00781	< 0.00742	< 0.00649	< 0.00754	< 0.00720	< 0.00792	< 0.00784	< 0.00750	< 0.00744
Benzo(b)Fluoranthene	mg/kg					< 0.00633	< 0.00632	< 0.00732	< 0.00740	< 0.00781	< 0.00742	< 0.00649	< 0.00754	< 0.00720	< 0.00792	< 0.00784	< 0.00750	< 0.00744
Benzo(k)Fluoranthene	mg/kg					< 0.00633	< 0.00632	< 0.00732	< 0.00740	< 0.00781	< 0.00742	< 0.00649	< 0.00754	< 0.00720	< 0.00792	< 0.00784	< 0.00750	< 0.00744
Chrysene	mg/kg					< 0.00633	< 0.00632	< 0.00732	< 0.00740	< 0.00781	< 0.00742	< 0.00649	< 0.00754	< 0.00720	< 0.00792	< 0.00784	< 0.00750	< 0.00744
Dibenz(a,h)Anthracene	mg/kg					< 0.00633	< 0.00632	< 0.00732	< 0.00740	< 0.00781	< 0.00742	< 0.00649	< 0.00754	< 0.00720	< 0.00792	< 0.00784	< 0.00750	< 0.00744
Indeno(1,2,3-c,d)Pyrene	mg/kg					< 0.00633	< 0.00632	< 0.00732	< 0.00740	< 0.00781	< 0.00742	< 0.00649	< 0.00754	< 0.00720	< 0.00792	< 0.00784	< 0.00750	< 0.00744
Naphthalene	mg/kg	5	Method A			< 0.0211	< 0.0211	< 0.0244	< 0.0247	< 0.0260	< 0.0247	< 0.0216	< 0.0251	< 0.0240	< 0.0264	< 0.0261	< 0.0250	< 0.0248
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			< 0.0106	< 0.0106	< 0.0122	< 0.0124	< 0.0130	< 0.0124	< 0.0108	< 0.0126	< 0.0120	< 0.0132	< 0.0131	< 0.0125	< 0.0124
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			< 0.00317	< 0.00316	< 0.00366	< 0.00370	< 0.00391	< 0.00371	< 0.00325	< 0.00377	< 0.00360	< 0.00396	< 0.00392	< 0.00375	< 0.00372
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	< 0.00618	< 0.00541	< 0.00628	< 0.00600	< 0.00660	< 0.00653	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	**2.60**	**2.37**	< 2.51	< 2.40	< 2.64	< 2.61	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	**83.8**	**75.9**	**78.6**	**120**	**130**	**113**	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	**2.71**	**3.96**	**3.79**	**3.98**	**6.17**	**5.03**	--	--

TABLE 18

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
					Location ID	B-16-17	B-16-18	B-16-18	B-16-19	B-16-20	B-16-21	B-16-22	B-16-22	B-16-23	B-16-24	B-16-24	OHM-1	OHM-1
					Sample ID	B-16-17-10FT	B-16-18-10	DUP-0811	B-16-19-12FT	B-16-20-10FT	B-16-21-13FT	B-16-22-10FT	DUP-0809	B-16-23-10FT	B-16-24-12	B-16-24-29	OHM-1-20	OHM-1-51
					Parent Sample ID			B-16-18-10					B-16-22-10FT					
					Sample Date	8/9/2016	8/11/2016	8/11/2016	8/8/2016	8/8/2016	8/8/2016	8/9/2016	8/9/2016	8/8/2016	8/10/2016	8/10/2016	11/1/2016	11/1/2016
					Sample Depth	9-10 ft	9-10 ft	9-10 ft	11-12 ft	9-10 ft	12-13 ft	9-10 ft	9-10 ft	9-10 ft	11-12 ft	29-30 ft	19-20 ft	50-51 ft
					Water Table Note	AWT	AWT	AWT	BWT	AWT	BWT	AWT	AWT	AWT	BWT	BWT	BWT	BWT
					Notes													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 4.68	--	--	< 4.94	< 4.82	< 4.86	< 5.16	< 5.22	< 4.99	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			< 11.7	--	--	< 12.3	< 12.1	< 12.1	< 12.9	< 13.1	< 12.5	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 2.34	--	--	< 2.47	< 2.41	< 2.43	< 2.58	< 2.61	< 2.50	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	--	--	ND	ND	ND	ND	ND	ND	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	< 4.85	< 4.30	--	--	--	--	--	--	< 4.99	< 5.67	**1,750**	**2,190**
Oil-Range Organics	mg/kg	2,000	Method A			--	< 12.1	< 10.7	--	--	--	--	--	--	< 12.5	< 14.2	**1,560**	**2,000**
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	< 2.43	< 2.15	--	--	--	--	--	--	< 2.50	< 2.84	**3,310**	**4,190**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	ND	ND	--	--	--	--	--	--	ND	ND	**3,310**	**4,190**
BTEX																		
Benzene	mg/kg	0.03	Method A			--	< 0.00121	< 0.00107	< 0.00123	**0.00158**	**0.00137**	**0.00135**	**0.00176**	< 0.00125	**0.00163**	< 0.00142	--	--
Toluene	mg/kg	7	Method A			--	< 0.00607	< 0.00537	< 0.00617	< 0.00603	< 0.00607	< 0.00644	< 0.00653	< 0.00623	< 0.00624	< 0.00709	--	--
Ethylbenzene	mg/kg	6	Method A			--	< 0.00121	< 0.00107	< 0.00123	< 0.00121	< 0.00121	< 0.00129	< 0.00131	< 0.00125	< 0.00125	< 0.00142	--	--
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	< 0.00364	< 0.00322	< 0.00370	< 0.00362	< 0.00364	< 0.00387	< 0.00392	< 0.00374	< 0.00374	< 0.00425	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	< 0.0243	< 0.0215	< 0.0247	< 0.0241	< 0.0243	< 0.0258	< 0.0261	< 0.0249	< 0.0249	< 0.0283	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	< 0.0243	< 0.0215	< 0.0247	< 0.0241	< 0.0243	< 0.0258	< 0.0261	< 0.0249	< 0.0249	< 0.0283	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	< 0.00728	< 0.00645	< 0.00740	< 0.00724	< 0.00729	< 0.00773	< 0.00783	< 0.00748	< 0.00748	< 0.00850	--	--
Benzo(a)anthracene	mg/kg					--	< 0.00728	< 0.00645	< 0.00740	< 0.00724	< 0.00729	< 0.00773	< 0.00783	< 0.00748	< 0.00748	< 0.00850	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			--	< 0.00728	< 0.00645	< 0.00740	< 0.00724	< 0.00729	< 0.00773	< 0.00783	< 0.00748	< 0.00748	< 0.00850	--	--
Benzo(b)Fluoranthene	mg/kg					--	< 0.00728	< 0.00645	< 0.00740	< 0.00724	< 0.00729	< 0.00773	< 0.00783	< 0.00748	< 0.00748	< 0.00850	--	--
Benzo(k)Fluoranthene	mg/kg					--	< 0.00728	< 0.00645	< 0.00740	< 0.00724	< 0.00729	< 0.00773	< 0.00783	< 0.00748	< 0.00748	< 0.00850	--	--
Chrysene	mg/kg					--	< 0.00728	< 0.00645	< 0.00740	< 0.00724	< 0.00729	< 0.00773	< 0.00783	< 0.00748	< 0.00748	< 0.00850	--	--
Dibenz(a,h)Anthracene	mg/kg					--	< 0.00728	< 0.00645	< 0.00740	< 0.00724	< 0.00729	< 0.00773	< 0.00783	< 0.00748	< 0.00748	< 0.00850	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	< 0.00728	< 0.00645	< 0.00740	< 0.00724	< 0.00729	< 0.00773	< 0.00783	< 0.00748	< 0.00748	< 0.00850	--	--
Naphthalene	mg/kg	5	Method A			--	< 0.0243	< 0.0215	< 0.0247	< 0.0241	< 0.0243	< 0.0258	< 0.0261	< 0.0249	< 0.0249	< 0.0283	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	< 0.0122	< 0.0108	< 0.0124	< 0.0121	< 0.0122	< 0.0129	< 0.0131	< 0.0125	< 0.0125	< 0.0142	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	< 0.00364	< 0.00323	< 0.00370	< 0.00362	< 0.00365	< 0.00387	< 0.00392	< 0.00374	< 0.00374	< 0.00425	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	--	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	< 0.00607	< 0.00537	< 0.00617	< 0.00603	< 0.00607	< 0.00644	< 0.00653	< 0.00623	< 0.00624	< 0.00709	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	**5.81**	**4.64**	< 2.47	< 2.41	< 2.43	< 2.58	< 2.61	< 2.49	< 2.49	**2.83**	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	**92.9**	**74.1**	**84.8**	**114**	**95.2**	**92.5**	**106**	**95.4**	**120**	**156**	--	--
Lead	mg/kg	250	Method A			--	**3.01**	**3.35**	**4.59**	**5.23**	**7.99**	**5.71**	**6.26**	**4.61**	**4.30**	**6.58**	--	--

TABLE 18

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)	OHM-2	OHM-2	OHM-3	OHM-3	OHM-4	RMD-1	RMD-1	RMD-1	RMD-2	RMD-2	RMD-2	RMD-3	RMD-3
Location ID						OHM-2	OHM-2	OHM-3	OHM-3	OHM-4	RMD-1	RMD-1	RMD-1	RMD-2	RMD-2	RMD-2	RMD-3	RMD-3
Sample ID						OHM-2-20	OHM-2-38	OHM-3-26	OHM-3-34	OHM-4-25	RMD-1-18	RMD-1-39	RMD-1-44.5	RMD-2-18	RMD-2-39	RMD-2-51	RMD-3-19	RMD-3-60
Parent Sample ID																		
Sample Date						10/25/2016	10/25/2016	10/20/2016	10/20/2016	10/20/2016	8/5/2016	8/5/2016	8/5/2016	8/4/2016	8/4/2016	8/5/2016	8/3/2016	8/4/2016
Sample Depth						19-20 ft	36-38 ft	25-26 ft	33-34 ft	25-25.5 ft	17-18 ft	38-39 ft	44-44.5 ft	17-18 ft	38-39 ft	50-51 ft	18-19 ft	59-60 ft
Water Table Note						BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT
Notes																		
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	< 4.99	< 4.90	< 5.13	**827**	**935**	**22.7**	< 4.42	< 5.20
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	< 12.5	< 12.2	< 12.8	**1,330**	**70.6**	**23.5**	< 11.0	< 13.0
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	< 2.50	< 2.45	< 2.57	**2,160**	**1,010**	**46.2**	< 2.21	< 2.60
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	ND	ND	ND	**2,160**	**1,010**	**46.2**	ND	ND
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**2,090**	**15,900**	**6,940**	**9,010**	**104**	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			**1,720**	**16,100**	**6,910**	**9,670**	**113**	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**3,810**	**32,000**	**13,900**	**18,700**	**217**	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**3,810**	**32,000**	**13,900**	**18,700**	**217**	--	--	--	--	--	--	--	--
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	7	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	< 0.0245	--	**0.281**	< 0.0261	**0.0449**	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	< 0.0404	--	< 1.96	< 0.0431	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	< 0.0245	--	< 0.238	< 0.0261	**0.0279**	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--	--	< 0.00734	--	**0.117**	**0.0325**	< 0.00797	--	--
Benzo(a)anthracene	mg/kg					--	--	--	--	--	--	< 0.00734	--	< 0.0714	< 0.00784	< 0.00797	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--	--	< 0.00734	--	**0.0874**	< 0.00784	< 0.00797	--	--
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--	--	< 0.00734	--	< 0.0714	< 0.00784	< 0.00797	--	--
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--	--	< 0.00734	--	< 0.0714	< 0.00784	< 0.00797	--	--
Chrysene	mg/kg					--	--	--	--	--	--	< 0.00734	--	< 0.0714	< 0.00784	< 0.00797	--	--
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--	--	< 0.00734	--	< 0.0714	< 0.00784	< 0.00797	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--	--	< 0.00734	--	< 0.0714	< 0.00784	< 0.00797	--	--
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	< 0.0245	--	< 0.238	**0.0281**	< 0.0266	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--	--	< 0.0123	--	**0.519**	**0.0542**	**0.0861**	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--	--	< 0.00	--	**0.281**	**0.0281**	**0.0728**	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--	--	< 0.00367	--	**0.106**	**< 0.00392**	< 0.00399	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--	--	< 0.00	--	**0.0874**	**< 0.00**	< 0.00	--	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	RMD-4	RMD-4	RMD-4	RMD-4	RMD-4	WMW-12	WMW-13	WMW-14	WMW-15	WMW-17	WMW-17	WMW-18	B-18-01
					Sample ID	RMD-4-30	RMD-4-60	RMD-4-60R	DUP-01	RMD-4-65	MW-12-12	MW-13-12	MW-14-20	MW-15-20	MW-17-18	MW-17-20	MW-18-16	B-18-01(3.0-3.5)
					Parent Sample ID				RMD-4-60R									
					Sample Date	8/2/2016	8/3/2016	10/12/2016	10/12/2016	10/12/2016	10/11/2016	10/11/2016	10/18/2016	10/18/2016	10/12/2016	10/17/2016	10/11/2016	8/16/2018
					Sample Depth	29-30 ft	59-60 ft	59-60 ft	59-60 ft	64-65 ft	11-12 ft	11-12 ft	19-20 ft	20-21 ft	17-18 ft	19-20 ft	15-16 ft	3-3.5 ft
					Water Table Note	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	BWT	AWT
					Notes													
Chemical	**Units**	**MTCA A then Lowest B**		**Soil Protective of GW (Vadose)**	**Soil Protective of GW (Saturated)**													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 4.80	**322**	< 5.15	< 5.32	< 5.30	< 4.98	< 4.91	--	--	**744**	--	**24.3**	< 4.17
Oil-Range Organics	mg/kg	2,000	Method A			< 12.0	**1,610**	< 12.9	< 13.3	< 13.2	< 12.4	< 12.3	--	--	**108**	--	**90.0**	< 10.4
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 2.40	**1,930**	< 2.58	< 2.66	< 2.65	< 2.49	< 2.46	--	--	**852**	--	**114**	< 2.09
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	**1,930**	ND	ND	ND	ND	ND	--	--	**852**	--	**114**	ND
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	< 5.15	< 5.32	--	< 4.98	< 4.91	< 5.10	< 4.73	**216**	**105**	**18.4**	< 4.17
Oil-Range Organics	mg/kg	2,000	Method A			--	--	< 12.9	< 13.3	--	< 12.5	< 12.3	< 12.8	< 11.8	**38.2**	**57.1**	**64.9**	< 10.4
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	< 2.58	< 2.66	--	< 2.49	< 2.46	< 2.55	< 2.37	**254**	**162**	**83.3**	< 2.09
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	ND	ND	--	ND	ND	ND	ND	**254**	**162**	**83.3**	ND
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 0.00114
Toluene	mg/kg	7	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 0.00568
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 0.00284
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	< 0.00454
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	< 0.00284
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 0.00142
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	< 0.0208
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	< 0.0208
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	< 0.0208
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--	--	--	--	--	--	--	--	< 0.00625
Benzo(a)anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	< 0.00625
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 0.00625
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	< 0.00625
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	< 0.00625
Chrysene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	< 0.00625
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	< 0.00625
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	< 0.00625
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 0.0208
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 0.0104
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 0.00
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 0.00313
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 0.00
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 0.0130
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 2.08
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	**81.5**
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	**3.05**

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)	B-18-01	B-18-02	B-18-02	B-18-03	B-18-03	B-18-03	B-18-04	B-18-04	B-18-05	B-18-05	B-18-06	B-18-06	B-18-07
Sample ID						B-18-01(9.5-10.0)	B-18-02(2.0-2.5)	B-18-02(9.5-10.0)	B-18-03(2.0-2.5)	B-18-03(9.5-10.0)	DUP-03-20180816	B-18-04(2.0-2.5)	B-18-04(9.5-10.0)	B-18-05(2.0-2.5)	B-18-05(9.5-10.0)	B-18-06(2.0-2.5)	B-18-06(9.5-10.0)	B-18-07(2.0-2.5)
Parent Sample ID											B-18-02(9.5-10.0)							
Sample Date						8/16/2018	8/16/2018	8/16/2018	8/16/2018	8/16/2018	8/16/2018	8/16/2018	8/16/2018	8/16/2018	8/16/2018	8/10/2018	8/13/2018	8/10/2018
Sample Depth						9.5-10 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft	9.5-10 ft	9.5-10 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft
Water Table Note						AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT
Notes																		
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 4.72	< 4.65	< 4.97	**990**	< 4.88	< 4.82	< 4.18	< 5.06	< 4.44	< 5.16	< 43.1	< 4.45	< 41.7
Oil-Range Organics	mg/kg	2,000	Method A			< 11.8	< 11.6	< 12.4	**3,790**	< 12.2	< 12.0	< 10.5	< 12.7	< 11.1	< 12.9	< 108	< 11.1	< 104
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 2.36	< 2.33	< 2.49	**4,780**	< 2.44	< 2.41	< 2.09	< 2.53	< 2.22	< 2.58	< 21.6	< 2.23	< 20.9
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	ND	ND	**4,780**	ND	ND	ND	ND	ND	ND	ND	ND	ND
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 4.72	--	--	--	--	--	--	--	--	--	< 21.6	< 4.45	--
Oil-Range Organics	mg/kg	2,000	Method A			< 11.8	--	--	--	--	--	--	--	--	--	**84.3**	< 11.1	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 2.36	--	--	--	--	--	--	--	--	--	**95.1**	< 2.23	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	--	--	--	--	--	--	--	--	--	**84.3**	ND	--
BTEX																		
Benzene	mg/kg	0.03	Method A			< 0.00118	< 0.00123	< 0.00124	< 0.00113	< 0.00122	< 0.00120	< 0.00105	< 0.00127	< 0.00111	< 0.00129	< 0.00108	< 0.00116	< 0.00104
Toluene	mg/kg	7	Method A			< 0.00591	< 0.00616	< 0.00622	< 0.00564	< 0.00610	< 0.00602	< 0.00523	< 0.00633	< 0.00555	< 0.00645	< 0.00539	**0.0109**	< 0.00522
Ethylbenzene	mg/kg	6	Method A			< 0.00295	< 0.00308	< 0.00311	< 0.00282	< 0.00305	< 0.00301	< 0.00261	< 0.00316	< 0.00278	< 0.00322	< 0.00270	< 0.00290	< 0.00261
Xylene, m,p-	mg/kg					< 0.00472	< 0.00493	< 0.00497	< 0.00452	< 0.00488	< 0.00482	< 0.00418	< 0.00506	< 0.00444	< 0.00516	< 0.00431	< 0.00463	< 0.00417
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	< 0.00295	< 0.00308	< 0.00311	< 0.00282	< 0.00305	< 0.00301	< 0.00261	< 0.00316	< 0.00278	< 0.00322	< 0.00270	< 0.00290	< 0.00261
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			< 0.00148	< 0.00154	< 0.00156	< 0.00141	< 0.00153	< 0.00151	< 0.00131	< 0.00158	< 0.00139	< 0.00161	< 0.00135	< 0.00145	< 0.00131
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			< 0.0236	< 0.0233	< 0.0249	< 0.109	< 0.0244	< 0.0241	< 0.0209	< 0.0253	< 0.0222	< 0.0258	< 0.0216	< 0.0223	< 0.0209
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			< 0.0236	< 0.0233	< 0.0249	< 0.109	< 0.0244	< 0.0241	< 0.0209	< 0.0253	< 0.0222	< 0.0258	< 0.0216	< 0.0223	< 0.0209
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			< 0.0236	< 0.0233	< 0.0249	< 0.109	< 0.0244	< 0.0241	< 0.0209	< 0.0253	< 0.0222	< 0.0258	< 0.0216	< 0.0223	< 0.0209
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 0.00709	< 0.00698	< 0.00746	< 0.0326	< 0.00732	< 0.00722	< 0.00628	< 0.00759	< 0.00666	< 0.00773	< 0.00647	< 0.00668	**0.00791**
Benzo(a)anthracene	mg/kg					< 0.00709	< 0.00698	< 0.00746	< 0.0326	< 0.00732	< 0.00722	< 0.00628	< 0.00759	< 0.00666	< 0.00773	< 0.00647	< 0.00668	< 0.00626
Benzo(a)pyrene	mg/kg	0.1	Method A			< 0.00709	< 0.00698	< 0.00746	< 0.0326	< 0.00732	< 0.00722	< 0.00628	< 0.00759	< 0.00666	< 0.00773	< 0.00647	< 0.00668	< 0.00626
Benzo(b)Fluoranthene	mg/kg					< 0.00709	< 0.00698	< 0.00746	< 0.0326	< 0.00732	< 0.00722	< 0.00628	< 0.00759	< 0.00666	< 0.00773	< 0.00647	< 0.00668	**0.00890**
Benzo(k)Fluoranthene	mg/kg					< 0.00709	< 0.00698	< 0.00746	< 0.0326	< 0.00732	< 0.00722	< 0.00628	< 0.00759	< 0.00666	< 0.00773	< 0.00647	< 0.00668	< 0.00626
Chrysene	mg/kg					< 0.00709	< 0.00698	< 0.00746	< 0.0326	< 0.00732	< 0.00722	< 0.00628	< 0.00759	< 0.00666	< 0.00773	< 0.00647	< 0.00668	< 0.00626
Dibenz(a,h)Anthracene	mg/kg					< 0.00709	< 0.00698	< 0.00746	< 0.0326	< 0.00732	< 0.00722	< 0.00628	< 0.00759	< 0.00666	< 0.00773	< 0.00647	< 0.00668	< 0.00626
Indeno(1,2,3-c,d)Pyrene	mg/kg					< 0.00709	< 0.00698	< 0.00746	< 0.0326	< 0.00732	< 0.00722	< 0.00628	< 0.00759	< 0.00666	< 0.00773	**0.00918**	< 0.00668	< 0.00626
Naphthalene	mg/kg	5	Method A			< 0.0236	< 0.0233	< 0.0249	< 0.109	< 0.0244	< 0.0241	< 0.0209	< 0.0253	< 0.0222	< 0.0258	< 0.0216	< 0.0223	< 0.0209
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			< 0.0118	**< 0.0117**	< 0.0125	< 0.0545	< 0.0122	< 0.0121	< 0.0105	< 0.0127	< 0.0111	< 0.0129	< 0.0108	< 0.0112	**< 0.0105**
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			< 0.00	**< 0.00**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	**< 0.00**
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			< 0.00355	**< 0.00349**	< 0.00373	< 0.0163	< 0.00366	< 0.00361	< 0.00314	< 0.00380	< 0.00333	< 0.00387	**0.00548**	< 0.00334	**0.00530**
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			< 0.00	**< 0.00**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	**0.000918**	< 0.00	**0.000890**
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			< 0.0148	< 0.0154	< 0.0155	< 0.0141	< 0.0153	< 0.0164	< 0.0131	< 0.0158	< 0.0139	< 0.0161	< 0.0135	< 0.0145	< 0.0130
Metals																		
Arsenic	mg/kg	20	Method A			< 2.36	< 2.33	< 2.49	< 2.17	< 2.44	< 2.41	**4.93**	< 2.53	**2.88**	< 2.58	**2.27**	< 2.23	**7.60**
Barium	mg/kg	16,000	Method B Non cancer	1600	83	**78.9**	**139**	**99.8**	**94.4**	**97.1**	**85.4**	**79.0**	**80.8**	**81.8**	**83.0**	**94.4**	**73.5**	**83.4**
Lead	mg/kg	250	Method A			**7.46**	**3.07**	**4.30**	**3.80**	**3.94**	**3.22**	**3.83**	**3.29**	**4.47**	**3.46**	**18.6**	**2.73**	**6.66**

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
					Location ID	B-18-07	B-18-08	B-18-08	B-18-09	B-18-09	B-18-10	B-18-10	B-18-11	B-18-11	B-18-12	B-18-12	B-18-13	B-18-13
					Sample ID	B-18-07(9.5-10.0)	B-18-08(2.0-2.5)	B-18-08(9.5-10.0)	B-18-09(2.0-2.5)	B-18-09(9.5-10.0)	B-18-10(2.0-2.5)	B-18-10(9.5-10.0)	B-18-11(2.0-2.5)	B-18-11(9.5-10.0)	B-18-12(2.0-2.5)	B-18-12(9.5-10.0)	B-18-13(2.0-2.5)	B-18-13(12.0-12.5)
					Parent Sample ID													
					Sample Date	8/14/2018	8/10/2018	8/14/2018	8/20/2018	8/20/2018	8/17/2018	8/17/2018	8/17/2018	8/17/2018	8/10/2018	8/14/2018	8/10/2018	8/14/2018
					Sample Depth	9.5-10 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft	12-12.5 ft
					Water Table Note	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	BWT
					Notes													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 4.92	< 8.45	< 4.78	< 4.98	< 5.17	< 4.40	< 5.16	< 20.7	< 5.19	< 5.21	< 4.89	< 4.91	< 5.04
Oil-Range Organics	mg/kg	2,000	Method A			< 12.3	< 21.1	< 11.9	< 12.5	< 12.9	< 11.0	< 12.9	< 51.8	< 13.0	< 13.0	< 12.2	< 12.3	< 12.6
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 2.46	< 4.23	< 2.39	< 2.49	< 2.59	< 2.20	< 2.58	< 10.4	< 2.60	< 2.61	< 2.45	< 2.46	< 2.52
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	< 4.15	< 5.19	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	< 10.4	< 13.0	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	< 2.08	< 2.60	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	ND	ND	--	--	--	--
BTEX																		
Benzene	mg/kg	0.03	Method A			< 0.00123	< 0.00106	< 0.00119	< 0.00130	< 0.00129	< 0.00110	< 0.00129	< 0.00129	< 0.00131	< 0.00141	< 0.00122	< 0.00128	< 0.00126
Toluene	mg/kg	7	Method A			< 0.00614	< 0.00528	< 0.00597	< 0.00648	< 0.00646	< 0.00550	< 0.00645	< 0.00643	< 0.00655	< 0.00703	< 0.00611	< 0.00638	< 0.00630
Ethylbenzene	mg/kg	6	Method A			< 0.00307	< 0.00264	< 0.00299	< 0.00324	< 0.00323	< 0.00275	< 0.00323	< 0.00321	< 0.00328	< 0.00352	< 0.00306	< 0.00319	< 0.00315
Xylene, m,p-	mg/kg					< 0.00492	< 0.00423	< 0.00478	< 0.00518	< 0.00517	< 0.00440	< 0.00516	< 0.00514	< 0.00524	< 0.00563	< 0.00489	**0.00870**	< 0.00504
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	< 0.00307	< 0.00264	< 0.00299	< 0.00324	< 0.00323	< 0.00275	< 0.00323	< 0.00321	< 0.00328	< 0.00352	< 0.00306	**0.00546**	< 0.00315
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			< 0.00154	< 0.00132	< 0.00150	< 0.00162	< 0.00162	< 0.00138	< 0.00162	< 0.00161	< 0.00164	< 0.00176	< 0.00153	**0.0142**	< 0.00158
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			< 0.0246	< 0.0211	< 0.0239	< 0.0249	< 0.0259	< 0.0220	< 0.0258	< 0.0207	< 0.0259	< 0.0261	< 0.0245	< 0.0246	< 0.0252
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			< 0.0246	< 0.0211	< 0.0239	< 0.0249	< 0.0259	< 0.0220	< 0.0258	< 0.0207	< 0.0259	< 0.0261	< 0.0245	< 0.0246	< 0.0252
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			< 0.0246	< 0.0211	< 0.0239	< 0.0249	< 0.0259	< 0.0220	< 0.0258	< 0.0207	< 0.0259	< 0.0261	< 0.0245	< 0.0246	< 0.0252
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 0.00737	< 0.00634	< 0.00717	< 0.00747	< 0.00776	< 0.00660	< 0.00774	< 0.00622	< 0.00778	< 0.00782	< 0.00734	**0.00781**	< 0.00756
Benzo(a)anthracene	mg/kg					< 0.00737	< 0.00634	< 0.00717	< 0.00747	< 0.00776	< 0.00660	< 0.00774	< 0.00622	< 0.00778	< 0.00782	< 0.00734	**0.00915**	< 0.00756
Benzo(a)pyrene	mg/kg	0.1	Method A			< 0.00737	< 0.00634	< 0.00717	< 0.00747	< 0.00776	< 0.00660	< 0.00774	< 0.00622	< 0.00778	< 0.00782	< 0.00734	**0.00916**	< 0.00756
Benzo(b)Fluoranthene	mg/kg					< 0.00737	< 0.00634	< 0.00717	< 0.00747	< 0.00776	< 0.00660	< 0.00774	< 0.00622	< 0.00778	< 0.00782	< 0.00734	**0.0257**	< 0.00756
Benzo(k)Fluoranthene	mg/kg					< 0.00737	< 0.00634	< 0.00717	< 0.00747	< 0.00776	< 0.00660	< 0.00774	< 0.00622	< 0.00778	< 0.00782	< 0.00734	**0.00803**	< 0.00756
Chrysene	mg/kg					< 0.00737	< 0.00634	< 0.00717	< 0.00747	< 0.00776	< 0.00660	< 0.00774	< 0.00622	< 0.00778	< 0.00782	< 0.00734	**0.0131**	< 0.00756
Dibenz(a,h)Anthracene	mg/kg					< 0.00737	< 0.00634	< 0.00717	< 0.00747	< 0.00776	< 0.00660	< 0.00774	< 0.00622	< 0.00778	< 0.00782	< 0.00734	< 0.00737	< 0.00756
Indeno(1,2,3-c,d)Pyrene	mg/kg					< 0.00737	< 0.00634	< 0.00717	< 0.00747	< 0.00776	< 0.00660	< 0.00774	< 0.00622	< 0.00778	< 0.00782	< 0.00734	**0.0121**	< 0.00756
Naphthalene	mg/kg	5	Method A			< 0.0246	< 0.0211	< 0.0239	< 0.0249	< 0.0259	< 0.0220	< 0.0258	< 0.0207	< 0.0259	< 0.0261	< 0.0245	< 0.0246	< 0.0252
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			< 0.0123	< 0.0106	< 0.0120	< 0.0125	< 0.0130	< 0.0110	< 0.0129	< 0.0104	< 0.0130	< 0.0131	< 0.0123	**< 0.0123**	< 0.0126
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	**< 0.00**	< 0.00
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			< 0.00369	< 0.00317	< 0.00359	< 0.00374	< 0.00388	< 0.00330	< 0.00387	< 0.00311	< 0.00389	< 0.00391	< 0.00367	**0.0152**	< 0.00378
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	**0.0148**	< 0.00
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			< 0.0154	< 0.0132	< 0.0149	< 0.0162	< 0.0162	< 0.0137	< 0.0161	< 0.0161	< 0.0164	< 0.0176	< 0.0153	< 0.0160	< 0.0158
Metals																		
Arsenic	mg/kg	20	Method A			< 2.46	**8.56**	< 2.39	< 2.49	< 2.59	< 2.20	< 2.58	< 2.07	< 2.59	< 2.61	< 2.45	< 2.46	< 2.52
Barium	mg/kg	16,000	Method B Non cancer	1600	83	**72.3**	**81.2**	**87.3**	**81.4**	**78.6**	**79.7**	**88.9**	**75.3**	**87.6**	**71.9**	**75.7**	**89.0**	**103**
Lead	mg/kg	250	Method A			**2.82**	**3.10**	**5.78**	**6.05**	**3.24**	**7.94**	**3.38**	**13.5**	**3.20**	**2.82**	**4.14**	**28.7**	**5.18**

TABLE 18

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	B-18-14	B-18-14	B-18-14	B-18-15	B-18-15	B-18-16	B-18-16	B-18-17	B-18-17	B-18-18	B-18-18	B-18-18	B-18-18
					Sample ID	B-18-14(2.0-2.5)	B-18-14(9.5-10.0)	B-18-14(26.0-26.5)	B-18-15(2.0-2.5)	B-18-15(12.0-12.5)	B-18-16(2.0-2.5)	B-18-16(9.0-9.5)	B-18-17(2.0-2.5)	B-18-17(9.0-9.5)	B-18-18(1.5-2.0)	B-18-18(14.0-14.5)	B-18-18(47.0-47.5)	B-18-18(52.5-53.0)
					Parent Sample ID													
					Sample Date	8/8/2018	8/9/2018	8/9/2018	8/8/2018	8/13/2018	8/8/2018	8/9/2018	8/10/2018	8/13/2018	8/8/2018	8/9/2018	8/9/2018	8/21/2018
					Sample Depth	2-2.5 ft	9.5-10 ft	26-26.5 ft	2-2.5 ft	12-12.5 ft	2-2.5 ft	9-9.5 ft	2-2.5 ft	9-9.5 ft	1.5-2 ft	14-14.5 ft	47-47.5 ft	52.5-53 ft
					Water Table Note	AWT	AWT	BWT	AWT	BWT	AWT	AWT	AWT	AWT	AWT	BWT	BWT	BWT
					Notes													
Chemical	**Units**	**MTCA A then Lowest B**		**Soil Protective of GW (Vadose)**	**Soil Protective of GW (Saturated)**													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 47.7	< 4.28	< 4.87	< 43.6	< 10.1	< 49.5	< 5.15	< 41.6	< 5.03	< 73.1	< 47.5	< 5.13	< 5.14
Oil-Range Organics	mg/kg	2,000	Method A			< 119	< 10.7	< 12.2	< 109	< 25.2	< 124	< 12.9	< 104	< 12.6	**341**	< 119	< 12.8	< 12.9
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 23.9	< 2.14	< 2.44	< 21.8	< 5.05	< 24.8	< 2.58	< 20.8	< 2.52	**378**	< 23.8	< 2.57	< 2.57
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	ND	ND	ND	ND	ND	ND	ND	ND	**341**	ND	ND	ND
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	< 4.16	< 5.03	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	< 10.4	< 12.6	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	< 2.08	< 2.52	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	ND	ND	--	--	--	--
BTEX																		
Benzene	mg/kg	0.03	Method A			< 0.00118	< 0.00114	< 0.00122	< 0.00109	< 0.00126	< 0.00125	< 0.00129	< 0.00104	< 0.00126 J	< 0.00137	< 0.00119	< 0.00128	< 0.00129
Toluene	mg/kg	7	Method A			< 0.00590	< 0.00568	< 0.00609	**0.0126**	< 0.00631	< 0.00625	< 0.00644	< 0.00520	< 0.00628 J	**0.0108**	< 0.00594	< 0.00641	< 0.00643
Ethylbenzene	mg/kg	6	Method A			< 0.00295	< 0.00284	< 0.00304	< 0.00273	< 0.00315	< 0.00312	< 0.00322	< 0.00260	< 0.00314 J	< 0.00343	< 0.00297	< 0.00321	< 0.00321
Xylene, m,p-	mg/kg					**0.00579**	< 0.00454	< 0.00487	**0.0131**	< 0.00505	< 0.00500	< 0.00515	< 0.00416	< 0.00503 J	**0.0186**	< 0.00475	< 0.00513	< 0.00514
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	< 0.00295	< 0.00284	< 0.00304	**0.00853**	< 0.00315	< 0.00312	< 0.00322	< 0.00260	< 0.00314 J	**0.0171**	< 0.00297	< 0.00321	< 0.00321
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			**0.00727**	< 0.00142	< 0.00152	**0.0216**	< 0.00158	< 0.00156	< 0.00161	< 0.00130	< 0.00157	**0.0357**	< 0.00149	< 0.00161	< 0.00161
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			< 0.0236	< 0.0214	< 0.0243	< 0.0218	< 0.0252	< 0.0247	< 0.0258	< 0.0208	< 0.0251	**0.0949**	< 0.0237	< 0.0257	< 0.0257
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			< 0.0236	< 0.0214	< 0.0243	< 0.0218	< 0.0252	< 0.0247	< 0.0258	< 0.0208	< 0.0251	< 0.0219	< 0.0237	< 0.0257	< 0.0257
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			< 0.0236	< 0.0214	< 0.0243	< 0.0218	< 0.0252	< 0.0247	< 0.0258	< 0.0208	< 0.0251	**0.138**	< 0.0237	< 0.0257	< 0.0257
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 0.00708	< 0.00643	< 0.00730	< 0.00654	< 0.00757	< 0.00742	< 0.00773	< 0.00624	< 0.00754	**0.798**	**0.0161**	< 0.00770	< 0.00771
Benzo(a)anthracene	mg/kg					**0.00791**	< 0.00643	< 0.00730	**0.0200**	< 0.00757	< 0.00742	< 0.00773	< 0.00624	< 0.00754	**3.65**	**0.0718**	< 0.00770	< 0.00771
Benzo(a)pyrene	mg/kg	0.1	Method A			**0.00868**	< 0.00643	< 0.00730	**0.0239**	< 0.00757	< 0.00742	< 0.00773	< 0.00624	< 0.00754	**3.07**	**0.0962**	< 0.00770	< 0.00771
Benzo(b)Fluoranthene	mg/kg					**0.00948**	< 0.00643	< 0.00730	**0.0294**	< 0.00757	< 0.00742	< 0.00773	< 0.00624	< 0.00754	**4.24**	**0.139**	< 0.00770	< 0.00771
Benzo(k)Fluoranthene	mg/kg					< 0.00708	< 0.00643	< 0.00730	**0.0109**	< 0.00757	< 0.00742	< 0.00773	< 0.00624	< 0.00754	**1.17**	**0.0312**	< 0.00770	< 0.00771
Chrysene	mg/kg					**0.00746**	< 0.00643	< 0.00730	**0.0194**	< 0.00757	< 0.00742	< 0.00773	< 0.00624	< 0.00754	**4.01**	**0.0704**	< 0.00770	< 0.00771
Dibenz(a,h)Anthracene	mg/kg					< 0.00708	< 0.00643	< 0.00730	< 0.00654	< 0.00757	< 0.00742	< 0.00773	< 0.00624	< 0.00754	**0.582**	**0.0179**	< 0.00770	< 0.00771
Indeno(1,2,3-c,d)Pyrene	mg/kg					< 0.00708	< 0.00643	< 0.00730	**0.0141**	< 0.00757	< 0.00742	< 0.00773	< 0.00624	< 0.00754	**1.72**	**0.0559**	< 0.00770	< 0.00771
Naphthalene	mg/kg	5	Method A			< 0.0236	< 0.0214	< 0.0243	< 0.0218	< 0.0252	< 0.0247	< 0.0258	< 0.0208	< 0.0251	**0.215**	< 0.0237	< 0.0257	< 0.0257
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			**< 0.0118**	< 0.0107	< 0.0122	**< 0.0109**	< 0.0126	< 0.0124	< 0.0129	< 0.0104	< 0.0126	**0.448**	**< 0.0119**	< 0.0129	< 0.0129
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			**< 0.00**	< 0.00	< 0.00	**< 0.00**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	**0.448**	**< 0.00**	< 0.00	< 0.00
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			**0.0116**	< 0.00322	< 0.00365	**0.0319**	< 0.00379	< 0.00371	< 0.00387	< 0.00312	< 0.00377	**4.25**	**0.128**	< 0.00385	< 0.00386
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			**0.0105**	< 0.00	< 0.00	**0.0315**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	**4.25**	**0.128**	< 0.00	< 0.00
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			< 0.0148	< 0.0142	< 0.0152	< 0.0136	< 0.0158	< 0.0156	< 0.0161	< 0.0130	< 0.0157	**0.0551**	< 0.0148	< 0.0160	< 0.0161
Metals																		
Arsenic	mg/kg	20	Method A			< 2.36	< 2.14	< 2.43	< 2.18	< 2.52	< 2.47	< 2.58	< 2.08	< 2.51	**9.65**	< 2.37	< 2.57	< 2.57
Barium	mg/kg	16,000	Method B Non cancer	1600	83	**75.6**	**87.4**	**56.2**	**84.8**	**60.1**	**98.5**	**93.7**	**81.4**	**54.6**	**78.9**	**78.6**	**69.8**	**122**
Lead	mg/kg	250	Method A			**66.5**	**2.70**	**4.31**	**73.7**	**3.11**	**23.5**	**3.12**	**7.38**	**2.98**	**135**	**19.6**	**2.47**	**4.52**

TABLE 18

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	B-18-18	B-18-19	B-18-19	B-18-20	B-18-20	B-18-21	B-18-21	B-18-22	B-18-22	B-18-23	B-18-23	B-18-24	B-18-24
					Sample ID	B-18-18(67.5-68.0)	B-18-19(2.0-2.5)	B-18-19(9.5-10.0)	B-18-20(2.0-2.5)	B-18-20(12.0-12.5)	B-18-21(3.0-3.5)	B-18-21(7.5-8.0)	B-18-22(2.0-2.5)	B-18-22(9.5-10.0)	B-18-23(3.0-3.5)	B-18-23(9.5-10.0)	B-18-24(2.0-2.5)	B-18-24(9.0-9.5)
					Parent Sample ID													
					Sample Date	8/21/2018	8/17/2018	8/20/2018	8/17/2018	8/20/2018	8/17/2018	8/20/2018	8/16/2018	8/16/2018	8/17/2018	8/17/2018	8/21/2018	8/21/2018
					Sample Depth	67.5-68 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft	12-12.5 ft	3-3.5 ft	7.5-8 ft	2-2.5 ft	9.5-10 ft	3-3.5 ft	9.5-10 ft	2-2.5 ft	9-9.5 ft
					Water Table Note	BWT	AWT	AWT	AWT	BWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT
					Notes													
Chemical	**Units**	**MTCA A then Lowest B**		**Soil Protective of GW (Vadose)**	**Soil Protective of GW (Saturated)**													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	< 2.81	< 3.17	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 4.58	< 4.68	< 4.81	< 4.56	< 4.93	< 22.5	< 45.4	< 4.25	< 5.39	< 4.50	< 5.07	**39.3**	**2,700**
Oil-Range Organics	mg/kg	2,000	Method A			< 11.5	< 11.7	< 12.0	< 11.4	< 12.3	< 56.3	< 113	**20.5**	< 13.5	**13.3**	< 12.7	< 12.3	< 546
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 2.29	< 2.34	< 2.41	< 2.28	< 2.47	< 11.3	< 22.7	**22.6**	< 2.70	**15.6**	< 2.54	**45.5**	**2,970**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	ND	ND	ND	ND	ND	ND	**20.5**	ND	**13.3**	ND	**39.3**	**2,700**
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	< 4.50	< 5.07	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	**11.5**	< 12.7	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	**13.8**	< 2.54	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	**11.5**	ND	--	--
BTEX																		
Benzene	mg/kg	0.03	Method A			< 0.00115	< 0.00117	< 0.00129	< 0.00122	< 0.00123	< 0.00128	< 0.00113	< 0.00106	< 0.00136	< 0.00112	< 0.00127	< 0.00131	< 0.00119
Toluene	mg/kg	7	Method A			< 0.00573	< 0.00585	< 0.00643	< 0.00610	< 0.00617	**0.00650**	< 0.00567	< 0.00532	< 0.00681	< 0.00562	< 0.00633	< 0.00653	< 0.00595
Ethylbenzene	mg/kg	6	Method A			< 0.00286	< 0.00292	< 0.00322	< 0.00305	< 0.00308	< 0.00321	< 0.00284	< 0.00266	< 0.00340	< 0.00281	< 0.00317	< 0.00327	< 0.00297
Xylene, m,p-	mg/kg					< 0.00458	< 0.00468	< 0.00515	< 0.00488	< 0.00493	< 0.00513	< 0.00454	< 0.00425	< 0.00545	< 0.00450	< 0.00507	< 0.00522	< 0.00476
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	< 0.00286	< 0.00292	< 0.00322	< 0.00305	< 0.00308	**0.00463**	< 0.00284	< 0.00266	< 0.00340	< 0.00281	< 0.00317	< 0.00327	< 0.00297
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			< 0.00143	< 0.00146	< 0.00161	< 0.00153	< 0.00154	**0.00720**	< 0.00142	< 0.00133	< 0.00170	< 0.00141	< 0.00159	< 0.00164	< 0.00149
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			< 0.0229	< 0.0234	< 0.0240	< 0.0228	< 0.0247	< 0.0225	< 0.0227	< 0.0213	< 0.0270	< 0.0225	< 0.0253	< 0.0246	< 0.0218
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			< 0.0229	< 0.0234	< 0.0240	< 0.0228	< 0.0247	< 0.0225	< 0.0227	< 0.0213	< 0.0270	< 0.0225	< 0.0253	< 0.0246	< 0.436
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			< 0.0229	< 0.0234	< 0.0240	< 0.0228	< 0.0247	< 0.0225	< 0.0227	< 0.0213	< 0.0270	< 0.0225	< 0.0253	< 0.0246	< 0.0218
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 0.00687	< 0.00702	< 0.00721	< 0.00684	< 0.00740	**0.0161**	< 0.00681	< 0.00638	< 0.00809	< 0.00675	< 0.00760	< 0.00739	< 0.131
Benzo(a)anthracene	mg/kg					< 0.00687	< 0.00702	< 0.00721	< 0.00684	< 0.00740	**0.0128**	< 0.00681	< 0.00638	< 0.00809	< 0.00675	< 0.00760	< 0.00739	**0.0312**
Benzo(a)pyrene	mg/kg	0.1	Method A			< 0.00687	< 0.00702	< 0.00721	< 0.00684	< 0.00740	**0.0883**	< 0.00681	< 0.00638	< 0.00809	< 0.00675	< 0.00760	< 0.00739	< 0.00655
Benzo(b)Fluoranthene	mg/kg					< 0.00687	< 0.00702	< 0.00721	< 0.00684	< 0.00740	**0.0344**	< 0.00681	< 0.00638	< 0.00809	< 0.00675	< 0.00760	< 0.00739	< 0.00655
Benzo(k)Fluoranthene	mg/kg					< 0.00687	< 0.00702	< 0.00721	< 0.00684	< 0.00740	< 0.00675	< 0.00681	< 0.00638	< 0.00809	< 0.00675	< 0.00760	< 0.00739	< 0.00655
Chrysene	mg/kg					< 0.00687	< 0.00702	< 0.00721	< 0.00684	< 0.00740	**0.0524**	< 0.00681	< 0.00638	< 0.00809	< 0.00675	< 0.00760	< 0.00739	< 0.00655
Dibenz(a,h)Anthracene	mg/kg					< 0.00687	< 0.00702	< 0.00721	< 0.00684	< 0.00740	**0.0191**	< 0.00681	< 0.00638	< 0.00809	< 0.00675	< 0.00760	< 0.00739	< 0.00655
Indeno(1,2,3-c,d)Pyrene	mg/kg					< 0.00687	< 0.00702	< 0.00721	< 0.00684	< 0.00740	**0.0272**	< 0.00681	< 0.00638	< 0.00809	< 0.00675	< 0.00760	< 0.00739	< 0.00655
Naphthalene	mg/kg	5	Method A			< 0.0229	< 0.0234	< 0.0240	< 0.0228	< 0.0247	< 0.0225	< 0.0227	< 0.0213	< 0.0270	< 0.0225	< 0.0253	< 0.0246	< 0.0218
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			< 0.0115	< 0.0117	< 0.0120	< 0.0114	< 0.0124	**< 0.0113**	< 0.0114	< 0.0107	< 0.0135	< 0.0113	< 0.0127	< 0.0123	< 0.0109
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	**< 0.00**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			< 0.00344	< 0.00351	< 0.00361	< 0.00342	< 0.00370	**0.0985**	< 0.00341	< 0.00319	< 0.00405	< 0.00338	< 0.00380	< 0.00370	**0.00774**
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	**0.0982**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	**0.00312**
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			< 0.0143	< 0.0146	< 0.0161	< 0.0153	< 0.0154	< 0.0160	< 0.0142	< 0.0133	< 0.0170	< 0.0141	< 0.0158	< 0.0163	< 0.0149
Metals																		
Arsenic	mg/kg	20	Method A			< 2.29	< 2.34	< 2.40	< 2.28	< 2.47	< 2.25	< 2.27	< 2.13	< 2.70	< 2.25	< 2.53	< 2.46	< 2.18
Barium	mg/kg	16,000	Method B Non cancer	1600	83	**62.1**	**51.1**	**64.8**	**67.5**	**88.5**	**62.0**	**79.4**	**62.0**	**87.2**	**84.1**	**70.6**	**80.2**	**91.1**
Lead	mg/kg	250	Method A			**2.94**	**2.76**	**6.58**	**3.77**	**4.43**	**12.2**	**8.14**	**33.1**	**2.77**	**5.74**	**2.47**	**7.42**	**4.10**

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
					Location ID	B-18-24	B-18-24	B-18-25	B-18-25	B-18-25	B-18-26	B-18-26	B-18-27	B-18-27	B-18-28	B-18-28	B-18-29	B-18-29
					Sample ID	B-18-24(13.5-14.0)	B-18-24(22.5-23.0)	B-18-25(2-2.5)	DUP-04-20180821	B-18-25(9.5-10)	B-18-26(2.0-2.5)	B-18-26(7.5-8.0)	B-18-27(2.0-2.5)	B-18-27(8.0-8.5)	B-18-28(2.0-2.5)	B-18-28(7.5-8.0)	B-18-29(2.0-2.5)	B-18-29(9.5-10.0)
					Parent Sample ID				B-18-25(2-2.5)									
					Sample Date	8/21/2018	8/21/2018	8/21/2018	8/21/2018	8/21/2018	8/14/2018	8/15/2018	8/14/2018	8/15/2018	8/14/2018	8/15/2018	8/14/2018	8/15/2018
					Sample Depth	13.5-14 ft	22.5-23 ft	2-2.5 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft	7.5-8 ft	2-2.5 ft	8-8.5 ft	2-2.5 ft	7.5-8 ft	2-2.5 ft	9.5-10 ft
					Water Table Note	BWT	BWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT
					Notes													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**9,070**	< 5.38	< 88.9	< 46.7	< 4.85	< 5.05	< 5.00	< 4.97	< 4.88	< 4.88	< 4.97	< 4.87	< 4.88
Oil-Range Organics	mg/kg	2,000	Method A			< 1,270	< 13.5	**276**	< 117	< 12.1	< 12.6	< 12.5	< 12.4	< 12.2	< 12.2	< 12.4	< 12.2	< 12.2
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**9,710**	< 2.69	**320**	< 23.4	< 2.43	< 2.53	< 2.50	< 2.49	< 2.44	< 2.44	< 2.49	< 2.44	< 2.44
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**9,070**	ND	**276**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
BTEX																		
Benzene	mg/kg	0.03	Method A			< 0.0254	< 0.00135	< 0.00113	< 0.00121	< 0.00121	< 0.00130	< 0.00125	< 0.00124	< 0.00122	< 0.00122	< 0.00124	< 0.00130	< 0.00122
Toluene	mg/kg	7	Method A			< 0.127	< 0.00673	**0.0225**	**0.0134**	< 0.00606	< 0.00650	< 0.00625	< 0.00622	< 0.00609	< 0.00610	< 0.00621	< 0.00651	< 0.00610
Ethylbenzene	mg/kg	6	Method A			**1.31**	< 0.00337	< 0.00283	< 0.00303	< 0.00303	< 0.00325	< 0.00312	< 0.00311	< 0.00305	< 0.00305	< 0.00311	< 0.00326	< 0.00305
Xylene, m,p-	mg/kg					**1.26**	< 0.00538	**0.0200**	**0.0141**	< 0.00485	< 0.00515	< 0.00500	< 0.00497	< 0.00488	< 0.00488	< 0.00497	< 0.00516	< 0.00488
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	< 0.0636	< 0.00337	**0.0154**	**0.00850**	< 0.00303	< 0.00325	< 0.00312	< 0.00311	< 0.00305	< 0.00305	< 0.00311	< 0.00326	< 0.00305
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			**1.29**	< 0.00169	**0.0354**	**0.0226**	< 0.00152	< 0.00163	< 0.00156	< 0.00156	< 0.00153	< 0.00153	< 0.00156	< 0.00163	< 0.00153
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			**81.6**	< 0.0269	**0.0412**	**0.0274**	< 0.0242	< 0.0252	< 0.0250	< 0.0249	< 0.0244	< 0.0244	< 0.0248	< 0.0244	< 0.0244
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			< 0.509	< 0.0269	< 0.0222	< 0.0233	< 0.0242	< 0.0252	< 0.0250	< 0.0249	< 0.0244	< 0.0244	< 0.0248	< 0.0244	< 0.0244
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			**94.0**	< 0.0269	**0.0441**	**0.0310**	< 0.0242	< 0.0252	< 0.0250	< 0.0249	< 0.0244	< 0.0244	< 0.0248	< 0.0244	< 0.0244
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 0.153	< 0.00808	**0.0123**	**0.00843**	< 0.00727	< 0.00757	< 0.00750	< 0.00746	< 0.00731	< 0.00732	< 0.00745	< 0.00731	< 0.00731
Benzo(a)anthracene	mg/kg					< 0.153	< 0.00808	**0.0304**	**0.0139**	< 0.00727	< 0.00757	< 0.00750	< 0.00746	< 0.00731	< 0.00732	< 0.00745	< 0.00731	< 0.00731
Benzo(a)pyrene	mg/kg	0.1	Method A			*< 0.153*	< 0.00808	**0.0491**	**0.0202**	< 0.00727	< 0.00757	< 0.00750	< 0.00746	< 0.00731	< 0.00732	< 0.00745	< 0.00731	< 0.00731
Benzo(b)Fluoranthene	mg/kg					< 0.153	< 0.00808	**0.0610**	**0.0314**	< 0.00727	< 0.00757	< 0.00750	< 0.00746	< 0.00731	< 0.00732	< 0.00745	< 0.00731	< 0.00731
Benzo(k)Fluoranthene	mg/kg					< 0.153	< 0.00808	**0.0213**	**0.00783**	< 0.00727	< 0.00757	< 0.00750	< 0.00746	< 0.00731	< 0.00732	< 0.00745	< 0.00731	< 0.00731
Chrysene	mg/kg					< 0.153	< 0.00808	**0.0375**	**0.0173**	< 0.00727	< 0.00757	< 0.00750	< 0.00746	< 0.00731	< 0.00732	< 0.00745	< 0.00731	< 0.00731
Dibenz(a,h)Anthracene	mg/kg					< 0.153	< 0.00808	**0.00933**	< 0.00700	< 0.00727	< 0.00757	< 0.00750	< 0.00746	< 0.00731	< 0.00732	< 0.00745	< 0.00731	< 0.00731
Indeno(1,2,3-c,d)Pyrene	mg/kg					< 0.153	< 0.00808	**0.0318**	**0.0138**	< 0.00727	< 0.00757	< 0.00750	< 0.00746	< 0.00731	< 0.00732	< 0.00745	< 0.00731	< 0.00731
Naphthalene	mg/kg	5	Method A			**19.1**	< 0.0269	**0.0380**	**0.0294**	< 0.0242	< 0.0252	< 0.0250	< 0.0249	< 0.0244	< 0.0244	< 0.0248	< 0.0244	< 0.0244
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			**195**	< 0.0135	**0.123**	**0.0878**	< 0.0121	< 0.0126	< 0.0125	< 0.0125	< 0.0122	< 0.0122	< 0.0124	< 0.0122	< 0.0122
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			**195**	< 0.00	**0.123**	**0.0878**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			**< 0.0765**	< 0.00404	**0.0649**	**0.0274**	< 0.00364	< 0.00379	< 0.00375	< 0.00373	< 0.00366	< 0.00366	< 0.00373	< 0.00366	< 0.00366
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			**< 0.00**	< 0.00	**0.0649**	**0.0271**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			**19.7**	< 0.0168	**0.0160**	< 0.0152	< 0.0152	< 0.0162	< 0.0156	< 0.0155	< 0.0152	< 0.0152	< 0.0155	< 0.0163	< 0.0152
Metals																		
Arsenic	mg/kg	20	Method A			< 2.54	< 2.69	**2.31**	< 2.33	< 2.42	< 2.52	< 2.50	< 2.49	< 2.44	< 2.44	< 2.48	< 2.44	< 2.44
Barium	mg/kg	16,000	Method B Non cancer	1600	83	**94.5**	**76.3**	**95.3**	**83.5**	**103**	**76.2**	**75.5**	**84.7**	**78.2**	**84.1**	**85.9**	**75.0**	**82.9**
Lead	mg/kg	250	Method A			**3.70**	**2.86**	**19.4**	**20.0**	**4.61**	**3.27**	**3.10**	**3.18**	**2.99**	**4.36**	**3.39**	**3.93**	**3.08**

TABLE 18

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
					Location ID	B-18-30	B-18-30	RMD-05	RMD-05	RMD-05	RMD-05	RMD-06	RMD-06	RMD-06	RMD-06	RMD-06	WMW-19	WMW-19
					Sample ID	B-18-30(2.0-2.5)	B-18-30(9.5-10.0)	RMD-5(2.0-2.5)	RMD-5(7.5-8.0)	RMD-5(29.5-30.0)	RMD-5(49.5-50.0)	RMD-6(2.0-2.5)	RMD-6(9.5-10.0)	RMD-6(44.5-45.0)	RMD-6(70.5-71.0)	DUP-01-20180801	WMW-19(2.0-2.5)	WMW-19(14.0-14.5)
					Parent Sample ID											RMD-6(70.5-71.0)		
					Sample Date	8/14/2018	8/15/2018	7/30/2018	7/31/2018	7/31/2018	7/31/2018	7/30/2018	8/1/2018	8/1/2018	8/3/2018	8/1/2018	7/30/2018	7/31/2018
					Sample Depth	2-2.5 ft	9.5-10 ft	2-2.5 ft	7.5-8 ft	29.5-30 ft	49.5-50 ft	2-2.5 ft	9.5-10 ft	44.5-45 ft	70.5-71 ft	70.5-71 ft	2-2.5 ft	14-14.5 ft
					Water Table Note	AWT	AWT	AWT	AWT	BWT	BWT	AWT	AWT	BWT	BWT	BWT	AWT	AWT
					Notes													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 4.84	< 4.89	< 25.2	< 81.3	< 5.21	< 5.18	< 4.17	< 4.20	**6.07**	< 5.34	< 5.08	< 4.24	< 81.3
Oil-Range Organics	mg/kg	2,000	Method A			< 12.1	< 12.2	< 63.0	**307**	< 13.0	< 13.0	< 10.4	< 10.5	< 12.6	< 13.4	< 12.7	< 10.6	< 203
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 2.42	< 2.45	< 12.6	**348**	< 2.61	< 2.59	< 2.09	< 2.10	**12.4**	< 2.67	< 2.54	< 2.12	< 40.7
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	ND	ND	**307**	ND	ND	ND	ND	**6.07**	ND	ND	ND	ND
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
BTEX																		
Benzene	mg/kg	0.03	Method A			< 0.00122	< 0.00122	< 0.00126	< 0.00126	< 0.00130	< 0.00130	< 0.00112	< 0.00105	< 0.00135	< 0.00134	< 0.00127	< 0.00106	< 0.00142
Toluene	mg/kg	7	Method A			< 0.00610	< 0.00611	< 0.00630	**0.00879**	< 0.00652	< 0.00648	< 0.00558	< 0.00525	< 0.00674	< 0.00668	< 0.00635	< 0.00530	< 0.00712
Ethylbenzene	mg/kg	6	Method A			**0.00386**	< 0.00305	< 0.00315	**0.00538**	< 0.00326	< 0.00324	< 0.00279	< 0.00263	< 0.00337	< 0.00334	< 0.00317	< 0.00265	< 0.00356
Xylene, m,p-	mg/kg					< 0.00488	< 0.00489	< 0.00504	**0.0309**	< 0.00521	< 0.00518	< 0.00446	< 0.00420	< 0.00539	< 0.00534	< 0.00508	< 0.00424	**0.00908**
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	**0.00340**	< 0.00305	< 0.00315	**0.0193**	< 0.00326	< 0.00324	< 0.00279	< 0.00263	< 0.00337	< 0.00334	< 0.00317	< 0.00265	**0.00424**
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			**0.00584**	< 0.00153	< 0.00158	**0.0502**	< 0.00163	< 0.00162	< 0.00140	< 0.00132	< 0.00169	< 0.00167	< 0.00159	< 0.00133	**0.0133**
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			< 0.0242	< 0.0244	< 0.0252	< 0.0203	< 0.0261	< 0.0259	< 0.0209	< 0.0210	< 0.0252	< 0.0267	< 0.0254	< 0.0212	< 0.0203
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			< 0.0242	< 0.0244	< 0.0252	< 0.0203	< 0.0261	< 0.0259	< 0.0209	< 0.0210	< 0.0252	< 0.0267	< 0.0254	< 0.0212	< 0.0203
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			< 0.0242	< 0.0244	< 0.0252	< 0.0203	< 0.0261	< 0.0259	< 0.0209	< 0.0210	< 0.0252	< 0.0267	< 0.0254	< 0.0212	< 0.0203
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 0.00725	< 0.00733	< 0.00756	**0.0378**	< 0.00782	< 0.00777	< 0.00626	< 0.00631	< 0.00756	< 0.00801	< 0.00762	< 0.00636	< 0.00610
Benzo(a)anthracene	mg/kg					**0.138**	< 0.00733	< 0.00756	**0.0708**	< 0.00782	< 0.00777	< 0.00626	< 0.00631	< 0.00756	< 0.00801	< 0.00762	< 0.00636	**0.0218**
Benzo(a)pyrene	mg/kg	0.1	Method A			**0.125**	< 0.00733	< 0.00756	**0.115**	< 0.00782	< 0.00777	< 0.00626	< 0.00631	< 0.00756	< 0.00801	< 0.00762	< 0.00636	**0.0353**
Benzo(b)Fluoranthene	mg/kg					**0.164**	< 0.00733	< 0.00756	**0.115**	< 0.00782	< 0.00777	< 0.00626	< 0.00631	< 0.00756	< 0.00801	< 0.00762	< 0.00636	**0.0455**
Benzo(k)Fluoranthene	mg/kg					**0.0742**	< 0.00733	< 0.00756	**0.0359**	< 0.00782	< 0.00777	< 0.00626	< 0.00631	< 0.00756	< 0.00801	< 0.00762	< 0.00636	**0.0133**
Chrysene	mg/kg					**0.117**	< 0.00733	< 0.00756	**0.0720**	< 0.00782	< 0.00777	< 0.00626	< 0.00631	< 0.00756	< 0.00801	< 0.00762	< 0.00636	**0.0353**
Dibenz(a,h)Anthracene	mg/kg					**0.0253**	< 0.00733	< 0.00756	**0.0244**	< 0.00782	< 0.00777	< 0.00626	< 0.00631	< 0.00756	< 0.00801	< 0.00762	< 0.00636	**0.00719**
Indeno(1,2,3-c,d)Pyrene	mg/kg					**0.0775**	< 0.00733	< 0.00756	**0.0493**	< 0.00782	< 0.00777	< 0.00626	< 0.00631	< 0.00756	< 0.00801	< 0.00762	< 0.00636	**0.0257**
Naphthalene	mg/kg	5	Method A			< 0.0242	< 0.0244	< 0.0252	< 0.0203	< 0.0261	< 0.0259	< 0.0209	< 0.0210	< 0.0252	< 0.0267	< 0.0254	< 0.0212	< 0.0203
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			**< 0.0121**	< 0.0122	< 0.0126	**< 0.0102**	< 0.0131	< 0.0130	< 0.0105	< 0.0105	< 0.0126	< 0.0134	< 0.0127	**< 0.0106**	**< 0.0102**
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			**< 0.00**	< 0.00	< 0.00	**< 0.00**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	**< 0.00**	**< 0.00**
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			**0.174**	< 0.00367	< 0.00378	**0.145**	< 0.00391	< 0.00389	< 0.00313	< 0.00316	< 0.00378	< 0.00401	< 0.00381	**< 0.00318**	**0.0470**
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			**0.174**	< 0.00	< 0.00	**0.145**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	**< 0.00**	**0.0470**
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			< 0.0153	< 0.0153	< 0.0158	**0.0344**	< 0.0163	< 0.0162	< 0.0140	< 0.0131	< 0.0169	< 0.0167	< 0.0159	< 0.0133	< 0.0178
Metals																		
Arsenic	mg/kg	20	Method A			< 2.42	< 2.44	< 2.52	**2.24**	< 2.61	< 2.59	**2.20**	**3.00**	< 2.52	< 2.67	< 2.54	**2.63**	**2.23**
Barium	mg/kg	16,000	Method B Non cancer	1600	83	**106**	**76.3**	**69.8**	**70.2**	**129**	**104**	**67.4**	**82.9**	**58.0**	**58.8**	**54.7**	**63.9**	**77.4**
Lead	mg/kg	250	Method A			**12.8**	**3.35**	**6.77**	**8.68**	**5.82**	**3.86**	**4.09**	**4.39**	**2.71**	**2.85**	**2.47**	**4.84**	**31.3**

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
					Location ID	WMW-20	WMW-20	WMW-21	WMW-21	WMW-22	WMW-22	WMW-23	WMW-23	WMW-24	WMW-24	WMW-26	WMW-26	WMW-27
					Sample ID	WMW-20(2.0-2.5)	WMW-20(14.5-15.0)	WMW-21(2.0-2.5)	WMW-21(9.5-10.0)	WMW-22(1.5-2.0)	WMW-22(13.0-13.5)	WMW-23(2.0-2.5)	WMW-23(5.5-6.0)	WMW-24(2.0-2.5)	WMW-24(9.5-10.0)	WMW-26(2.0-2.5)	WMW-26(9.5-10.0)	WMW-27(2.0-2.5)
					Parent Sample ID													
					Sample Date	7/31/2018	8/2/2018	8/6/2018	8/7/2018	8/6/2018	8/7/2018	8/6/2018	8/7/2018	8/2/2018	8/2/2018	8/3/2018	8/3/2018	8/3/2018
					Sample Depth	2-2.5 ft	14.5-15 ft	2-2.5 ft	9.5-10 ft	1.5-2 ft	13-13.5 ft	2-2.5 ft	5.5-6 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft
					Water Table Note	AWT	BWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT
					Notes													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**5.30**	< 4.53	< 4.96	**6.49**	< 4.58	**5.44**	< 4.16 J	< 4.13	< 84.3	< 4.51	< 4.19	< 4.65	< 21.5
Oil-Range Organics	mg/kg	2,000	Method A			< 10.2	< 11.3	< 12.4	**29.8**	< 11.5	**35.5**	< 10.4	< 10.3	< 211	< 11.3	< 10.5	< 11.6	< 53.8
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**10.4**	< 2.27	< 2.48	**36.3**	< 2.29	**40.9**	< 2.08	< 2.07	< 42.2	< 2.26	< 2.10	< 2.33	< 10.8
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**5.30**	ND	ND	**36.3**	ND	**40.9**	ND	ND	ND	ND	ND	ND	ND
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
BTEX																		
Benzene	mg/kg	0.03	Method A			< 0.00106	< 0.00113	< 0.00124	< 0.00115	< 0.00115	< 0.00116	< 0.00104	< 0.00103	< 0.00105	< 0.00113	< 0.00113	< 0.00116	< 0.00119
Toluene	mg/kg	7	Method A			< 0.00532	< 0.00566	< 0.00620	< 0.00576	< 0.00573	< 0.00580	< 0.00520	< 0.00516	< 0.00527	< 0.00563	< 0.00565	< 0.00581	**0.00709**
Ethylbenzene	mg/kg	6	Method A			< 0.00266	< 0.00283	< 0.00310	< 0.00288	< 0.00286	< 0.00290	< 0.00260	< 0.00258	< 0.00263	< 0.00282	< 0.00283	< 0.00290	< 0.00299
Xylene, m,p-	mg/kg					< 0.00425	< 0.00453	**0.0110**	**0.00679**	< 0.00458	**0.00485**	< 0.00416	< 0.00413	< 0.00421	< 0.00451	< 0.00452	< 0.00465	**0.0112**
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	< 0.00266	< 0.00283	**0.0106**	**0.00571**	< 0.00286	< 0.00290	< 0.00260	< 0.00258	< 0.00263	< 0.00282	< 0.00283	< 0.00290	**0.00373**
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			< 0.00133	< 0.00142	**0.0216**	**0.0125**	< 0.00143	**0.00630**	< 0.00130	< 0.00129	< 0.00132	< 0.00141	< 0.00142	< 0.00145	**0.0149**
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			< 0.0205	< 0.0227	< 0.0248	< 0.0231	< 0.0229	< 0.0232	< 0.0208	< 0.0206	< 0.0211	< 0.0225	< 0.0209	< 0.0232	< 0.0215
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			< 0.0205	< 0.0227	< 0.0248	< 0.0231	< 0.0229	< 0.0232	< 0.0208	< 0.0206	< 0.0211	< 0.0225	< 0.0209	< 0.0232	< 0.0215
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			< 0.0205	< 0.0227	< 0.0248	< 0.0231	< 0.0229	**0.0347**	< 0.0208	< 0.0206	< 0.0211	< 0.0225	< 0.0209	< 0.0232	< 0.0215
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 0.00614	< 0.00680	< 0.00745	< 0.00692	**0.0118**	< 0.00696	< 0.00624	< 0.00619	**0.00875**	< 0.00676	< 0.00628	< 0.00697	< 0.00646
Benzo(a)anthracene	mg/kg					**0.0118**	< 0.00680	**0.0295**	< 0.00692	**0.0330**	< 0.00696	< 0.00624	< 0.00619	< 0.00632	< 0.00676	< 0.00628	< 0.00697	< 0.00646
Benzo(a)pyrene	mg/kg	0.1	Method A			**0.0121**	< 0.00680	**0.0246**	< 0.00692	**0.0326**	< 0.00696	< 0.00624	< 0.00619	< 0.00632	< 0.00676	< 0.00628	< 0.00697	< 0.00646
Benzo(b)Fluoranthene	mg/kg					**0.0161**	< 0.00680	**0.0367**	< 0.00692	**0.0448**	< 0.00696	< 0.00624	< 0.00619	**0.00780**	< 0.00676	< 0.00628	< 0.00697	< 0.00646
Benzo(k)Fluoranthene	mg/kg					< 0.00614	< 0.00680	**0.0122**	< 0.00692	**0.0160**	< 0.00696	< 0.00624	< 0.00619	< 0.00632	< 0.00676	< 0.00628	< 0.00697	< 0.00646
Chrysene	mg/kg					**0.0138**	< 0.00680	**0.0272**	< 0.00692	**0.0334**	< 0.00696	< 0.00624	< 0.00619	< 0.00632	< 0.00676	< 0.00628	< 0.00697	< 0.00646
Dibenz(a,h)Anthracene	mg/kg					< 0.00614	< 0.00680	< 0.00745	< 0.00692	**0.00740**	< 0.00696	< 0.00624	< 0.00619	< 0.00632	< 0.00676	< 0.00628	< 0.00697	< 0.00646
Indeno(1,2,3-c,d)Pyrene	mg/kg					**0.00737**	< 0.00680	**0.0158**	< 0.00692	**0.0238**	< 0.00696	< 0.00624	< 0.00619	**0.00758**	< 0.00676	< 0.00628	< 0.00697	< 0.00646
Naphthalene	mg/kg	5	Method A			< 0.0205	< 0.0227	< 0.0248	< 0.0231	< 0.0229	**0.0233**	< 0.0208	< 0.0206	< 0.0211	< 0.0225	< 0.0209	< 0.0232	< 0.0215
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			**< 0.0103**	< 0.0114	**< 0.0124**	< 0.0116	**< 0.0115**	**0.0696**	< 0.0104	< 0.0103	**< 0.0106**	< 0.0113	< 0.0105	< 0.0116	< 0.0108
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			**< 0.00**	< 0.00	**< 0.00**	< 0.00	**< 0.00**	**0.0580**	< 0.00	< 0.00	**< 0.00**	< 0.00	< 0.00	< 0.00	< 0.00
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			**0.0164**	< 0.00340	**0.0347**	< 0.00346	**0.0454**	< 0.00348	< 0.00312	< 0.00310	**0.00568**	< 0.00338	< 0.00314	< 0.00349	< 0.00323
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			**0.0158**	< 0.00	**0.0343**	< 0.00	**0.0454**	< 0.00	< 0.00	< 0.00	**0.00154**	< 0.00	< 0.00	< 0.00	< 0.00
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			< 0.0133	< 0.0142	**0.0197**	< 0.0144	< 0.0143	< 0.0145	< 0.0130	< 0.0129	< 0.0132	< 0.0141	< 0.0141	< 0.0145	< 0.0149
Metals																		
Arsenic	mg/kg	20	Method A			**2.38**	< 2.27	< 2.48	**2.77**	**2.79**	**4.43**	**3.00**	**2.71**	< 2.11	< 2.25	< 2.09	< 2.32	< 2.15
Barium	mg/kg	16,000	Method B Non cancer	1600	83	**69.3**	**82.7**	**65.5**	**96.6**	**64.1**	**36.5**	**81.1**	**51.4**	**73.0**	**90.4**	**67.7**	**84.2**	**87.1**
Lead	mg/kg	250	Method A			**6.20**	**3.77**	**11.9**	**48.8**	**7.73**	**184**	**4.73**	**5.37**	**15.4**	**3.62**	**4.06**	**3.86**	**27.0**

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	WMW-27	WMW-28	WMW-28	WMW-29	WMW-29	WMW-30	WMW-30	WMW-31	WMW-31	WMW-31	WMW-32	WMW-32	DXA1-2
					Sample ID	WMW-27(9.5-10.0)	WMW-28(2.0-2.5)	WMW-28(13.0-13.5)	WMW-29(2.0-2.5)	WMW-29(9.5-10.0)	WMW-30(2.0-2.5)	WMW-30(8.5-9.0)	WMW-31(2.0-2.5)	WMW-31(9.0-9.5)	DUP-02-20180808	WMW-32(2.0-2.5)	WMW-32(9.5-10.0)	DXA1-2_20070308
					Parent Sample ID										WMW-31(9.0-9.5)			
					Sample Date	8/3/2018	8/2/2018	8/2/2018	8/2/2018	8/3/2018	8/2/2018	8/3/2018	8/7/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018	3/8/2007
					Sample Depth	9.5-10 ft	2-2.5 ft	13-13.5 ft	2-2.5 ft	9.5-10 ft	2-2.5 ft	8.5-9 ft	2-2.5 ft	9-9.5 ft	9-9.5 ft	2-2.5 ft	9.5-10 ft	2 ft
					Water Table Note	AWT	AWT	BWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT
					Notes													Excavation confirmation soil sample.
Chemical	**Units**	**MTCA A then Lowest B**		**Soil Protective of GW (Vadose)**	**Soil Protective of GW (Saturated)**													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	< 0.117	< 0.100	--
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 4.94	< 4.41	< 5.00	< 85.2	< 4.96	< 4.17	< 4.25	< 5.04	< 4.93	< 4.88	**5.35**	< 4.91	--
Oil-Range Organics	mg/kg	2,000	Method A			< 12.3	< 11.0	< 12.5	< 213	< 12.4	< 10.4	< 10.6	**15.2**	< 12.3	< 12.2	**30.2**	< 12.3	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 2.47	< 2.21	< 2.50	< 42.6	< 2.48	< 2.09	< 2.13	**17.7**	< 2.47	< 2.44	**35.6**	< 2.46	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	ND	ND	ND	ND	ND	ND	**15.2**	ND	ND	**35.6**	ND	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	**105**
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	**295**
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	**400**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	**400**
BTEX																		
Benzene	mg/kg	0.03	Method A			< 0.00123	< 0.00126	< 0.00125	**0.00301**	< 0.00129	< 0.00138	< 0.00117	< 0.00131	< 0.00123	< 0.00122	< 0.00114	< 0.00123	--
Toluene	mg/kg	7	Method A			< 0.00617	< 0.00628	< 0.00625	**0.0401**	< 0.00645	< 0.00689	< 0.00584	**0.00910**	< 0.00616	< 0.00610	< 0.00570	< 0.00614	--
Ethylbenzene	mg/kg	6	Method A			< 0.00309	< 0.00314	< 0.00313	**0.00336**	< 0.00322	< 0.00344	< 0.00292	< 0.00328	< 0.00308	< 0.00305	< 0.00285	< 0.00307	--
Xylene, m,p-	mg/kg					< 0.00494	< 0.00503	< 0.00500	**0.0593**	< 0.00516	< 0.00551	< 0.00467	**0.0130**	< 0.00493	< 0.00488	< 0.00456	< 0.00491	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	< 0.00309	< 0.00314	< 0.00313	**0.0146**	< 0.00322	< 0.00344	< 0.00292	**0.00508**	< 0.00308	< 0.00305	< 0.00285	< 0.00307	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			< 0.00155	< 0.00157	< 0.00157	**0.0739**	< 0.00161	< 0.00172	< 0.00146	**0.0181**	< 0.00154	< 0.00153	< 0.00143	< 0.00154	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			< 0.0247	< 0.0220	< 0.0250	**0.0492**	< 0.0248	< 0.0209	< 0.0212	< 0.0252	< 0.0246	< 0.0244	< 0.0215	< 0.0245	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			< 0.0247	< 0.0220	< 0.0250	< 0.0426	< 0.0248	< 0.0209	< 0.0212	< 0.0252	< 0.0246	< 0.0244	< 0.0215	< 0.0245	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			< 0.0247	< 0.0220	< 0.0250	**0.0885**	< 0.0248	< 0.0209	< 0.0212	< 0.0252	< 0.0246	< 0.0244	< 0.0215	< 0.0245	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	< 0.00740	< 0.00661	< 0.00750	**0.0437**	< 0.00744	< 0.00626	< 0.00637	< 0.00756	< 0.00739	< 0.00732	< 0.00645	< 0.00736	--
Benzo(a)anthracene	mg/kg					< 0.00740	< 0.00661	< 0.00750	**0.148**	< 0.00744	< 0.00626	< 0.00637	< 0.00756	< 0.00739	< 0.00732	< 0.00645	< 0.00736	--
Benzo(a)pyrene	mg/kg	0.1	Method A			< 0.00740	< 0.00661	< 0.00750	**0.0675**	< 0.00744	< 0.00626	< 0.00637	< 0.00756	< 0.00739	< 0.00732	< 0.00645	< 0.00736	--
Benzo(b)Fluoranthene	mg/kg					< 0.00740	< 0.00661	< 0.00750	**0.147**	< 0.00744	< 0.00626	< 0.00637	< 0.00756	< 0.00739	< 0.00732	< 0.00645	< 0.00736	--
Benzo(k)Fluoranthene	mg/kg					< 0.00740	< 0.00661	< 0.00750	**0.0413**	< 0.00744	< 0.00626	< 0.00637	< 0.00756	< 0.00739	< 0.00732	< 0.00645	< 0.00736	--
Chrysene	mg/kg					< 0.00740	< 0.00661	< 0.00750	**0.175**	< 0.00744	< 0.00626	< 0.00637	< 0.00756	< 0.00739	< 0.00732	< 0.00645	< 0.00736	--
Dibenz(a,h)Anthracene	mg/kg					< 0.00740	< 0.00661	< 0.00750	**0.0162**	< 0.00744	< 0.00626	< 0.00637	< 0.00756	< 0.00739	< 0.00732	< 0.00645	< 0.00736	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					< 0.00740	< 0.00661	< 0.00750	**0.0377**	< 0.00744	< 0.00626	< 0.00637	< 0.00756	< 0.00739	< 0.00732	< 0.00645	< 0.00736	--
Naphthalene	mg/kg	5	Method A			< 0.0247	< 0.0220	< 0.0250	< 0.0426	< 0.0248	< 0.0209	< 0.0212	< 0.0252	< 0.0246	< 0.0244	< 0.0215	< 0.0245	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			< 0.0124	< 0.0110	< 0.0125	**0.159**	< 0.0124	< 0.0105	< 0.0106	< 0.0126	< 0.0123	< 0.0122	< 0.0108	< 0.0123	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			< 0.00	< 0.00	< 0.00	**0.138**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			< 0.00370	< 0.00331	< 0.00375	**0.108**	< 0.00372	< 0.00313	< 0.00319	< 0.00378	< 0.00370	< 0.00366	< 0.00323	< 0.00368	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			< 0.00	< 0.00	< 0.00	**0.108**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			< 0.0154	< 0.0157	< 0.0156	**0.0183**	< 0.0161	< 0.0172	< 0.0146	< 0.0164	< 0.0154	< 0.0153	< 0.0142	< 0.0153	--
Metals																		
Arsenic	mg/kg	20	Method A			< 2.47	< 2.20	< 2.50	< 2.13	< 2.48	< 2.09	< 2.12	< 2.52	< 2.46	< 2.44	< 2.15	< 2.45	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	**86.0**	**76.3**	**81.9**	**80.0**	**110**	**75.4**	**72.9**	**104**	**90.7**	**124**	**99.4**	**83.8**	--
Lead	mg/kg	250	Method A			**2.87**	**3.60**	**3.35**	**241**	**4.42**	**3.45**	**3.03**	**50.9**	**1.70**	**1.48**	**18.2**	**0.969**	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	DXA2-2	DXA3-2	DXA4-2	DXA5-2	DXA6-2	DXA7-2	WR-B1-5	WR-B2-6	WR-S1-3	WR-S2-3	WR-S3-3	WR-S4-3	WR-S5-4
					Sample ID	DXA2-2_20070308	DXA3-2_20070308	DXA4-2_20070308	DXA5-2_20070308	DXA6-2_20070308	DXA7-2_20070308	WR-B1-5_20100622	WR-B2-6_20100623	WR-S1-3_20100622	WR-S2-3_20100622	WR-S3-3_20100623	WR-S4-3_20100623	WR-S5-4_20100623
					Parent Sample ID													
					Sample Date	3/8/2007	3/8/2007	3/8/2007	3/8/2007	3/8/2007	3/8/2007	6/22/2010	6/23/2010	6/22/2010	6/22/2010	6/23/2010	6/23/2010	6/23/2010
					Sample Depth	2 ft	2 ft	2 ft	2 ft	2 ft	2 ft	5 ft	6 ft	3 ft	3 ft	3 ft	3 ft	4 ft
					Water Table Note	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT
					Notes	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.
Chemical	**Units**	**MTCA A then Lowest B**		**Soil Protective of GW (Vadose)**	**Soil Protective of GW (Saturated)**													
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	< 5.7	< 5.5	< 5.7	< 5.8	< 6.1	< 6.7	< 5.2
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 11.1	< 11	**18.4**	< 11.5	**78.3**	< 11	< 20.2	< 20.1	< 20.9	< 21.2	< 20.1	< 22.1	< 20.2
Oil-Range Organics	mg/kg	2,000	Method A			< 27.8	< 27.4	**55.4**	**31.8**	**334**	< 27.4	< 81	< 80.4	< 83.4	< 84.7	< 80.6	< 88.4	< 80.8
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 5.55	< 5.50	**73.8**	**37.6**	**412**	< 5.50	< 10.1	< 10.1	< 10.5	< 10.6	< 10.1	< 11.1	< 10.1
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	ND	**73.8**	**31.8**	**412**	ND	ND	ND	ND	ND	ND	ND	ND
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	--	--	--	< 0.0228	< 0.022	< 0.023	< 0.023	< 0.0245	< 0.0267	< 0.0207
Toluene	mg/kg	7	Method A			--	--	--	--	--	--	< 0.0285	< 0.0275	< 0.0287	< 0.0288	< 0.0306	< 0.0334	< 0.0259
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	--	--	< 0.0285	< 0.0275	< 0.0287	< 0.0288	< 0.0306	< 0.0334	< 0.0259
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	< 0.0855	< 0.0826	< 0.0861	< 0.0863	< 0.0917	< 0.1	< 0.0777
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Location ID						WR-S6-4	E-13	E-14	E-15	E-16	E-17	E-18	N-1	N-2	N-3	N-4	N-9	N-10	N-11
Sample ID						WR-S6-4_20100623	E-13-14.5	E-14-3	E-15-14.5	E-16-3	E-17-14.5	E-18-3	N-1-15.5	N-2-3	N-3-15.5	N-4-3	N-9-14.5	N-10-3	N-11-14.5
Parent Sample ID																			
Sample Date						6/23/2010	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002
Sample Depth						4 ft	14.5 ft	3 ft	14.5 ft	3 ft	14.5 ft	3 ft	15.5 ft	3 ft	15.5 ft	3 ft	14.5 ft	3 ft	14.5 ft
Water Table Note						AWT	BWT	AWT	BWT	AWT	BWT	AWT	BWT	AWT	BWT	AWT	BWT	AWT	BWT
Notes						Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.
Chemical	**Units**	**MTCA A then Lowest B**		**Soil Protective of GW (Vadose)**	**Soil Protective of GW (Saturated)**														
NWTPH-Gx																			
Gasoline-Range Organics	mg/kg	30	Method A			< 6	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																			
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																			
Diesel-Range Organics	mg/kg	2,000	Method A			< 20.3	**27,200**	< 25	**60,600**	< 25	**52,500**	< 25	< 25	< 25	**28,500**	< 25	**26,900**	< 25	**35,400**
Oil-Range Organics	mg/kg	2,000	Method A			< 81.1	**30,400**	< 100	**44,400**	< 100	**47,300**	< 100	< 100	< 100	**48,500**	< 100	**34,400**	< 100	**53,500**
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 10.2	**57,600**	< 12.5	**105,000**	< 12.5	**99,800**	< 12.5	< 12.5	< 12.5	**77,000**	< 12.5	**61,300**	< 12.5	**88,900**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	**57,600**	ND	**105,000**	ND	**99,800**	ND	ND	ND	**77,000**	ND	**61,300**	ND	**88,900**
BTEX																			
Benzene	mg/kg	0.03	Method A			< 0.0241	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	7	Method A			< 0.0302	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	6	Method A			< 0.0302	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			< 0.0905	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																			
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																			
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																			
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)	N-12	S-19	S-20	S-21	S-22	S-23	S-24	S-25	S-26	W-5	W-6	W-7	W-8	W-27
					Sample ID	N-12-3	S-19-14.5	S-20-3	S-21-15.5	S-22-3	S-23-15.5	S-24-3	S-25-15.5	S-26-3	W-5-14.5	W-6-3	W-7-14.5	W-8-3	W-27-15.5
					Parent Sample ID														
					Sample Date	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002	4/17/2002
					Sample Depth	3 ft	14.5 ft	3 ft	15.5 ft	3 ft	15.5 ft	3 ft	15.5 ft	3 ft	14.5 ft	3 ft	14.5 ft	3 ft	15.5 ft
					Water Table Note	AWT	BWT	AWT	BWT	AWT	BWT	AWT	BWT	AWT	BWT	AWT	BWT	AWT	BWT
					Notes	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.
NWTPH-Gx																			
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																			
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																			
Diesel-Range Organics	mg/kg	2,000	Method A			**351**	**936**	< 25	**29,300**	**43**	**35,500**	< 25	< 25	< 25	**42,800**	< 25	**7,660**	< 25	< 25
Oil-Range Organics	mg/kg	2,000	Method A			**523**	**882**	< 100	**44,500**	< 100	**58,800**	< 100	< 100	< 100	**60,000**	< 100	**17,900**	< 100	< 100
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**874**	**1,820**	< 12.5	**73,800**	**93.0**	**94,300**	< 12.5	< 12.5	< 12.5	**103,000**	< 12.5	**25,600**	< 12.5	< 12.5
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**874**	**1,820**	ND	**73,800**	**43.0**	**94,300**	ND	ND	ND	**103,000**	ND	**25,600**	ND	ND
BTEX																			
Benzene	mg/kg	0.03	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	mg/kg	7	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																			
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																			
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																			
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)	W-28	W-29	W-30	FI-EAST-6	FIEXC-B-1-12	FIEXC-B-3-15	FIEXC-B-5-10	FIEXC-B-6-10	FIEXC-B-7-10	FIEXC-E-8	FIEXC-N-8	FIEXC-S-10	FIEXC-W-10
					Location ID	W-28	W-29	W-30	FI-EAST-6	FIEXC-B-1-12	FIEXC-B-3-15	FIEXC-B-5-10	FIEXC-B-6-10	FIEXC-B-7-10	FIEXC-E-8	FIEXC-N-8	FIEXC-S-10	FIEXC-W-10
					Sample ID	W-28-3	W-29-15.5	W-30-3	FI-EAST-6_20051026	FIEXC-B-1-12_20051103	FIEXC-B-3-15_20051103	FIEXC-B-5-10_20051101	FIEXC-B-6-10_20051101	FIEXC-B-7-10_20051102	FIEXC-E-8_20051102	FIEXC-N-8_20051027	FIEXC-S-10_20051027	FIEXC-W-10_20051027
					Parent Sample ID													
					Sample Date	4/17/2002	4/17/2002	4/17/2002	10/26/2005	11/3/2005	11/3/2005	11/1/2005	11/1/2005	11/2/2005	11/2/2005	10/27/2005	10/27/2005	10/27/2005
					Sample Depth	3 ft	15.5 ft	3 ft	6 ft	12 ft	15 ft	10 ft	10 ft	10 ft	8 ft	8 ft	10 ft	10 ft
					Water Table Note	AWT	BWT	AWT	AWT	BWT	BWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT
					Notes	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	**10.4**	--	--	--	--	--	< 6.16	< 6.13	< 6.77
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			**28**	**150**	**217**	**152**	**908**	< 10.9	< 10.4	< 11.1	< 10.5	**56.1**	**853**	**52.5**	< 10.5
Oil-Range Organics	mg/kg	2,000	Method A			< 100	< 100	< 100	< 26.8	**1,920**	< 27.2	< 26.1	< 27.7	< 26.2	**37.2**	**3,390**	**493**	< 26.3
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**78.0**	**200**	**267**	**165**	**2,830**	< 5.45	< 5.20	< 5.55	< 5.25	**93.3**	**4,240**	**546**	< 5.25
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**28.0**	**150**	**217**	**152**	**2,830**	ND	ND	ND	ND	**93.3**	**4,240**	**546**	ND
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	--	< 0.0268	--	--	--	--	--	< 0.00161	< 0.00153	< 0.0271
Toluene	mg/kg	7	Method A			--	--	--	--	< 0.0670	--	--	--	--	--	< 0.00161	< 0.00153	< 0.0677
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	< 0.0670	--	--	--	--	--	< 0.00428	< 0.00408	< 0.0677
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	< 0.134	--	--	--	--	--	< 0.0107	< 0.0102	< 0.135
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	< 0.00536	< 0.00510	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	**4.37**	--	--	--	--	--	--	--	**2.74**

TABLE 18

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)													
					Location ID	FI-MID-10	M-1-14	M-2-14	M-2-8	M-3-8	M-4-10	M-5-8	M-6-10	M-7-14	M-7-8	M-8-14	M-8-6	M-9-14
					Sample ID	FI-MID-10_20051026	M-1-14_20051108	M-2-14_20051108	M-2-8_20051108	M-3-8_20051108	M-4-10_20051109	M-5-8_20051109	M-6-10_20051110	M-7-14_20051110	M-7-8_20051110	M-8-14_20051110	M-8-6_20051110	M-9-14_20051110
					Parent Sample ID													
					Sample Date	10/26/2005	11/8/2005	11/8/2005	11/8/2005	11/8/2005	11/9/2005	11/9/2005	11/10/2005	11/10/2005	11/10/2005	11/10/2005	11/10/2005	11/10/2005
					Sample Depth	10 ft	14 ft	14 ft	8 ft	8 ft	10 ft	8 ft	10 ft	14 ft	8 ft	14 ft	6 ft	14 ft
					Water Table Note	AWT	BWT	BWT	AWT	AWT	AWT	AWT	AWT	BWT	AWT	BWT	AWT	BWT
					Notes	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.
NWTPH-Gx																		
Gasoline-Range Organics	mg/kg	30	Method A			--	--	--	--	--	--	--	--	--	--	--	--	**233**
NWTPH-Dx - without silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																		
Diesel-Range Organics	mg/kg	2,000	Method A			< 10.9	**121**	**182**	**89.9**	**183**	**164**	**53.4**	**107**	**324**	< 11	**78.6**	< 11.2	**2,690**
Oil-Range Organics	mg/kg	2,000	Method A			< 27.4	< 27.8	< 27.7	< 27.3	< 27.1	< 27.5	< 27.4	< 27.4	< 27.9	< 27.5	< 27.3	< 28.1	< 285
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			< 5.45	**135**	**196**	**104**	**197**	**178**	**67.1**	**121**	**338**	< 5.50	**92.3**	< 5.60	**2,830**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			ND	**121**	**182**	**89.9**	**183**	**164**	**53.4**	**107**	**324**	ND	**78.6**	ND	**2,690**
BTEX																		
Benzene	mg/kg	0.03	Method A			--	--	--	--	--	--	--	--	--	--	--	--	*< 0.0328*
Toluene	mg/kg	7	Method A			--	--	--	--	--	--	--	--	--	--	--	--	< 0.0819
Ethylbenzene	mg/kg	6	Method A			--	--	--	--	--	--	--	--	--	--	--	--	**0.125**
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--	--	**0.209**
Polycyclic Aromatic Hydrocarbons using SIM																		
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																		
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																		
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--	--	--	**4.10**	--	--	--	--	**3.64**

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

					Location ID	M-10-14	PH-1-10	PH-2-17	#15	#16	#17	#17	#17	WSB-5	WSB-04-6	WSB-04-7
					Sample ID	M-10-14_20051110	PH-1-10_20051102	PH-2-17_20051104	#15-8	#16-13	#17-10	#17-12	#17-14	WSB-5-10	WSB-04-6-8	WSB-04-7-12
					Parent Sample ID											
					Sample Date	11/10/2005	11/2/2005	11/4/2005	1/28/2002	1/28/2002	1/28/2002	1/28/2002	1/28/2002	9/2/2003	2/26/2004	4/5/2004
					Sample Depth	14 ft	10 ft	17 ft	8 ft	13 ft	10 ft	12 ft	14 ft	10 ft	8 ft	12 ft
					Water Table Note	BWT	AWT	BWT	AWT	AWT	AWT	AWT	AWT	AWT	AWT	BWT
					Notes	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excavation confirmation soil sample.	Excluded from data set. Sample from soil later excavated.	Excluded from data set. Sample from soil later excavated.	Excluded from data set. Sample from soil later excavated.	Excluded from data set. Sample from soil later excavated.	Excluded from data set. Sample from soil later excavated.	Excluded from data set. Sample from soil later excavated.	Excluded from data set. Sample from soil later excavated.	Excluded from data set. Sample from soil later excavated.
Chemical	**Units**	**MTCA A then Lowest B**		**Soil Protective of GW (Vadose)**	**Soil Protective of GW (Saturated)**											
NWTPH-Gx																
Gasoline-Range Organics	mg/kg	30	Method A			**225**	< 6.27	< 7.29	--	--	--	--	--	--	--	**40.5**
NWTPH-Dx - without silica gel cleanup																
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																
Diesel-Range Organics	mg/kg	2,000	Method A			--	< 10.4	< 10.6	**39,400**	**999**	**2,480**	**118,500**	**57,600**	**21,000**	< 0.0250	**1,070**
Oil-Range Organics	mg/kg	2,000	Method A			--	< 26	< 26.5	**51,200**	**3,870**	**2,440**	< 100	**56,900**	**21,600**	< 0.0500	**165**
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	< 5.20	< 5.30	**90,600**	**4,870**	**4,920**	**119,000**	**115,000**	**42,600**	< 0.0125	**1,240**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	ND	ND	**90,600**	**4,870**	**4,920**	**119,000**	**115,000**	**42,600**	ND	**1,240**
BTEX																
Benzene	mg/kg	0.03	Method A			< 0.0271	< 0.00180	< 0.0292	--	--	--	--	--	*< 0.1*	--	*< 0.05*
Toluene	mg/kg	7	Method A			< 0.0678	< 0.00180	< 0.0729	--	--	--	--	--	**0.153**	--	< 0.05
Ethylbenzene	mg/kg	6	Method A			**0.124**	< 0.00481	< 0.0729	--	--	--	--	--	**0.221**	--	**0.0141**
Xylene, m,p-	mg/kg					--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	9	Method A			**0.222**	< 0.012	< 0.146	--	--	--	--	--	**1.65**	--	**0.0468**
Polycyclic Aromatic Hydrocarbons using SIM																
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--	--	--	--	--	< 0.0134	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--	--	--	--	--	< 0.0134	--
Benzo(a)anthracene	mg/kg					--	--	--	--	--	--	--	--	--	< 0.0134	< 0.0134
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	< 0.0134	< 0.0134
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	< 0.0134	< 0.0134
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--	--	--	--	--	< 0.0134	< 0.0134
Chrysene	mg/kg					--	--	--	--	--	--	--	--	--	< 0.0134	< 0.0134
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--	--	--	--	--	< 0.0134	< 0.0134
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--	--	--	--	--	< 0.0134	< 0.0134
Naphthalene	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	< 0.0134	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	< 0.00670	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--	--	--	--	--	< 0.00	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	< 0.00670	< 0.00670
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--	--	--	--	--	< 0.00	< 0.00
Volatile Organic Compounds																
Naphthalene	mg/kg	5	Method A			--	< 0.00602	--	--	--	--	--	--	--	--	--
Metals																
Arsenic	mg/kg	20	Method A			--	--	--	--	--	--	--	--	**9.35**	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--	--	--	--	**6,340**	--	--
Lead	mg/kg	250	Method A			--	**10**	--	--	--	--	--	--	**29.4**	--	--

TABLE 18

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Soil Protective of GW (Vadose)	Soil Protective of GW (Saturated)	WSB-04-9	WSB-04-9	WSB-04-26	WSB-04-26	WSB-04-37
					Location ID	WSB-04-9	WSB-04-9	WSB-04-26	WSB-04-26	WSB-04-37
					Sample ID	WSB-04-9-5	WSB-04-9-10	WSB-04-26-2	WSB-04-26-10	WSB-04-37-7
					Parent Sample ID					
					Sample Date	2/25/2004	2/25/2004	2/25/2004	2/25/2004	4/5/2004
					Sample Depth	5 ft	10 ft	2 ft	10 ft	7 ft
					Water Table Note	AWT	AWT	AWT	AWT	AWT
					Notes	Excluded from data set. Sample from soil later excavated.	Excluded from data set. Sample from soil later excavated.	Excluded from data set. Sample from soil later excavated.	Excluded from data set. Sample from soil later excavated.	Excluded from data set. Sample from soil later excavated.
NWTPH-Gx										
Gasoline-Range Organics	mg/kg	30	Method A			**1,210**	**977**	--	**606**	--
NWTPH-Dx - without silica gel cleanup										
Diesel-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--
Oil-Range Organics	mg/kg	2,000	Method A			--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			--	--	--	--	--
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			--	--	--	--	--
NWTPH-Dx - with silica gel cleanup										
Diesel-Range Organics	mg/kg	2,000	Method A			**12,100**	**23,900**	< 0.0250	**21,100**	**2,490**
Oil-Range Organics	mg/kg	2,000	Method A			**604**	**602**	< 0.0500	**14,000**	**3,740**
Total TPH-Dx (HalfDL_WA)	mg/kg	2,000	Method A			**12,700**	**24,500**	< 0.0125	**35,100**	**6,230**
Total TPH-Dx (HitsOnly)	mg/kg	2,000	Method A			**12,700**	**24,500**	ND	**35,100**	**6,230**
BTEX										
Benzene	mg/kg	0.03	Method A			*< 0.05*	*< 0.05*	--	**0.0393**	--
Toluene	mg/kg	7	Method A			< 0.05	< 0.05	--	**0.0874**	--
Ethylbenzene	mg/kg	6	Method A			**0.286**	**2.03**	--	**0.623**	--
Xylene, m,p-	mg/kg					--	--	--	--	--
Xylene, o-	mg/kg	16,000	Method B Non cancer	14	0.84	--	--	--	--	--
Total Xylenes (HalfDL_WA)	mg/kg	9	Method A			--	--	--	--	--
Xylene, total	mg/kg	9	Method A			**0.514**	**2.98**	--	**1.47**	--
Polycyclic Aromatic Hydrocarbons using SIM										
1-Methylnaphthalene	mg/kg	34	Method B Cancer			--	--	--	--	--
2-Chloronaphthalene	mg/kg	6,400	Method B Non cancer			--	--	--	--	--
2-Methylnaphthalene	mg/kg	320	Method B Non cancer			--	--	--	--	--
Anthracene	mg/kg	24,000	Method B Non cancer	2300	110	--	--	--	--	--
Benzo(a)anthracene	mg/kg					--	--	--	--	--
Benzo(a)pyrene	mg/kg	0.1	Method A			--	--	--	--	--
Benzo(b)Fluoranthene	mg/kg					--	--	--	--	--
Benzo(k)Fluoranthene	mg/kg					--	--	--	--	--
Chrysene	mg/kg					--	--	--	--	--
Dibenz(a,h)Anthracene	mg/kg					--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	mg/kg					--	--	--	--	--
Naphthalene	mg/kg	5	Method A			--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	mg/kg	5	Method A			--	--	--	--	--
Total Naphthalenes (HitsOnly)	mg/kg	5	Method A			--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	mg/kg	0.1	Method A			--	--	--	--	--
Total cPAH TEQ (HitsOnly)	mg/kg	0.1	Method A			--	--	--	--	--
Volatile Organic Compounds										
Naphthalene	mg/kg	5	Method A			--	--	--	--	--
Metals										
Arsenic	mg/kg	20	Method A			--	--	--	--	--
Barium	mg/kg	16,000	Method B Non cancer	1600	83	--	--	--	--	--
Lead	mg/kg	250	Method A			--	--	--	--	--

SUMMARY OF SOIL ANALYTICAL RESULTS (2002 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

34300	Detected concentrations above the cleanup level are shaded blue and bolded.
< 0.18	Non-detect values above the cleanup level are shaded gray and italicized.
1700	Detected concentrations at or above the method reporting limit are shown in bold.
<u>**1700**</u>	Detected concentrations above the screening level for soil protective of groundwater in the vadose or saturated zone are underlined and bolded.

Abbreviations and Symbols

"AWT" denotes soil sample collected above the water table in the vadose zone. Results compared to MTCA CULs (see below) and soil protective of groundwater in the vadose zone screening levels.
"BWT" denotes soil sample collected below the water table in the saturated zone. Results compared to MTCA CULs (see below) and soil protective of groundwater in the saturated zone screening levels.
" - -" denotes not measured, not available, or not applicable.
" < " denotes not detected at or above the indicated method reporting limit.
"ND" denotes that the result was not detected and the method reporting limit is unknown.
"B" denotes that the value has been qualified due to blank contamination by the laboratory.
"DUP" denotes a field duplicate sample. Primary sample ID is provided beneath the duplicate sample ID.
"E" indicates that the concentration exceeded the calibration curve and is an estimate.
"J" indicates an estimated concentration based on either being less than the laboratory reporting limit or data validation findings.
"J+" indicates an estimated concentration likely biased high based on data validation findings or as reported by the laboratory.
"U" denotes that the value has been qualified as undetected (at the detected concentration if above the method reporting limit) due to blank contamination.
"Y" denotes that 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.
ft = feet
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
Total TPH-Dx = Total TPH-Dx concentrations were calculated by summing diesel-range organics (DRO) and oil-range organics (ORO) concentrations. Non-detects were included as noted.
Total cPAHs = Possible Total Carcinogenic Polycyclic Aromatic hydrocarbons (cPAHs) are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. Non-detects were included as noted.
Total Naphthalenes = Total Naphthalenes concentrations were calculated by summing 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene concentrations. Non-detects were included as noted.
Total PCBs = Total PCB concentrations were calculated by summing individual aroclor concentrations. Non-detects were included as noted.
Total Xylenes = Total Xylenes concentrations were calculated by summing Xylene, m,p- and Xylene, o- concentrations. Non-detects were included as noted.
(HitsOnly) = If an individual chemical was not detected, it was not included in the calculation.
(HalfDL_WA) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration.

Cleanup Levels (CUL)

Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for unrestricted land use (Method A) based on Washington State Administrative Code (WAC) 173-340-900 Table 740-1.
Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2020).

Methods

Samples analyzed for gasoline-range organics (GRO) using Northwest Total Petroleum Hydrocarbon (NWTPH)-Gx and diesel- and oil-range organics (DRO and ORO) using NWTPH-Dx (with or without silica gel cleanup as noted).
Samples analyzed for extractable petroleum hydrocarbons (EPH) using NWTPH-EPH.
Samples analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) and Volatile Organic Compounds using EPA Method 8021 or 8260.
Samples analyzed for metals using EPA Method 6010, 3060, or 7471.
Samples analyzed for Semivolatile Organic Compound using EPA Method 8270 with selective ion monitoring (SIM). In cases where SIM was not used, it is noted in the notes row.
Samples analyzed for Polychlorinated Biphenyls using EPA Method 8082.

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN RECONNAISSANCE GROUNDWATER SAMPLES
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Env Effects-Based Conc	Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
NWTPH-Gx														
Gasoline-Range Organics	µg/L	800/1000	Method A		32(2)	0(0)	9(0)	26%	50-100	20	390	WSB-04-6-GW,AS-12-3	No	Maximum concentration does not exceed the cleanup level.
NWTPH-Dx Without Silica Gel Cleanup (SGC)														
Diesel-Range Organics	µg/L	500	Method A	Fresh Diesel: 250 Weathered Diesel: 3,040	40(2)	Method A: 4(0) EEBC-F: 17(0) EEBC-W: 1(0)	25(0)	60%	100-400	108	38,900	B-18-24	Yes	The maximum concentration exceeds MTCA Method A screening level.
Oil-Range Organics	µg/L	500	Method A		40(2)	10(0)	24(0)	57%	250-500	258	9,270	B-18-24	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A		40(2)	20(0)	30(0)	71%	50-200	233	48,200	B-18-24	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HitsOnly)	µg/L	500	Method A		40(2)	18(0)	30(0)	71%	0	108	48,200	B-18-24	Yes	The maximum concentration exceeds MTCA Method A screening level.
NWTPH-Dx With Silica Gel Cleanup (SGC)														
Diesel-Range Organics	µg/L	500	Method A	Fresh Diesel: 250 Weathered Diesel: 3,040	28(1)	Method A: 11(0) EEBC-F: 13(0) EEBC-W: 4(0)	16(1)	59%	100-417	126	22,000	MWD-1-35	Yes	The maximum concentration exceeds MTCA Method A screening level.
Oil-Range Organics	µg/L	500	Method A		28(1)	9(0)	15(1)	55%	250-833	85	4,400	MWD-1-20	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A		28(1)	13(0)	16(1)	59%	50-209	219	23,800	MWD-1-35	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HitsOnly)	µg/L	500	Method A		28(1)	13(0)	16(1)	59%	0	219	23,800	MWD-1-35	Yes	The maximum concentration exceeds MTCA Method A screening level.
BTEX														
Benzene	µg/L	5	Method A		59(3)	0(0)	1(0)	2%	0.5-1	0.17	0.17	AS-12-3	No	Maximum concentration does not exceed the cleanup level.
Toluene	µg/L	1,000	Method A		59(3)	0(0)	1(0)	2%	0.5-5	2.14	2.14	WSB-04-34-GW	No	Maximum concentration does not exceed the cleanup level.
Ethylbenzene	µg/L	700	Method A		59(3)	0(0)	4(0)	6%	0.5-1	0.31	5.1	WSB-04-6-GW	No	Maximum concentration does not exceed the cleanup level.
Xylene, m,p-	µg/L	--			37(2)	0(0)	3(0)	8%	2	0.77	3.1	B-18-24	No	Cleanup level not available for parameter.
Xylene, o-	µg/L	1,600	B Non cancer		37(2)	0(0)	1(0)	3%	1	0.41	0.41	AS-12-3	No	Maximum concentration does not exceed the cleanup level.
Total Xylenes (HalfDL_WA)	µg/L	1,000	Method A		37(2)	0(0)	3(0)	8%	0.5	1.27	3.6	B-18-24	No	Maximum concentration does not exceed the cleanup level.
Xylene, total	µg/L	1,000	Method A		31(2)	0(0)	4(0)	12%	0.5-3	0.77	18.2	WSB-04-6-GW	No	Maximum concentration does not exceed the cleanup level.
Semi Volatile Organic Compounds										--				
2-Methylphenol (o-Cresol)	µg/L	400	B Non cancer		2()	0(0)	0()	0%	10		--	--	No	Detection frequency is 0%.
3&4-Methylphenol (m&p-Cresol)	µg/L	--			2()	0(0)	0()	0%	10		--	--	No	Cleanup level not available for parameter.
Polycyclic Aromatic Hydrocarbons using SIM														
1-Methylnaphthalene	µg/L	1.5	B Cancer		45(2)	2(0)	3(0)	6%	0.25-0.5	0.313	47.1	B-18-24	Yes	The maximum concentration exceeds MTCA B Cancer screening level.
2-Methylnaphthalene	µg/L	32	B Non cancer		45(2)	2(0)	2(0)	4%	0.25-0.5	43.5	47.4	B-18-24	Yes	The maximum concentration exceeds MTCA B Non cancer screening level.
Acenaphthene	µg/L	960	B Non cancer		47(2)	0(0)	5(0)	10%	0.05-1	0.0514	34.8	B-16-20 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Acenaphthylene	µg/L	--			47(2)	0(0)	2(0)	4%	0.05-1	0.0602	0.333	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Anthracene	µg/L	4,800	B Non cancer		47(2)	0(0)	13(0)	27%	0.05-1	0.0613	2.93	B-16-20 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Benzo(a)anthracene	µg/L	--			47(2)	0(0)	1(0)	2%	0.05-1	0.207	0.207	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Benzo(a)pyrene	µg/L	0.1	Method A		47(2)	0(0)	1(0)	2%	0.05-1	0.0842	0.0842	B-16-20 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Benzo(b)Fluoranthene	µg/L	--			47(2)	0(0)	1(0)	2%	0.05-1	0.11	0.11	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Benzo(g,h,i)Perylene	µg/L	--			47(2)	0(0)	1(0)	2%	0.05-1	0.133	0.133	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Benzo(k)Fluoranthene	µg/L	--			47(2)	0(0)	0(0)	%	0.05-1	--	--	--	No	Cleanup level not available for parameter.
Chrysene	µg/L	--			47(2)	0(0)	1(0)	2%	0.05-1	0.168	0.168	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Dibenz(a,h)Anthracene	µg/L	--			47(2)	0(0)	0(0)	%	0.05-1	--	--	--	No	Cleanup level not available for parameter.
Fluoranthene	µg/L	640	B Non cancer		47(2)	0(0)	3(0)	6%	0.05-1	0.11	2.19	B-16-20 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Fluorene	µg/L	640	B Non cancer		47(2)	0(0)	4(0)	8%	0.05-1	0.155	20.9	B-16-20 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Indeno(1,2,3-c,d)Pyrene	µg/L	--			47(2)	0(0)	1(0)	2%	0.05-1	0.0737	0.0737	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Naphthalene	µg/L	160	Method A		49(2)	1(0)	11(1)	24%	0.25-5	0.312	268	B-16-20 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Phenanthrene	µg/L	--			47(2)	0(0)	7(0)	14%	0.05-1	0.0513	23	B-16-20 (10.0) (20160808)	No	Cleanup level not available for parameter.
Pyrene	µg/L	480	B Non cancer		47(2)	0(0)	3(0)	6%	0.05-1	0.0802	1.31	B-16-20 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A		49(2)	1(0)	11(1)	24%	0.125-2.5	0.562	339	B-16-20 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total Naphthalenes (HitsOnly)	µg/L	160	Method A		49(2)	1(0)	11(1)	24%	0	0.312	339	B-16-20 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A		47(2)	1(0)	1(0)	2%	0.025-0.5	0.13	0.13	B-16-20 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A		47(2)	1(0)	1(0)	2%	0	0.125	0.125	B-16-20 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Volatile Organic Compounds														
1,2,3-Trimethylbenzene	µg/L	80	B Non cancer		44(2)	0(0)	1(0)	2%	1	2.74	2.74	B-18-24	No	Maximum concentration does not exceed the cleanup level.
1,2,4-Trimethylbenzene	µg/L	80	B Non cancer		46(2)	0(0)	1(0)	2%	1	21.5	21.5	B-18-24	No	Maximum concentration does not exceed the cleanup level.
Cymene (p-Isopropyltoluene)	µg/L	--			46(2)	0(0)	1(0)	2%	1-2	1.84	1.84	B-18-24	No	Cleanup level not available for parameter.
Isopropylbenzene	µg/L	800	B Non cancer		46(2)	0(0)	1(0)	2%	1-2	1.83	1.83	B-18-24	No	Maximum concentration does not exceed the cleanup level.
Naphthalene	µg/L	160	Method A		44(2)	1(0)	2(0)	4%	5	40	360	B-16-20 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
n-Propylbenzene	µg/L	800	B Non cancer		46(2)	0(0)	1(0)	2%	1	2.97	2.97	B-18-24	No	Maximum concentration does not exceed the cleanup level.

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN RECONNAISSANCE GROUNDWATER SAMPLES
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B		Env Effects-Based Conc	Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
Metals														
Arsenic, Dissolved	µg/L	5	Method A		44(2)	14(1)	27(1)	61%	2-10	2.28	15.5	B-18-17	Yes	The maximum concentration exceeds MTCA Method A screening level.
Arsenic, Total	µg/L	5	Method A		17(1)	10(1)	10(1)	61%	10	6.48	151	B-16-10 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Barium, Dissolved	µg/L	3,200	B Non cancer		44(2)	0(0)	44(2)	100%	0	21.1	143	B-16-15 (10.0) (20160809)	No	Maximum concentration does not exceed the cleanup level.
Barium, Total	µg/L	3,200	B Non cancer		17(1)	2(0)	17(1)	100%	0	120	8,620	B-16-10 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA B Non cancer screening level.
Cadmium, Dissolved	µg/L	5	Method A		44(2)	0(0)	0(0)	0%	1-2		--	--	No	Detection frequency is 0%.
Cadmium, Total	µg/L	5	Method A		17(1)	3(0)	5(1)	33%	1-2	3.92	19.3	B-16-10 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Chromium, total, Dissolved	µg/L	100	Method A		44(2)	0(0)	5(1)	13%	2-10	2.19	18.1	B-16-13 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Chromium, total, Total	µg/L	100	Method A		17(1)	4(0)	16(1)	94%	10	10.4	854	B-16-10 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Lead, Dissolved	µg/L	15	Method A		45(2)	0(0)	3(0)	6%	2-5	2.52	6.29	B-16-23 (10.0) (20160808)	No	Maximum concentration does not exceed the cleanup level.
Lead, Total	µg/L	15	Method A		18(1)	14(1)	18(1)	100%	0	6.33	4,530	B-16-23 (10.0) (20160808)	Yes	The maximum concentration exceeds MTCA Method A screening level.
Mercury, Dissolved	µg/L	2	Method A		44(2)	0(0)	0(0)	0%	0.2		--	--	No	Detection frequency is 0%.
Mercury, Total	µg/L	2	Method A		17(1)	0(0)	4(1)	28%	0.2	0.297	1.45	DUP-01 (20160809)	No	Maximum concentration does not exceed the cleanup level.
Selenium, Dissolved	µg/L	80	B Non cancer		44(2)	0(0)	0(0)	0%	2-10		--	--	No	Detection frequency is 0%.
Selenium, Total	µg/L	80	B Non cancer		17(1)	0(0)	1(0)	6%	10-50	1.46	1.46	WSB-04-34-GW	No	Maximum concentration does not exceed the cleanup level.
Silver, Dissolved	µg/L	80	B Non cancer		44(2)	0(0)	0(0)	0%	2-5		--	--	No	Detection frequency is 0%.
Silver, Total	µg/L	80	B Non cancer		17(1)	0(0)	0(0)	0%	1-25		--	--	No	Detection frequency is 0%.

Abbreviations and Symbols:

" - -" denotes not measured, not available, or not applicable.

Total TPH-Dx = Total TPH-Dx concentrations were calculated by summing diesel-range organics (DRO) and oil-range organics (ORO) concentrations. Non-detects were included as noted.

Total cPAHs = Possible Total Carcinogenic Polycyclic Aromatic hydrocarbons (cPAHs) are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. Non-detects were included as noted.

Total Naphthalenes = Total Naphthalenes concentrations were calculated by summing 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene concentrations. Non-detects were included as noted.

Total Xylenes = Total Xylenes concentrations were calculated by summing Xylene, m,p- and Xylene, o- concentrations. Non-detects were included as noted.

(HitsOnly) = If an individual chemical was not detected, it was not included in the calculation.

(HalfDL_WA) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration.

µg/L = micrograms per liter

Notes

Above CUL. Yes (Y) or No (N) based on reported resulted in at least one groundwater sample at a concentration above an applicable cleanup level (CUL).

If "Yes", the cell is shaded blue. Yes

Number of Analyses. Normal sample analyses are followed by duplicate sample analyses in parentheses.

Cleanup Levels (CUL)

Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for groundwater (Method A) based on Washington State Administrative Code (WAC) 173-340-740 Table 720-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2020).

Environmental Effects-Based Concentrations (EEBC) for Surface Water. Value for Fresh Diesel (EEBC-F) based on Table 2 of Environmental Effects-Based Concentrations for Total Petroleum Hydrocarbons (TPH), February 2018, Ecology Publication No. 18-03-002. Value for Weathered Diesel (EEBC-W) based on Environmental Effects-Based Concentrations for Weathered Diesel-Range Organics, June 2020, Ecology Publication No. 20-03-008.

SUMMARY OF RECONNAISSANCE GROUNDWATER ANALYTICAL RESULTS (2004 through 2018)
BNSF Wishram Railyard, Wishram, Washington

			Location ID	WSB-04-6	WSB-04-15	WSB-04-16	WSB-04-25	WSB-04-26	WSB-04-27	WSB-04-34	WSB-04-35	AS-12-1	AS-12-2	AS-12-3	RB1	RB2	RB2	RB3	RB4
			Sample ID	WSB-04-6-GW	WSB-04-15-GW	WSB-04-16-GW	WSB-04-25-GW	WSB-04-26-GW	WSB-04-27-GW	WSB-04-34-GW	WSB-04-35-GW	AS-12-1	AS-12-2	AS-12-3	RB1	RB2	DUP-1-20120117	RB3	RB4
			Parent Sample ID														RB2		
			Sample Date	2/26/2004	2/25/2004	2/26/2004	2/25/2004	2/25/2004	2/26/2004	2/25/2004	2/25/2004	1/12/2012	1/13/2012	1/16/2012	1/17/2012	1/17/2012	1/17/2012	1/16/2012	1/16/2012
			Sample Depth	15 - 16 ft	14 - 15 ft	15 - 16 ft	10.5 - 11.5 ft	13 - 14 ft	11 - 12 ft	11 - 12 ft	11 - 12 ft	17 - 17 ft	17 - 17 ft	17 - 17 ft	17 - 17 ft	17 - 17 ft	17 - 17 ft	17 - 17 ft	17 - 17 ft
			Notes																
Chemical	Units	MTCA A then Lowest B																	
Field																			
Depth to Water	ft			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oxidation-Reduction Potential	mV			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oxygen, dissolved	mg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH	SU			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Specific Conductance	µS/cm			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature	deg c			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Gx																			
Gasoline-Range Organics	µg/L	800/1000	Method A	**390**	< 80.0	< 80.0	< 80.0	**140**	< 80.0	< 80.0	--	**43 J**	**200**	**390**	**78**	< 50	< 50	**76**	**20 J**
NWTPH-Dx - without silica gel cleanup																			
Diesel-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																			
Diesel-Range Organics	µg/L	500	Method A	--	< 250	< 417	--	**483**	--	< 250	< 250	**190 Y**	**3,700**	**2,800 Y**	**1,000 Y**	**130 Y**	**200 Y**	**1,800 Y**	**630 Y**
Oil-Range Organics	µg/L	500	Method A	--	< 500	*< 833*	--	< 500	--	< 500	< 500	**85 J**	**1,300**	**520 Y**	**370 Y**	**89 J**	**110 J**	**280 Y**	**210 J**
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A	--	< 125	< 209	--	**483**	--	< 125	< 125	**275**	**5,000**	**3,320**	**1,370**	**219**	**310**	**2,080**	**840**
Total TPH-Dx (HitsOnly)	µg/L	500	Method A	--	ND	ND	--	**483**	--	ND	ND	**275**	**5,000**	**3,320**	**1,370**	**219**	**310**	**2,080**	**840**
BTEX																			
Benzene	µg/L	5	Method A	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 1	< 1	**0.170 J**	< 1	< 1	< 1	< 1	< 1
Toluene	µg/L	1000	Method A	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	**2.14**	< 1.00	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ethylbenzene	µg/L	700	Method A	**5.10**	< 0.500	< 0.500	< 0.500	**0.709**	< 0.500	< 0.500	< 0.500	< 1	**0.31 J**	**1.10**	< 1	< 1	< 1	< 1	< 1
Xylene, m,p-	µg/L			--	--	--	--	--	--	< 2.00	< 2.00	< 2	**0.770 J**	**1.40 J**	< 2	< 2	< 2	< 2	< 2
Xylene, o-	µg/L	1600	B Non cancer	--	--	--	--	--	--	< 1.00	< 1.00	< 1	< 1	**0.410 J**	< 1	< 1	< 1	< 1	< 1
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	--	--	--	< 0.500	< 0.500	< 0.500	**1.27**	**1.81**	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500
Xylene, total	µg/L	1000	Method A	**18.2**	< 1.00	< 1.00	< 1.00	**6.40**	< 1.00	< 1.00	< 3.00	< 2	**0.770**	**1.81**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Semi Volatile Organic Compounds																			
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3&4-Methylphenol (m&p-Cresol)	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																			
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	µg/L	640	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	4800	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)Perylene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	< 2.00	< 5.00	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	--	--	--	--	< 1.00	< 2.50	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	--	--	--	--	< 0.00	< 0.00	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																			
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																			
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	**6.48**	--	--	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non cancer	--	--	--	--	--	--	**134**	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Total	µg/L	15	Method A	--	--	--	--	--	--	**6.33**	--	--	--	--	--	--	--	--	--

SUMMARY OF RECONNAISSANCE GROUNDWATER ANALYTICAL RESULTS (2004 through 2018)
BNSF Wishram Railyard, Wishram, Washington

			Location ID	MWD-1	MWD-1	MWD-2	MWD-2	MWD-4	MWD-4	B-16-09	B-16-10	B-16-11	B-16-12	B-16-13	B-16-14	B-16-15	B-16-15	B-16-16	B-16-17
			Sample ID	MWD-1-20	MWD-1-35	MWD-2-20-WG	MWD-2-33-WG	MWD-4-30	MWD-4-60	B-16-09(10.0) (20160809)	B-16-10 (10.0) (20160808)	B-16-11 (10.0) (20160808)	B-16-12(10.0) (20160809)	B-16-13 (10.0) (20160808)	B-16-14 (10.0) (20160808)	B-16-15 (10.0) (20160809)	DUP-01 (20160809)	B-16-16 (10.0) (20160809)	B-16-17 (10.0) (20160809)
			Parent Sample ID														B-16-15 (10.0)(20160809)		
			Sample Date	7/24/2014	7/24/2014	7/23/2014	7/23/2014	7/23/2014	7/23/2014	8/9/2016	8/8/2016	8/8/2016	8/9/2016	8/8/2016	8/8/2016	8/9/2016	8/9/2016	8/9/2016	8/9/2016
			Sample Depth	20 - 20 ft	35 - 35 ft	20 - 20 ft	33 - 33 ft	30 - 30 ft	60 - 60 ft	10 - 20 ft	10 - 15 ft	10 - 15 ft	10 - 15 ft	10 - 15 ft	10 - 15 ft	10 - 15 ft	10 - 15 ft	10 - 20 ft	10 - 15 ft
			Notes		PAHs & SVOCs by 8270		PAHs & SVOCs by 8270												
Chemical	**Units**	**MTCA A then Lowest B**								Metals collected on 8/12/16, with Sample ID ending (20160812)	Metals collected on 8/12/16, with Sample ID ending (20160811)	Metals collected on 8/12/16, with Sample ID ending (20160811)	Metals collected on 8/12/16, with Sample ID ending (20160812)	Metals collected on 8/12/16, with Sample ID ending (20160811)	Metals collected on 8/12/16, with Sample ID ending (20160811)	Metals collected on 8/12/16, with Sample ID ending (20160812)	Metals collected on 8/12/16, with Sample ID ending (20160812)	Metals collected on 8/12/16, with Sample ID ending (20160812)	Metals collected on 8/12/16, with Sample ID ending (20160812)
Field																			
Depth to Water	ft			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oxidation-Reduction Potential	mV			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oxygen, dissolved	mg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH	SU			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Specific Conductance	µS/cm			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature	deg c			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Gx																			
Gasoline-Range Organics	µg/L	800/1000	Method A	--	--	--	--	--	--	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
NWTPH-Dx - without silica gel cleanup																			
Diesel-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	**238**	**480**	--	**261**	< 100	**108**	< 100	< 100	**149**
Oil-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	**381**	**332**	--	< 250	< 250	< 250	< 250	< 250	**258**
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A	--	--	--	--	--	--	--	**619**	**812**	--	**386**	< 50.0	**233**	< 50.0	< 50.0	**407**
Total TPH-Dx (HitsOnly)	µg/L	500	Method A	--	--	--	--	--	--	--	**619**	**812**	--	**261**	ND	**108**	ND	ND	**407**
NWTPH-Dx - with silica gel cleanup																			
Diesel-Range Organics	µg/L	500	Method A	**9,900**	**22,000**	**1,800**	**8,700**	< 100	< 100	**126**	--	--	**2,280**	--	--	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	**4,400**	**1,800**	**2,400**	**3,000**	< 250	< 250	**419**	--	--	**2,010**	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A	**14,300**	**23,800**	**4,200**	**11,700**	< 50.0	< 50.0	**545**	--	--	**4,290**	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	µg/L	500	Method A	**14,300**	**23,800**	**4,200**	**11,700**	ND	ND	**545**	--	--	**4,290**	--	--	--	--	--	--
BTEX																			
Benzene	µg/L	5	Method A	--	--	--	--	--	--	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	--
Toluene	µg/L	1000	Method A	--	--	--	--	--	--	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	--
Ethylbenzene	µg/L	700	Method A	--	--	--	--	--	--	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	--
Xylene, m,p-	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, o-	µg/L	1600	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	µg/L	1000	Method A	--	--	--	--	--	--	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	--
Semi Volatile Organic Compounds																			
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	< 10	--	< 10	--	--	--	--	--	--	--	--	--	--	--	--
3&4-Methylphenol (m&p-Cresol)	µg/L			--	< 10	--	< 10	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																			
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	--	--	--	< 0.500	< 0.250	< 0.250	**0.313**	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
2-Chloronaphthalene	µg/L	640	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	--	--	--	< 0.500	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
Anthracene	µg/L	4800	B Non cancer	--	< 1	--	< 1	--	--	< 0.100	**0.105**	**0.0994**	**0.0960**	**0.0754**	**0.153**	< 0.0500	< 0.0500	< 0.0500	**0.0705**
Benzo(a)anthracene	µg/L			--	< 1	--	< 1	--	--	< 0.100	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(a)pyrene	µg/L	0.1	Method A	--	*< 1*	--	*< 1*	--	--	< 0.100	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(b)Fluoranthene	µg/L			--	< 1	--	< 1	--	--	< 0.100	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(g,h,i)Perylene	µg/L			--	< 1	--	< 1	--	--	< 0.100	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(k)Fluoranthene	µg/L			--	< 1	--	< 1	--	--	< 0.100	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Chrysene	µg/L			--	< 1	--	< 1	--	--	< 0.100	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Dibenz(a,h)Anthracene	µg/L			--	< 1	--	< 1	--	--	< 0.100	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Indeno(1,2,3-c,d)Pyrene	µg/L			--	< 1	--	< 1	--	--	< 0.100	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Naphthalene	µg/L	160	Method A	--	**3.20**	--	< 1	--	--	< 0.500	< 0.250	< 0.250	**1.80**	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	**3.20**	--	< 0.500	--	--	< 0.250	< 0.125	< 0.125	**2.24**	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	**3.20**	--	< 0.00	--	--	< 0.00	< 0.00	< 0.00	**2.11**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	--	*< 0.500*	--	*< 0.500*	--	--	< 0.0500	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	--	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Volatile Organic Compounds																			
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	--
Metals																			
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	*< 10.0*	*< 10.0*	*< 10.0*	*< 10.0*	*< 10.0*	*< 10.0*	*< 10.0*	*< 10.0*	*< 10.0*	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	**31.8**	**151**	**107**	*< 10.0*	*< 10.0*	*< 10.0*	**28.1**	**32.8**	**11.5**	--
Barium, Dissolved	µg/L	3200	B Non cancer	--	--	--	--	--	--	**44.0 J+,B**	**63.4**	**70.6**	**43.4 J+,B**	**27.6 J+,B**	**68.1**	**143**	**142**	**68.3**	--
Barium, Total	µg/L	3200	B Non cancer	--	--	--	--	--	--	**1,020**	**8,620**	**6,150**	**495**	**192**	**352**	**494**	**482**	**327**	--
Lead, Dissolved	µg/L	15	Method A	--	--	--	--	--	--	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Lead, Total	µg/L	15	Method A	--	--	--	--	--	--	**61.7**	**1,860**	**445**	**78.6**	**59.5**	**308**	**1,420**	**1,310**	**115**	**19.9**

SUMMARY OF RECONNAISSANCE GROUNDWATER ANALYTICAL RESULTS (2004 through 2018)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Units	MTCA A then Lowest B																	
			Location ID	B-16-18	B-16-19	B-16-20	B-16-21	B-16-22	B-16-23	B-16-24	B-16-24	B-18-01	B-18-02	B-18-03	B-18-04	B-18-05	B-18-06	B-18-07	B-18-08
			Sample ID	B-16-18(10.0) (20160811)	B-16-19 (10.0) (20160808)	B-16-20 (10.0) (20160808)	B-16-21 (10.0) (20160808)	B-16-22 (10.0) (20160809)	B-16-23 (10.0) (20160808)	B-16-24(10.0) (20160811)	B-16-24(25.0) (20160810)	B-18-01	B-18-02	B-18-03	B-18-04	B-18-05	B-18-06	B-18-07	B-18-08
			Parent Sample ID																
			Sample Date	8/11/2016	8/8/2016	8/8/2016	8/8/2016	8/9/2016	8/8/2016	8/11/2016	8/10/2016	8/16/2018	8/16/2018	8/16/2018	8/16/2018	8/16/2018	8/13/2018	8/14/2018	8/14/2018
			Sample Depth	10 - 15 ft	10 - 15 ft	10 - 15 ft	10 - 15 ft	10 - 15 ft	10 - 15 ft	10 - 15 ft	25 - 30 ft								
			Notes		Metals collected on 8/12/16, with Sample ID ending (20160812)	Metals collected on 8/12/16, with Sample ID ending (20160812)	Metals collected on 8/12/16, with Sample ID ending (20160812)	Metals collected on 8/12/16, with Sample ID ending (20160812)	Metals collected on 8/12/16, with Sample ID ending (20160811)										
Field																			
Depth to Water	ft			--	--	--	--	--	--	--	--	**11.33**	**11.35**	--	**10.85**	**11.46**	**11.12**	**11.39**	**13.17**
Oxidation-Reduction Potential	mV			--	--	--	--	--	--	--	--	**-45.9**	**62.4**	--	**63.8**	**56.3**	**24.6**	**74.3**	--
Oxygen, dissolved	mg/L			--	--	--	--	--	--	--	--	**2.86**	**2.58**	--	**2.87**	**2.79**	**2.85**	**2.75**	--
pH	SU			--	--	--	--	--	--	--	--	**8.48**	**7.86**	--	**7.47**	**7.79**	**8.20**	**7.63**	--
Specific Conductance	µS/cm			--	--	--	--	--	--	--	--	**706**	**804**	--	**1,269**	**1,120**	**517**	**562**	--
Temperature	deg c			--	--	--	--	--	--	--	--	**24.58**	**25.88**	--	**23.18**	**22.93**	**28.09**	**19.17**	--
NWTPH-Gx																			
Gasoline-Range Organics	µg/L	800/1000	Method A	< 100	< 100	**112**	< 100	< 100	< 100	< 100	< 100	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																			
Diesel-Range Organics	µg/L	500	Method A	--	**689**	**1,970**	**159**	**197**	**172**	--	--	**267**	**252**	< 200	< 200	< 200	**335**	**333**	**387**
Oil-Range Organics	µg/L	500	Method A	--	**1,080**	**856**	**330**	< 250	**356**	--	--	< 250	< 250	< 250	< 250	< 250	**1,030**	**1,220**	**946**
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A	--	**1,770**	**2,830**	**489**	**322**	**528**	--	--	**392**	**377**	< 100	< 100	< 100	**1,370**	**1,550**	**1,330**
Total TPH-Dx (HitsOnly)	µg/L	500	Method A	--	**1,770**	**2,830**	**489**	**197**	**528**	--	--	**267**	**252**	ND	ND	ND	**1,370**	**1,550**	**1,330**
NWTPH-Dx - with silica gel cleanup																			
Diesel-Range Organics	µg/L	500	Method A	**336**	--	--	--	--	--	**2,840**	< 100	< 200	--	--	--	--	< 200	--	--
Oil-Range Organics	µg/L	500	Method A	**945**	--	--	--	--	--	**3,180**	< 250	< 250	--	--	--	--	< 250	--	--
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A	**1,280**	--	--	--	--	--	**6,020**	< 50.0	< 100	--	--	--	--	< 100	--	--
Total TPH-Dx (HitsOnly)	µg/L	500	Method A	**1,280**	--	--	--	--	--	**6,020**	ND	ND	--	--	--	--	ND	--	--
BTEX																			
Benzene	µg/L	5	Method A	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Toluene	µg/L	1000	Method A	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Ethylbenzene	µg/L	700	Method A	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Xylene, m,p-	µg/L			--	--	--	--	--	--	--	--	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Xylene, o-	µg/L	1600	B Non cancer	--	--	--	--	--	--	--	--	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	--	--	--	--	--	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500
Xylene, total	µg/L	1000	Method A	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	--	--	--	--	--	--	--	--
Semi Volatile Organic Compounds																			
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3&4-Methylphenol (m&p-Cresol)	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																			
1-Methylnaphthalene	µg/L	1.5	B Non cancer	< 0.250	< 0.250	**27.0**	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.500
2-Chloronaphthalene	µg/L	640	B Non cancer	--	--	--	--	--	--	--	--	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.500
2-Methylnaphthalene	µg/L	32	B Non cancer	< 0.250	< 0.250	**43.5**	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.500
Anthracene	µg/L	4800	B Non cancer	< 0.0500	**0.205**	**2.93**	**0.0613**	**0.472**	**0.0899**	**0.0664**	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.100
Benzo(a)anthracene	µg/L			< 0.0500	< 0.0500	**0.207**	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.100
Benzo(a)pyrene	µg/L	0.1	Method A	< 0.0500	< 0.0500	**0.0842**	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.100
Benzo(b)Fluoranthene	µg/L			< 0.0500	< 0.0500	**0.110**	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.100
Benzo(g,h,i)Perylene	µg/L			< 0.0500	< 0.0500	**0.133**	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.100
Benzo(k)Fluoranthene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.100
Chrysene	µg/L			< 0.0500	< 0.0500	**0.168**	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.100
Dibenz(a,h)Anthracene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.100
Indeno(1,2,3-c,d)Pyrene	µg/L			< 0.0500	< 0.0500	**0.0737**	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.100
Naphthalene	µg/L	160	Method A	< 0.250	< 0.250	**268**	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	**0.318**	< 0.500
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	< 0.125	< 0.125	**339**	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	**0.568**	< 0.250
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	< 0.00	< 0.00	**339**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	**0.318**	< 0.00
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	< 0.0250	< 0.0250	**0.130**	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0500
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	< 0.00	< 0.00	**0.125**	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Volatile Organic Compounds																			
Naphthalene	µg/L	160	Method A	< 5.00	< 5.00	**360**	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Metals																			
Arsenic, Dissolved	µg/L	5	Method A	*< 10.0*	*< 10.0*	*< 10.0*	*< 10.0*	*< 10.0*	*< 10.0*	*< 10.0*	*< 10.0*	**2.38**	**4.08**	< 2.00	**3.06**	**2.64**	**3.24**	**8.15**	**4.02**
Arsenic, Total	µg/L	5	Method A	**10.1**	**15.2**	**15.7**	*< 10.0*	*< 10.0*	**26.4**	*< 10.0*	*< 10.0*	--	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non cancer	**36.6**	**63.3**	**28.8 J+,B**	**39.9 J+,B**	**43.0 J+,B**	**74.0**	**111**	**84.4**	**47.1**	**51.9**	**115**	**77.5**	**65.7**	**41.1**	**58.5**	**39.4**
Barium, Total	µg/L	3200	B Non cancer	**228**	**367**	**167**	**120**	**146**	**1,550**	**138**	**247**	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	**6.29**	< 5.00	< 5.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Lead, Total	µg/L	15	Method A	**68.0**	**7.52**	**46.2**	**7.30**	**222**	**4,530**	**30.5**	**6.87**	--	--	--	--	--	--	--	--

SUMMARY OF RECONNAISSANCE GROUNDWATER ANALYTICAL RESULTS (2004 through 2018)
BNSF Wishram Railyard, Wishram, Washington

			Location ID	B-18-09	B-18-10	B-18-11	B-18-12	B-18-12	B-18-13	B-18-14	B-18-15	B-18-16	B-18-17	B-18-18	B-18-19	B-18-21	B-18-22	B-18-23	B-18-24
			Sample ID	B-18-09	B-18-10	B-18-11	B-18-12	DUP-01-20180814	B-18-13	B-18-14	B-18-15	B-18-16	B-18-17	B-18-18	B-18-19	B-18-21	B-18-22	B-18-23	B-18-24
			Parent Sample ID					B-18-12											
			Sample Date	8/20/2018	8/20/2018	8/20/2018	8/14/2018	8/14/2018	8/14/2018	8/9/2018	8/13/2018	8/9/2018	8/13/2018	8/9/2018	8/20/2018	8/21/2018	8/16/2018	8/17/2018	8/21/2018
			Sample Depth																
			Notes																
Chemical	**Units**	**MTCA A then Lowest B**																	
Field																			
Depth to Water	ft			**11.53**	**11.63**	**11.63**	**10.13**	--	**10.29**	**11.39**	**11.45**	**10.74**	**9.29**	**10.46**	**9.78**	**13.48**	**11.5**	**11.14**	**13.1**
Oxidation-Reduction Potential	mV			**45.4**	--	--	**24.4**	--	**51.2**	**40.3**	**112.6**	**35.2**	**470.0**	**152.2**	**-1.3**	**10.4**	**-46.5**	**-43.0**	**-60.2**
Oxygen, dissolved	mg/L			--	--	--	**1.44**	--	**3.52**	**2.39**	**1.08**	**1.24**	**0.90**	**1.29**	**2.50**	**2.04**	**2.61**	**3.25**	**2.39**
pH	SU			**7.96**	--	--	**7.33**	--	**7.23**	**6.73**	**7.28**	**6.86**	**7.55**	**6.02**	**7.37**	**7.24**	**8.42**	**9.02**	**7.33**
Specific Conductance	µS/cm			**250**	--	--	**385**	--	**708**	**690**	**615**	**546**	**540**	**528**	**477**	**534**	**963**	**390**	**1,388**
Temperature	deg c			**27.45**	--	--	**20.02**	--	**21.42**	**24.18**	**20.78**	**25.31**	**21.96**	**19.57**	**18.15**	**18.57**	**22.76**	**18.80**	**25.30**
NWTPH-Gx																			
Gasoline-Range Organics	µg/L	800/1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 100	--
NWTPH-Dx - without silica gel cleanup																			
Diesel-Range Organics	µg/L	500	Method A	< 200	< 400	< 200	< 200	< 200	< 200	< 200	**515**	< 200	**209**	**418**	**294**	**398**	**287**	< 200	**38,900**
Oil-Range Organics	µg/L	500	Method A	**329**	< 500	**550**	< 250	< 250	**459**	**283**	**550**	**340**	**343**	**597**	**500**	**577**	**345**	< 250	**9,270**
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A	**429**	< 200	**650**	< 100	< 100	**559**	**383**	**1,070**	**440**	**552**	**1,020**	**794**	**975**	**632**	< 100	**48,200**
Total TPH-Dx (HitsOnly)	µg/L	500	Method A	**329**	ND	**550**	ND	ND	**459**	**283**	**1,070**	**340**	**552**	**1,020**	**794**	**975**	**632**	ND	**48,200**
NWTPH-Dx - with silica gel cleanup																			
Diesel-Range Organics	µg/L	500	Method A	--	--	< 200	--	--	--	--	--	--	< 200	--	--	--	--	< 200	--
Oil-Range Organics	µg/L	500	Method A	--	--	< 250	--	--	--	--	--	--	< 250	--	--	--	--	< 250	--
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A	--	--	< 100	--	--	--	--	--	--	< 100	--	--	--	--	< 100	--
Total TPH-Dx (HitsOnly)	µg/L	500	Method A	--	--	ND	--	--	--	--	--	--	ND	--	--	--	--	ND	--
BTEX																			
Benzene	µg/L	5	Method A	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Toluene	µg/L	1000	Method A	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Ethylbenzene	µg/L	700	Method A	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Xylene, m,p-	µg/L			< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**3.10**
Xylene, o-	µg/L	1600	B Non cancer	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	**3.60**
Xylene, total	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Semi Volatile Organic Compounds																			
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3&4-Methylphenol (m&p-Cresol)	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM																			
1-Methylnaphthalene	µg/L	1.5	B Non cancer	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	**47.1**
2-Chloronaphthalene	µg/L	640	B Non cancer	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
2-Methylnaphthalene	µg/L	32	B Non cancer	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	**47.4**
Anthracene	µg/L	4800	B Non cancer	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	**0.568**
Benzo(a)anthracene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(a)pyrene	µg/L	0.1	Method A	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(b)Fluoranthene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(g,h,i)Perylene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(k)Fluoranthene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Chrysene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Dibenz(a,h)Anthracene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Indeno(1,2,3-c,d)Pyrene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Naphthalene	µg/L	160	Method A	< 0.250	< 0.250	< 0.250	**0.318**	**0.339**	< 0.250	**0.380**	**0.407**	**0.391**	< 0.250	**0.419**	< 0.250	< 0.250	< 0.250	< 0.250	**21.6**
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	< 0.125	< 0.125	< 0.125	**0.568**	**0.589**	< 0.125	**0.630**	**0.657**	**0.641**	< 0.125	**0.669**	< 0.125	< 0.125	< 0.125	< 0.125	**116**
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	< 0.00	< 0.00	< 0.00	**0.318**	**0.339**	< 0.00	**0.380**	**0.407**	**0.391**	< 0.00	**0.419**	< 0.00	< 0.00	< 0.00	< 0.00	**116**
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Volatile Organic Compounds																			
Naphthalene	µg/L	160	Method A	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	**40.0**
Metals																			
Arsenic, Dissolved	µg/L	5	Method A	**2.28**	**2.63**	**2.42**	**5.34**	**5.27**	**7.33**	**7.57**	**7.12**	**7.81**	**15.5**	**7.06**	**4.80**	**10.1**	**3.88**	**3.65**	**4.41**
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non cancer	**28.8**	**31.7**	**38.3**	**31.8**	**32.4**	**45.4**	**41.2**	**43.6**	**41.6**	**34.3**	**44.9**	**32.9**	**39.6**	**70.6**	**21.1**	**135**
Barium, Total	µg/L	3200	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**4.52**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Lead, Total	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF RECONNAISSANCE GROUNDWATER ANALYTICAL RESULTS (2004 through 2018)
BNSF Wishram Railyard, Wishram, Washington

			Location ID	B-18-26	B-18-27	B-18-28	B-18-29	B-18-30
			Sample ID	B-18-26	B-18-27	B-18-28	B-18-29	B-18-30
			Parent Sample ID					
			Sample Date	8/15/2018	8/15/2018	8/15/2018	8/15/2018	8/15/2018
			Sample Depth					
			Notes					
Chemical	**Units**	**MTCA A then Lowest B**						
Field								
Depth to Water	ft			**9.4**	**9.06**	**8.8**	**8.66**	**13.89**
Oxidation-Reduction Potential	mV			**-5.5**	**-27.0**	**-2.0**	**-7.4**	**-31.5**
Oxygen, dissolved	mg/L			**2.39**	**2.49**	**2.00**	**2.56**	**2.80**
pH	SU			**8.02**	**7.73**	**7.42**	**8.33**	**8.45**
Specific Conductance	µS/cm			**787**	**677**	**799**	**514**	**386**
Temperature	deg c			**22.90**	**23.66**	**21.49**	**21.39**	**23.46**
NWTPH-Gx								
Gasoline-Range Organics	µg/L	800/1000	Method A	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup								
Diesel-Range Organics	µg/L	500	Method A	**248**	< 200	**281**	< 200	**427**
Oil-Range Organics	µg/L	500	Method A	**302**	< 250	**323**	< 250	< 250
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A	**550**	< 100	**604**	< 100	**552**
Total TPH-Dx (HitsOnly)	µg/L	500	Method A	**550**	ND	**604**	ND	**427**
NWTPH-Dx - with silica gel cleanup								
Diesel-Range Organics	µg/L	500	Method A	--	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	µg/L	500	Method A	--	--	--	--	--
Total TPH-Dx (HitsOnly)	µg/L	500	Method A	--	--	--	--	--
BTEX								
Benzene	µg/L	5	Method A	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Toluene	µg/L	1000	Method A	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Ethylbenzene	µg/L	700	Method A	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Xylene, m,p-	µg/L			< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Xylene, o-	µg/L	1600	B Non cancer	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500
Xylene, total	µg/L	1000	Method A	--	--	--	--	--
Semi Volatile Organic Compounds								
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--
3&4-Methylphenol (m&p-Cresol)	µg/L			--	--	--	--	--
Polycyclic Aromatic Hydrocarbons using SIM								
1-Methylnaphthalene	µg/L	1.5	B Non cancer	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
2-Chloronaphthalene	µg/L	640	B Non cancer	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
2-Methylnaphthalene	µg/L	32	B Non cancer	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
Anthracene	µg/L	4800	B Non cancer	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(a)anthracene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(a)pyrene	µg/L	0.1	Method A	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(b)Fluoranthene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(g,h,i)Perylene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(k)Fluoranthene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Chrysene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Dibenz(a,h)Anthracene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Indeno(1,2,3-c,d)Pyrene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Naphthalene	µg/L	160	Method A	< 0.250	< 0.250	**0.312**	< 0.250	< 0.250
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	< 0.125	< 0.125	**0.562**	< 0.125	< 0.125
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	< 0.00	< 0.00	**0.312**	< 0.00	< 0.00
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Volatile Organic Compounds								
Naphthalene	µg/L	160	Method A	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Metals								
Arsenic, Dissolved	µg/L	5	Method A	**9.04**	**11.8**	**6.35**	**10.5**	**14.1**
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non cancer	**64.8**	**49.7**	**52.7**	**63.1**	**38.4**
Barium, Total	µg/L	3200	B Non cancer	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	< 2.00	< 2.00	< 2.00	**2.52**	< 2.00
Lead, Total	µg/L	15	Method A	--	--	--	--	--

SUMMARY OF RECONNAISSANCE GROUNDWATER ANALYTICAL RESULTS (2004 through 2018)
BNSF Wishram Railyard, Wishram, Washington

3,700	Detected concentrations above the cleanup level are shaded blue and bolded.
< 1	Non-detect values above the cleanup level are shaded gray and italicized.
390	Detected concentrations at or above the method reporting limit are shown in bold.

Abbreviations and Symbols

" - -" denotes not measured, not available, or not applicable.
" < " denotes not detected at or above the indicated method reporting limit.
"B" denotes that the value has been qualified due to blank contamination by the laboratory.
"DUP" denotes a field duplicate sample. Primary sample ID is provided beneath the duplicate sample ID.
"J" indicates an estimated concentration based on either being less than the laboratory reporting limit or data validation findings.
"J+" indicates an estimated concentration likely biased high based on data validation findings or as reported by the laboratory.
"Y" denotes that 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.
Total TPH-Dx = Total TPH-Dx concentrations were calculated by summing diesel-range organics (DRO) and oil-range organics (ORO) concentrations. Non-detects were included as noted.
Total cPAHs = Possible Total Carcinogenic Polycyclic Aromatic hydrocarbons (cPAHs) are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. Non-detects were included as noted.
Total Naphthalenes = Total Naphthalenes concentrations were calculated by summing 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene concentrations. Non-detects were included as noted.
Total Xylenes = Total Xylenes concentrations were calculated by summing Xylene, m,p- and Xylene, o- concentrations. Non-detects were included as noted.
(HitsOnly) = If an individual chemical was not detected, it was not included in the calculation.
(HalfDL_WA) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration.
deg C = degrees Celsius
ft = feet
mg/L = milligrams per liter
mV = millivolts
SU = standard units
µg/L = micrograms per liter
µS/cm = microsiemens per centimeter

Cleanup Levels (CUL)

Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for groundwater (Method A) based on Washington State Administrative Code (WAC) 173-340-740 Table 720-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2020). See Table 2 for additional cleanup level information.

Methods

Samples analyzed for gasoline-range organics (GRO) using Northwest Total Petroleum Hydrocarbon (NWTPH)-Gx and diesel- and oil-range organics (DRO and ORO) using NWTPH-Dx (with or without silica gel cleanup as noted).
Samples analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) and Volatile Organic Compounds using EPA Method 8260 or 8021.
Samples analyzed for metals using EPA Method 6010, 6020, and 7470.
Samples analyzed for Semivolatile Organic Compounds using EPA Method 8270.
Samples analyzed for Polycyclic Aromatic Hydrocarbons (PAHs) using EPA Method 8270 with or without selective ion monitoring (SIM) as indicated.

Notes

Field water quality parameters (depth to water, oxidation-reduction potential, dissolved oxygen, pH, specific conductance, temperature) were measured after purging temporary wells for approximately 30 minutes, prior to groundwater sample collection in 2018. Data are for field observation purposes only, and are not representative of fully developed monitoring wells.

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN MONITORING WELL GROUNDWATER SAMPLES (2003 THROUGH 2011)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Unit	MTCA A then Lowest B		Env Effects-Based Conc	Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
NWTPH-Gx														
Gasoline-Range Organics	µg/L	800 / 1000	Method A		39(7)	1(0)	28(4)	70%	50-250	63	1790	WMW-7-20040416	Yes	The maximum concentration exceeds MTCA Method A screening level
NWTPH-Dx - without silica gel cleanup														
Diesel-Range Organics	µg/L	500	Method A	Fresh Diesel: 250 Weathered Diesel: 3,040	(0)	Method A: 0(0) EEBC-F: 0(0) EEBC-W: 0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Oil-Range Organics	µg/L	500	Method A		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Total TPH-Dx (HitsOnly)	ug/L	500	Method A		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
NWTPH-Dx - with silica gel cleanup														
Diesel-Range Organics	µg/L	500	Method A	Fresh Diesel: 250 Weathered Diesel: 3,040	44(8)	Method A: 20(5) EEBC-F: 27(6) EEBC-W: 4(1)	27(6)	63%	77-250	253	5960	WMW-1-20070703	Yes	The maximum concentration exceeds MTCA Method A screening level
Oil-Range Organics	µg/L	500	Method A		44(8)	3(0)	3(0)	6%	250-532	518	2450	WMW-2-20030918	Yes	The maximum concentration exceeds MTCA Method A screening level
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A		44(8)	27(6)	27(6)	63%	38.5-125	503	6620	WMW-2-20030918	Yes	The maximum concentration exceeds MTCA Method A screening level
Total TPH-Dx (HitsOnly)	ug/L	500	Method A		44(8)	20(5)	27(6)	63%	0	253	6620	WMW-2-20030918	Yes	The maximum concentration exceeds MTCA Method A screening level
BTEX														
Benzene	µg/L	5	Method A		43(8)	3(0)	3(0)	6%	0.5-5	5.71	17.4	WMW-2-20040415	Yes	The maximum concentration exceeds MTCA Method A screening level
Ethylbenzene	µg/L	700	Method A		43(8)	0(0)	7(2)	18%	0.5-5	0.713	17.4	WMW-2-20040415	No	Maximum concentration does not exceed the cleanup level.
Toluene	µg/L	1000	Method A		43(8)	0(0)	3(0)	6%	0.5-5	3.66	23.5	WMW-2-20030918	No	Maximum concentration does not exceed the cleanup level.
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Xylene, total	µg/L	1000	Method A		43(8)	0(0)	6(1)	14%	1-15	1.02	37.2	WMW-2-20040415	No	Maximum concentration does not exceed the cleanup level.
Semi Volatile Organic Compounds														
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer		(0)	0(0)	(0)		0	--	--	--	No	Detection frequency is 0%.
Methylphenol, 3 & 4	µg/L	--			(0)	0(0)	(0)	0%	0	--	--	--	No	Cleanup level not available for parameter.
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM														
1-Methylnaphthalene	µg/L	1.5	B Cancer		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
2-Methylnaphthalene	µg/L	32	B Non cancer		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Acenaphthene	µg/L	960	B Non cancer		4(1)	0(0)	1(0)	20%	0.1-10	1.65	1.65	WMW-7-20040416	No	Maximum concentration does not exceed the cleanup level.
Acenaphthylene	µg/L	--			(0)	0(0)	(0)	--	0	--	--	--	No	Cleanup level not available for parameter.
Anthracene	µg/L	4800	B Non cancer		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Benzo(a)anthracene	µg/L	--			13(2)	0(0)	1(0)	7%	0.1-10	0.304	0.304	WMW-2-20030918	No	Cleanup level not available for parameter.
Benzo(a)pyrene	µg/L	0.1	Method A		8(2)	0(0)	0(0)	0%	0.1-10	--	--	--	No	Detection frequency is 0%.
Benzo(b)Fluoranthene	µg/L	--			8(2)	0(0)	0(0)	0%	0.1-10	--	--	--	No	Cleanup level not available for parameter.
Benzo(g,h,i)Perylene	µg/L	--			(0)	0(0)	(0)	--	0	--	--	--	No	Cleanup level not available for parameter.
Benzo(k)Fluoranthene	µg/L	--			8(2)	0(0)	0(0)	0%	0.1-10	--	--	--	No	Cleanup level not available for parameter.
Chrysene	µg/L	--			13(2)	0(0)	1(0)	7%	0.1-10	0.516	0.516	WMW-2-20030918	No	Cleanup level not available for parameter.
Dibenz(a,h)Anthracene	µg/L	--			8(2)	0(0)	0(0)	0%	0.2-20	--	--	--	No	Cleanup level not available for parameter.
Fluoranthene	µg/L	640	B Non cancer		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Fluorene	µg/L	640	B Non cancer		4(1)	0(0)	1(0)	20%	0.1-10	0.839	0.839	WMW-7-20040416	No	Maximum concentration does not exceed the cleanup level.
Indeno(1,2,3-c,d)Pyrene	µg/L	--			8(2)	0(0)	0(0)	0%	0.1-10	--	--	--	No	Cleanup level not available for parameter.
Naphthalene	µg/L	160	Method A		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Phenanthrene	µg/L	--			(0)	0(0)	(0)	--	0	--	--	--	No	Cleanup level not available for parameter.
Pyrene	µg/L	480	B Non cancer		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Total Naphthalenes (HitsOnly)	µg/L	160	Method A		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A		13(2)	1(0)	1(0)	7%	0.05-5	0.186	0.186	WMW-2-20030918	Yes	The maximum concentration exceeds MTCA Method A screening level
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A		13(2)	0(0)	1(0)	7%	0	0.0356	0.0356	WMW-2-20030918	No	Maximum concentration does not exceed the cleanup level.
Anions														
Nitrogen, Ammonia (as NH3)	µg/L	--			(0)	0(0)	(0)	--	0	--	--	--	No	Cleanup level not available for parameter.
Nitrogen, Nitrate-Nitrite	µg/L	--			(0)	0(0)	(0)	--	0	--	--	--	No	Cleanup level not available for parameter.
Sulfate (as SO4)	µg/L	--			(0)	0(0)	(0)	--	0	--	--	--	No	Cleanup level not available for parameter.
Sulfide	µg/L	--			(0)	0(0)	(0)	--	0	--	--	--	No	Cleanup level not available for parameter.
Gases														
Ethane	µg/L	--			(0)	0(0)	(0)	--	0	--	--	--	No	Cleanup level not available for parameter.
Ethylene	µg/L	--			(0)	0(0)	(0)	--	0	--	--	--	No	Cleanup level not available for parameter.
Methane	µg/L	--			(0)	0(0)	(0)	--	0	--	--	--	No	Cleanup level not available for parameter.
MNA Metals														
Iron, Dissolved	µg/L	11200	B Non Cancer		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Manganese, Dissolved	µg/L	2240	B Non Cancer		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN MONITORING WELL GROUNDWATER SAMPLES (2003 THROUGH 2011)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Unit	MTCA A then Lowest B		Env Effects-Based Conc	Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
Metals														
Arsenic, Dissolved	µg/L	5	Method A		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Arsenic, Total	µg/L	5	Method A		7(1)	5(1)	7(1)	100%	0	3.64	21.7	WMW-2-20040713	Yes	The maximum concentration exceeds MTCA Method A screening level
Barium, Dissolved	µg/L	3200	B Non Cancer		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Barium, Total	µg/L	3200	B Non Cancer		7(1)	0(0)	7(1)	100%	0	16.4	122	WMW-6-20040416	No	Maximum concentration does not exceed the cleanup level.
Cadmium, Dissolved	µg/L	5	Method A		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Cadmium, Total	µg/L	5	Method A		4(1)	0(0)	0(0)	0%	1	--	--	--	No	Detection frequency is 0%.
Chromium, total, Dissolved	µg/L	50	Method A		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Chromium, total, Total	µg/L	50	Method A		7(1)	0(0)	2(0)	25%	1	2.56	4.39	WMW-2-20040415	No	Maximum concentration does not exceed the cleanup level.
Lead, Dissolved	µg/L	15	Method A		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Lead, Total	µg/L	15	Method A		4(1)	0(0)	0(0)	0%	1	--	--	--	No	Detection frequency is 0%.
Mercury, Dissolved	µg/L	2	Method A		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Mercury, Total	µg/L	2	Method A		4(1)	0(0)	0(0)	0%	0.2	--	--	--	No	Detection frequency is 0%.
Selenium, Dissolved	µg/L	80	B Non Cancer		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Selenium, Total	µg/L	80	B Non Cancer		7(1)	0(0)	5(0)	63%	1	1.51	6.5	WMW-2-20040713	No	Maximum concentration does not exceed the cleanup level.
Silver, Dissolved	µg/L	80	B Non Cancer		(0)	0(0)	(0)	--	0	--	--	--		No samples analyzed for this chemical
Silver, Total	µg/L	80	B Non Cancer		4(1)	0(0)	0(0)	0%	1	--	--	--	No	Detection frequency is 0%.

Abbreviations and Symbols:
" - -" denotes not measured, not available, or not applicable.
µg/L = micrograms per liter
BTEX = benzene, toluene, ethylbenzene, and xylenes compounds
NWTPH = Northwest Total Petroleum Hydrocarbon Method
SIM = selective ion monitoring
Total TPH-Dx = Total TPH-Dx concentrations were calculated by summing diesel-range organics (DRO) and oil-range organics (ORO) concentrations. Non-detects were included as noted.
Total cPAHs = Possible Total Carcinogenic Polycyclic Aromatic hydrocarbons (cPAHs) are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. Non-detects were included as noted.
Total Naphthalenes = Total Naphthalenes concentrations were calculated by summing 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene concentrations. Non-detects were included as noted.
Total Xylenes = Total Xylenes concentrations were calculated by summing Xylene, m,p- and Xylene, o- concentrations. Non-detects were included as noted.
(HitsOnly) = If an individual chemical was not detected, it was not included in the calculation.
(HalfDL_WA) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration.

Notes:
Above CUL. Yes (Y) or No (N) based on reported resulted in at least one groundwater sample at a concentration above an applicable cleanup level (CUL).
If "Yes", the cell is shaded blue. Yes
Number of Analyses. Normal sample analyses are followed by duplicate sample analyses in parentheses.

Cleanup Levels (CUL)
Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for groundwater (Method A) based on Washington State Administrative Code (WAC) 173-340-900 Table 720-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2020).
Environmental Effects-Based Concentrations (EEBC) for Surface Water. Value for Fresh Diesel (EEBC-F) based on Table 2 of Environmental Effects-Based Concentrations for Total Petroleum Hydrocarbons (TPH), February 2018, Ecology Publication No. 18-03-002. Value for Weathered Diesel (EEBC-W) based on Environmental Effects-Based Concentrations for Weathered Diesel-Range Organics, June 2020, Ecology Publication No. 20-03-008.

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN MONITORING WELL GROUNDWATER SAMPLES (2012 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Unit	MTCA A then Lowest B		Env Effects-Based Conc	Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
NWTPH-Gx														
Gasoline-Range Organics	µg/L	800 / 1000	Method A		123(34)	0(0)	30(10)	25%	50-500	10	420	WMW-8-20120313	No	Maximum concentration does not exceed the cleanup level.
NWTPH-Dx - without silica gel cleanup														
Diesel-Range Organics	µg/L	500	Method A	Fresh Diesel: 250 Weathered Diesel: 3,040	216(21)	Method A: 84(15) EEBC-F: 101(16) EEBC-W: 56(9)	112(16)	54%	200-250	203	28600	WMW-16-20171130	Yes	The maximum concentration exceeds MTCA Method A screening level.
Oil-Range Organics	µg/L	500	Method A		216(21)	110(18)	148(19)	70%	250-500	252	12600	WMW-03-20180823	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A		216(21)	125(18)	148(19)	70%	100-125	352	36300	WMW-16-20171130	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HitsOnly)	ug/L	500	Method A		216(21)	117(18)	148(19)	70%	0	252	36300	WMW-16-20171130	Yes	The maximum concentration exceeds MTCA Method A screening level.
NWTPH-Dx - with silica gel cleanup														
Diesel-Range Organics	µg/L	500	Method A	Fresh Diesel: 250 Weathered Diesel: 3,040	127(24)	Method A: 52(17) EEBC-F: 62(17) EEBC-W: 33(13)	68(21)	59%	100-250	71	21100	WMW-16-20171130	Yes	The maximum concentration exceeds MTCA Method A screening level.
Oil-Range Organics	µg/L	500	Method A		127(24)	45(16)	59(17)	50%	250-5000	51	8300	WMW-3-20131105-H	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A		127(24)	65(18)	70(21)	60%	50-125	111	25300	WMW-3-20131105-H	Yes	The maximum concentration exceeds MTCA Method A screening level.
Total TPH-Dx (HitsOnly)	ug/L	500	Method A		127(24)	61(18)	70(21)	60%	0	51	25300	WMW-3-20131105-H	Yes	The maximum concentration exceeds MTCA Method A screening level.
BTEX														
Benzene	µg/L	5	Method A		186(30)	0(0)	0(0)	0%	0.5-5	--	--	--	No	Detection frequency is 0%.
Ethylbenzene	µg/L	700	Method A		186(30)	0(0)	0(2)	1%	0.5-5	1	1	WMW-11-20140930-DUP,WMW-11-20150427-	No	Maximum concentration does not exceed the cleanup level.
Toluene	µg/L	1000	Method A		186(30)	0(0)	3(2)	2%	1-5	1.57	7.11	WMW-32-20180827	No	Maximum concentration does not exceed the cleanup level.
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A		118(9)	0(0)	0(0)	0%	0.5-2.5	--	--	--	No	Detection frequency is 0%.
Xylene, total	µg/L	1000	Method A		68(21)	0(0)	3(3)	7%	1.5-3	1.15	3	WMW-11-20140930-	No	Maximum concentration does not exceed the cleanup level.
Semi Volatile Organic Compounds														
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer		14(1)	0(0)	0(0)	0%	10-11.1	--	--	--	No	Detection frequency is 0%.
Methylphenol, 3 & 4	µg/L	--			14(1)	0(0)	0(0)	0%	10-11.1	--	--	--	No	Cleanup level not available for parameter.
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM														
1-Methylnaphthalene	µg/L	1.5	B Cancer		96(9)	10(0)	15(0)	14%	0.25-2.5	0.298	15	WMW-16-20181107	Yes	The maximum concentration exceeds MTCA B Cancer screening level.
2-Methylnaphthalene	µg/L	32	B Non cancer		96(9)	0(0)	3(0)	3%	0.25-2.5	0.912	1.95	WMW-16-20171130	No	Maximum concentration does not exceed the cleanup level.
Acenaphthene	µg/L	960	B Non cancer		100(10)	0(0)	23(4)	25%	0.05-1.11	0.0554	1.36	WMW-16-20171130	No	Maximum concentration does not exceed the cleanup level.
Acenaphthylene	µg/L	--			100(10)	0(0)	2(0)	2%	0.05-1.11	0.0541	0.103	RMD-1-20190507	No	Cleanup level not available for parameter.
Anthracene	µg/L	4800	B Non cancer		100(10)	0(0)	7(1)	7%	0.05-1.11	0.0536	0.126	RMD-1-20170919	No	Maximum concentration does not exceed the cleanup level.
Benzo(a)anthracene	µg/L	--			100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Cleanup level not available for parameter.
Benzo(a)pyrene	µg/L	0.1	Method A		100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Detection frequency is 0%.
Benzo(b)Fluoranthene	µg/L	--			100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Cleanup level not available for parameter.
Benzo(g,h,i)Perylene	µg/L	--			100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Cleanup level not available for parameter.
Benzo(k)Fluoranthene	µg/L	--			100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Cleanup level not available for parameter.
Chrysene	µg/L	--			100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Cleanup level not available for parameter.
Dibenz(a,h)Anthracene	µg/L	--			100(10)	0(0)	1(0)	1%	0.05-1.11	0.0689	0.0689	WMW-30-20180829	No	Cleanup level not available for parameter.
Fluoranthene	µg/L	640	B Non cancer		100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Detection frequency is 0%.
Fluorene	µg/L	640	B Non cancer		100(10)	0(0)	24(6)	27%	0.05-1.11	0.0608	1.35	RMD-1-20190507	No	Maximum concentration does not exceed the cleanup level.
Indeno(1,2,3-c,d)Pyrene	µg/L	--			100(10)	0(0)	0(0)	0%	0.05-1.11	--	--	--	No	Cleanup level not available for parameter.
Naphthalene	µg/L	160	Method A		100(10)	0(0)	10(1)	10%	0.25-2.5	0.271	1.25	RMD-1-20190507	No	Maximum concentration does not exceed the cleanup level.
Phenanthrene	µg/L	--			100(10)	0(0)	5(1)	5%	0.05-1.11	0.056	0.175	RMD-1-20180430	No	Cleanup level not available for parameter.
Pyrene	µg/L	480	B Non cancer		100(10)	0(0)	6(4)	9%	0.05-1.11	0.0507	0.077	D-2-20170919	No	Maximum concentration does not exceed the cleanup level.
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A		100(10)	0(0)	17(1)	16%	0.125-1.25	0.521	17.3	WMW-16-20181107	No	Maximum concentration does not exceed the cleanup level.
Total Naphthalenes (HitsOnly)	µg/L	160	Method A		100(10)	0(0)	17(1)	16%	0	0.271	17.3	WMW-16-20181107	No	Maximum concentration does not exceed the cleanup level.
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A		100(10)	0(0)	1(0)	1%	0.025-0.555	0.0421	0.0421	WMW-30-20180829	No	Maximum concentration does not exceed the cleanup level.
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A		100(10)	0(0)	1(0)	1%	0	0.00689	0.00689	WMW-30-20180829	No	Maximum concentration does not exceed the cleanup level.
Anions														
Nitrogen, Ammonia (as NH3)	µg/L	--			261(21)	0(0)	81(13)	33%	100-250000	100	1830	WMW-16-20171130	No	Cleanup level not available for parameter.
Nitrogen, Nitrate-Nitrite	µg/L	--			261(19)	0(0)	187(11)	71%	10-100	5	32400	WMW-12-20190822	No	Cleanup level not available for parameter.
Sulfate (as SO4)	µg/L	--			261(19)	0(0)	210(8)	78%	1200-100000	5010	10400000	WMW-17-20170920	No	Cleanup level not available for parameter.
Sulfide	µg/L	--			261(19)	0(0)	8(1)	3%	50	74	7200	WMW-11-20120314	No	Cleanup level not available for parameter.
Gases														
Ethane	µg/L	--			234(18)	0(0)	1(0)	0%	13	29.9	29.9	RMD-3-20161115	No	Cleanup level not available for parameter.
Ethylene	µg/L	--			234(18)	0(0)	1(0)	0%	13	16.2	16.2	RMD-3-20161115	No	Cleanup level not available for parameter.
Methane	µg/L	--			261(21)	0(0)	120(15)	48%	5-200	15.6	13200	RMD-1-20180426	No	Cleanup level not available for parameter.
Metals														
Iron, Dissolved	µg/L	11200	B Non Cancer		261(20)	7(0)	96(14)	39%	40-100	9.7	18400	WMW-16-20171130	Yes	The maximum concentration exceeds MTCA B Non Cancer screening level.
Manganese, Dissolved	µg/L	2240	B Non Cancer		234(18)	33(4)	193(17)	83%	5-10	5.12	6750	WMW-03-20180823	Yes	The maximum concentration exceeds MTCA B Non Cancer screening level.

SUMMARY OF CHEMICAL CONSTITUENTS REPORTED IN MONITORING WELL GROUNDWATER SAMPLES (2012 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Unit	MTCA A then Lowest B		Env Effects-Based Conc	Number of Analyses	Results Above CUL	Number of Detections	Frequency of Detection	Detection Limit Range	Minimum Detection	Maximum Detection	Sample(s) with Maximum Concentration	Above CUL	Comments
Metals														
Arsenic, Dissolved	µg/L	5	Method A		65(13)	42(11)	59(13)	92%	2-10	2.18	37	WMW-24-20180830	Yes	The maximum concentration exceeds MTCA Method A screening level.
Arsenic, Total	µg/L	5	Method A		65(13)	39(11)	60(13)	94%	2-10	2.14	35.5	WMW-24-20180830	Yes	The maximum concentration exceeds MTCA Method A screening level.
Barium, Dissolved	µg/L	3200	B Non Cancer		40(3)	0(0)	40(3)	100%	0	17.7	152	WMW-29-20180831	No	Maximum concentration does not exceed the cleanup level.
Barium, Total	µg/L	3200	B Non Cancer		40(3)	1(0)	40(3)	100%	0	15.9	16500	WMW-30-20190820	Yes	The maximum concentration exceeds MTCA B Non Cancer screening level.
Cadmium, Dissolved	µg/L	5	Method A		39(3)	0(0)	0(0)	0%	1	--	--	--	No	Detection frequency is 0%.
Cadmium, Total	µg/L	5	Method A		39(3)	0(0)	0(0)	0%	1	--	--	--	No	Detection frequency is 0%.
Chromium, total, Dissolved	µg/L	100	Method A		39(3)	0(0)	12(3)	36%	2	2	15	WMW-26-20190507	No	Maximum concentration does not exceed the cleanup level.
Chromium, total, Total	µg/L	100	Method A		39(3)	0(0)	11(3)	33%	2	2.07	14	WMW-26-20190507	No	Maximum concentration does not exceed the cleanup level.
Lead, Dissolved	µg/L	15	Method A		102(9)	0(0)	1(0)	1%	2-5	5.69	5.69	WMW-30-20180829	No	Maximum concentration does not exceed the cleanup level.
Lead, Total	µg/L	15	Method A		102(9)	0(0)	2(0)	2%	2-5	2.85	9.68	WMW-23-20190508	No	Maximum concentration does not exceed the cleanup level.
Mercury, Dissolved	µg/L	2	Method A		39(3)	0(0)	0(0)	0%	0.2	--	--	--	No	Detection frequency is 0%.
Mercury, Total	µg/L	2	Method A		39(3)	0(0)	0(0)	0%	0.2	--	--	--	No	Detection frequency is 0%.
Selenium, Dissolved	µg/L	80	B Non Cancer		39(3)	0(0)	1(0)	2%	2	3.01	3.01	WMW-32-20180827	No	Maximum concentration does not exceed the cleanup level.
Selenium, Total	µg/L	80	B Non Cancer		39(3)	0(0)	1(0)	2%	2	3.09	3.09	WMW-32-20180827	No	Maximum concentration does not exceed the cleanup level.
Silver, Dissolved	µg/L	80	B Non Cancer		39(3)	0(0)	0(0)	0%	2	--	--	--	No	Detection frequency is 0%.
Silver, Total	µg/L	80	B Non Cancer		39(3)	0(0)	0(0)	0%	2	--	--	--	No	Detection frequency is 0%.

Abbreviations and Symbols:

" - -" denotes not measured, not available, or not applicable.
µg/L = micrograms per liter
BTEX = benzene, toluene, ethylbenzene, and xylenes compounds
NWTPH = Northwest Total Petroleum Hydrocarbon Method
SIM = selective ion monitoring
Total TPH-Dx = Total TPH-Dx concentrations were calculated by summing diesel-range organics (DRO) and oil-range organics (ORO) concentrations. Non-detects were included as noted.
Total cPAHs = Possible Total Carcinogenic Polycyclic Aromatic hydrocarbons (cPAHs) are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. Non-detects were included as noted.
Total Naphthalenes = Total Naphthalenes concentrations were calculated by summing 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene concentrations. Non-detects were included as noted.
Total Xylenes = Total Xylenes concentrations were calculated by summing Xylene, m,p- and Xylene, o- concentrations. Non-detects were included as noted.
(HitsOnly) = If an individual chemical was not detected, it was not included in the calculation.
(HalfDL_WA) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration.

Notes:

Above CUL. Yes (Y) or No (N) based on reported resulted in at least one groundwater sample at a concentration above an applicable cleanup level (CUL).
If "Yes", the cell is shaded blue. Yes
Number of Analyses. Normal sample analyses are followed by duplicate sample analyses in parentheses.

Cleanup Levels (CUL)

Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for groundwater (Method A) based on Washington State Administrative Code (WAC) 173-340-900 Table 720-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2020).
Environmental Effects-Based Concentrations (EEBC) for Surface Water. Value for Fresh Diesel (EEBC-F) based on Table 2 of Environmental Effects-Based Concentrations for Total Petroleum Hydrocarbons (TPH), February 2018, Ecology Publication No. 18-03-002. Value for Weathered Diesel (EEBC-W) based on Environmental Effects-Based Concentrations for Weathered Diesel-Range Organics, June 2020, Ecology Publication No. 20-03-008.

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01
			Sample Date	9/17/2003	9/17/2003	4/15/2004	7/13/2004	7/13/2004	11/9/2006	7/3/2007	8/16/2007	4/16/2008	8/21/2008	3/12/2009	9/10/2009	7/7/2011	3/13/2012	9/11/2012	9/11/2012	3/14/2013	3/14/2013	11/5/2013	11/5/2013	4/9/2014	9/30/2014
			Sample Type	N	FD	N	N	FD	N	N	N	N	N	N	N	N	N	N	FD	N	FD	N	FD	N	N
			Sample ID	WMW-1-20030917	WMW-1-20030917-DUP	WMW-1-20040415	WMW-1-20040713	WMW-1-20040713-DUP	WMW-1-20061109	WMW-1-20070703	WMW-1-20070816	WMW-1-20080416	WMW-1-20080821	WMW-1-20090312	WMW-1-20090910	WMW-1-20110707	WMW-1-20120313	WMW-1-20120911	WMW-1-20120911-H	WMW-1-20130314	WMW-1-20130314-H	WMW-1-20131105	WMW-1-20131105-H	WMW-1-20140409	WMW-1-20140930
			Parent Sample ID		WMW-1-20030917			WMW-1-20040713											WMW-1-20120911		WMW-1-20130314		WMW-1-20131105		
			Sample Delivery Group																						
			Screen Interval	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft
Chemical	**Unit**	**MTCA A then Lowest B**																	Hydrasleeve		Hydrasleeve		Hydrasleeve		
Field																									
Depth to Water	ft			--	--	10.46	10.78	--	9.60	9.85	10.55	10.10	10.59	10.15	10.44	9.96	10.36	10.27	--	10.71	--	10.69	--	10.32	10.57
Oxidation-Reduction Potential	mV			330	--	116.7	--	--	--	--	--	--	--	--	--	--	-111	--	--	--	--	-113	--	--	182
Oxygen, dissolved	mg/L			0.37	--	0.35	--	--	--	--	--	--	--	--	--	--	0.49	--	--	--	--	0.26	--	--	1.85
pH	SU			6.77	--	7.39	--	--	--	--	--	--	--	--	--	--	6.81	--	--	--	--	6.81	--	--	6.85
Specific Conductance	µS/cm			1561	--	1375	--	--	--	--	--	--	--	--	--	--	599	--	--	--	--	655	--	--	578
Temperature	deg c			19.8	--	17.2	--	--	--	--	--	--	--	--	--	--	15.26	--	--	--	--	17.9	--	--	19.0
Turbidity	ntu			--	--	--	--	--	--	--	--	--	--	--	--	--	8.70	--	--	--	--	21.2	--	--	--
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	--	--	329	306	--	< 250	93.4	152	191	180	206	350	217	310 B	130	130	200	220	140	160	110	110
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	593	605	426	411	424	< 236	5960	328	< 243	3470	2260	1500	950	2400 Y	5300	5000	3400	2500	4100	3900	3100	3400
Oil-Range Organics	µg/L	500	Method A	< 500	< 500	< 500	< 500	< 500	< 472	523	*< 521*	< 485	< 476	< 490	< 250	< 380	2000 Y	2600	2800	1400	*< 1200*	3600	3600	1300	1600
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	843	855	676	661	674	< 118	6480	589	< 122	3710	2510	1630	1140	4400	7900	7800	4800	3100	7700	7500	4400	5000
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	593	605	426	411	424	ND	6480	328	ND	3470	2260	1500	950	4400	7900	7800	4800	2500	7700	7500	4400	5000
BTEX																									
Benzene	µg/L	5	Method A	< 0.5	< 0.5	< 0.5	< 0.5	--	< 2.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 0.5	< 1
Ethylbenzene	µg/L	700	Method A	< 0.5	< 0.5	< 0.5	2.33	--	< 2.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 0.5	< 1
Toluene	µg/L	1000	Method A	< 0.5	< 0.5	< 0.5	< 0.5	--	< 2.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 1	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	µg/L	1000	Method A	< 1	1.02	2.33	< 1	--	< 5	< 1	< 1	1.10	< 1	< 1	< 3	< 3	1.67 J	< 1.5	< 1.5	< 1.5	1.60	< 3	< 3	< 1.5	< 3
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	4800	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L			< 0.100	< 0.100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	Method A	< 0.100	< 0.100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	µg/L			< 0.100	< 0.100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	µg/L			< 0.100	< 0.100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L			< 0.100	< 0.100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	µg/L			< 0.200	< 0.200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	µg/L			< 0.100	< 0.100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	< 0.050	< 0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	< 0.00	< 0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	480	--	--	--	--	460	--	--	390
Nitrogen, Nitrate-Nitrite	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	< 10	--	--	--	--	< 100	--	--	< 100
Sulfate (as SO4)	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	< 1200	--	--	--	--	< 5000	--	--	< 5000
Sulfide	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	6400	--	--	--	--	< 50	--	--	< 50
Gases																									
Ethane	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methane	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	4760	--	--	--	--	3400	--	--	4700
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	12000	--	--	--	--	< 100	--	--	750
Manganese, Dissolved	µg/L	2240	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Total	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

Location				WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-01	WMW-02	WMW-02	WMW-02	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03
Sample Date				9/30/2014	4/27/2015	11/16/2016	4/18/2017	9/20/2017	4/25/2018	8/23/2018	5/9/2019	8/21/2019	9/18/2003	4/15/2004	7/13/2004	9/17/2003	4/16/2004	7/13/2004	11/9/2006	7/3/2007	8/16/2007	4/16/2008	8/21/2008	3/14/2012	9/11/2012
Sample Type				FD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Sample ID				WMW-1-20140930-H	WMW-1-20150427	WMW-1-20161116	WMW-1-20170418	WMW-1-20170920	WMW-01-20180425	WMW-01-20180823	WMW-01-20190509	WMW-01-20190821	WMW-2-20030918	WMW-2-20040415	WMW-2-20040713	WMW-3-20030917	WMW-3-20040416	WMW-3-20040713	WMW-3-20061109	WMW-3-20070703	WMW-3-20070816	WMW-3-20080416	WMW-3-20080821	WMW-3-20120314	WMW-3-20120911
Parent Sample ID				WMW-1-20140930																					
Sample Delivery Group						L873914	L903886	L938609	L989723	L1020953	L1098098	L1131738													
Screen Interval				10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft				10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft
Chemical	**Unit**	**MTCA A then Lowest B**		Hydrasleeve																					
Field																									
Depth to Water	ft			--	10.22	10.92	9.69	10.39	10.58	10.34	9.61	9.74	--	10.81	11.08	16.37	10.32	10.65	10.20	10.08	10.65	10.14	10.89	10.67	10.85
Oxidation-Reduction Potential	mV			--	--	4.4	113.4	139.5	-134.3	-123.7	-102.9	-145.7	200	--	--	310	221.5	--	--	--	--	--	--	7	--
Oxygen, dissolved	mg/L			--	6.50	0.22	0.11	0.41	0.31	0.29	0.15	0.26	0.78	--	--	0.56	0.62	--	--	--	--	--	--	0.65	--
pH	SU			--	7.11	6.99	6.81	6.95	6.91	6.71	7.08	6.91	7.5	--	--	7.41	7.5	--	--	--	--	--	--	6.77	--
Specific Conductance	µS/cm			--	636	622	967	832	573	595	446	563	3018	--	--	980	1106	--	--	--	--	--	--	1030	--
Temperature	deg c			--	20.68	18.67	16.01	18.08	16.87	21.14	16.37	19.83	14.91	--	--	20.0	17.4	--	--	--	--	--	--	15.84	--
Turbidity	ntu			--	--	1.35	4.41	13.69	5.71	5.62	5.61	6.95	--	--	--	--	--	--	--	--	--	--	--	11.7	--
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	120	< 100	< 500	111	139	--	--	--	--	--	750	166	--	--	190	209	203	291	212	199	220 B	< 100
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	--	--	--	3810	11700	3470	4050	2080	2630	--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	--	--	--	3870	5700	2580	3180	1590	2320	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	--	--	7680	17400	6050	7230	3670	4950	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	--	--	7680	17400	6050	7230	3670	4950	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	3000	3500	3220	--	--	--	--	--	--	4170	844	1770	253	< 250	306	659	3180	1280	< 248	730	3300 Y	15000
Oil-Range Organics	µg/L	500	Method A	1400	4000	1470	--	--	--	--	--	--	2450	< 500	518	< 500	< 500	< 500	< 500	*< 532*	< 495	< 495	< 485	380 Y	3900
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	4400	7500	4690	--	--	--	--	--	--	6620	1090	2290	503	< 125	556	909	3450	1530	< 124	973	3680	18900
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	4400	7500	4690	--	--	--	--	--	--	6620	844	2290	253	ND	306	659	3180	1280	ND	730	3680	18900
BTEX																									
Benzene	µg/L	5	Method A	< 1	< 1	< 1.00	< 1.00	< 5.00	--	--	--	--	5.71	17.4	10.9	< 0.5	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 0.5
Ethylbenzene	µg/L	700	Method A	< 1	< 1	< 1.00	< 1.00	< 5.00	--	--	--	--	5.84	17.4	8.02	< 0.5	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 0.5
Toluene	µg/L	1000	Method A	< 5	< 5	< 5.00	< 1.00	< 5.00	--	--	--	--	23.5	3.66	4.02	< 0.5	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 5
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	< 0.500	< 2.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	µg/L	1000	Method A	< 3	< 3	< 3.00	--	--	--	--	--	--	11.8	37.2	12.5	< 1	--	< 1	< 1	< 1	1.43	< 1	< 1	1.25 J	< 1.5
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	4800	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L			--	--	--	--	--	--	--	--	--	0.304	< 10	< 0.400	< 0.100	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	*< 0.200*	*< 10*	--	< 0.100	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	< 0.200	< 10	--	< 0.100	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	< 0.200	< 10	--	< 0.100	--	--	--	--	--	--	--	--	--
Chrysene	µg/L			--	--	--	--	--	--	--	--	--	0.516	< 10	< 0.200	< 0.100	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	µg/L			--	--	--	--	--	--	--	--	--	< 0.400	< 20	--	< 0.200	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	µg/L			--	--	--	--	--	--	--	--	--	< 0.200	< 10	--	< 0.100	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	0.186	*< 5.00*	< 0.100	< 0.0500	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	0.0356	< 0.00	< 0.00	< 0.00	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			--	344	261	241	387	< 100	287	< 100	219	--	--	--	--	--	--	--	--	--	--	--	600	--
Nitrogen, Nitrate-Nitrite	µg/L			--	< 100	< 100	< 100	< 100	1750	< 100	< 100	< 100	--	--	--	--	--	--	--	--	--	--	--	13	--
Sulfate (as SO4)	µg/L			--	< 5000	< 5000	< 5000	< 5000	< 5000	< 5000	5550	< 5000	--	--	--	--	--	--	--	--	--	--	--	7300	--
Sulfide	µg/L			--	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	--	--	--	--	--	--	--	--	--	--	--	2800	--
Gases																									
Ethane	µg/L			--	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylene	µg/L			--	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Methane	µg/L			--	3990	3160	200	6700	4490	2180	1700	4510	--	--	--	--	--	--	--	--	--	--	--	1760	--
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	--	< 100	15500	10000	15400	9080	11700	2350	6280	--	--	--	--	--	--	--	--	--	--	--	5300	--
Manganese, Dissolved	µg/L	2240	B Non Cancer	--	--	1750	1380	2000	940	1270	487	868	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	18.4	21.7	--	8.54	5.52	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	16.4	18.5	--	55.9	59	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	--	--	< 5.00	< 2.00	< 2.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Total	µg/L	15	Method A	--	--	< 5.00	< 2.00	< 2.00	--	--	--	--	--	< 1	--	--	< 1	--	--	--	--	--	--	--	--

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-03	WMW-04	WMW-04	WMW-04	WMW-05	WMW-05
			Sample Date	9/11/2012	3/15/2013	3/15/2013	11/5/2013	11/5/2013	4/9/2014	4/9/2014	9/30/2014	9/30/2014	11/17/2016	4/18/2017	9/20/2017	4/25/2018	8/23/2018	8/23/2018	5/9/2019	8/21/2019	9/18/2003	4/15/2004	7/13/2004	4/16/2004	4/16/2004
			Sample Type	FD	N	FD	N	FD	N	FD	N	FD	N	N	N	N	N	FD	N	N	N	N	N	N	FD
			Sample ID	WMW-3-20120911-H	WMW-3-20130315	WMW-3-20130315-H	WMW-3-20131105	WMW-3-20131105-H	WMW-3-20140409	WMW-3-20140409-H	WMW-3-20140930	WMW-3-20140930-H	WMW-3-20161117	WMW-3-20170418	WMW-3-20170920	WMW-03-20180425	WMW-03-20180823	D-2-20180823	WMW-03-20190509	WMW-03-20190821	WMW-4-20030918	WMW-4-20040415	WMW-4-20040713	WMW-5-20040416	WMW-5-20040416-DUP
			Parent Sample ID	WMW-3-20120911		WMW-3-20130315		WMW-3-20131105		WMW-3-20140409		WMW-3-20140930						WMW-03-20180823							WMW-5-20040416
			Sample Delivery Group										L873914	L903886	L938609	L989723	L1020953	L1020953	L1098098	L1131738					
			Screen Interval	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft				15.0-25.0 ft	15.0-25.0 ft
Chemical	**Unit**	**MTCA A then Lowest B**		Hydrasleeve		Hydrasleeve		Hydrasleeve		Hydrasleeve		Hydrasleeve													
Field																									
Depth to Water	ft			--	11.12	--	11.29	--	10.76	--	11.25	--	11.02	10.04	10.76	10.77	10.85	--	9.97	10.34	--	11.10	11.40	10.12	--
Oxidation-Reduction Potential	mV			--	--	--	-120	--	--	--	164	--	-146.2	280.3	-100.3	-63.7	-114.0	--	-129.5	-134.4	320	200	--	261	--
Oxygen, dissolved	mg/L			--	--	--	0.33	--	--	--	1.86	--	0.35	0.22	0.38	0.27	0.29	--	0.27	0.36	0.42	0.36	--	0.79	--
pH	SU			--	--	--	6.92	--	--	--	6.94	--	6.86	7.06	6.99	6.88	6.83	--	6.96	6.87	7.49	7.65	--	7.67	--
Specific Conductance	µS/cm			--	--	--	1120	--	--	--	1010	--	1520	1617	1204	1344	1176	--	1248	1288	969	920	--	416	--
Temperature	deg c			--	--	--	17.8	--	--	--	19.4	--	18.23	16.32	19.41	21.15	20.18	--	17.85	19.18	18.3	15.9	--	15.9	--
Turbidity	ntu			--	--	--	14.1	--	--	--	--	--	9.55	7.70	10.10	51.99	4.69	--	6.73	5.75	--	--	--	--	--
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	< 100	180	150	130	120	110	110	110	110	123	136	< 100	--	--	--	--	--	--	< 80	84.3	< 80	< 80
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	6650	18900	14400	19700	18600	20800	21700	--	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	4050	9020	6870	12600	12000	8450	10500	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	--	--	--	--	--	--	--	--	--	10700	27900	21300	32300	30600	29300	32200	--	--	--	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	--	--	--	--	--	--	--	--	--	10700	27900	21300	32300	30600	29300	32200	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	13000	7500	9200	12000	17000	4200	5400	8200	7200	7380	--	--	4300	14600	--	741	2480	409	< 250	< 250	< 250	< 250
Oil-Range Organics	µg/L	500	Method A	3500	*< 5000*	*< 5000*	5800	8300	1600	2200	3200	2100	3690	--	--	3280	6080	--	< 250	269	< 500	< 500	< 500	< 500	< 500
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	16500	10000	11700	17800	25300	5800	7600	11400	9300	11100	--	--	7580	20700	--	866	2750	659	< 125	< 125	< 125	< 125
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	16500	7500	9200	17800	25300	5800	7600	11400	9300	11100	--	--	7580	20700	--	741	2750	409	ND	ND	ND	ND
BTEX																									
Benzene	µg/L	5	Method A	< 0.5	< 0.5	< 0.5	< 1	--	< 0.5	< 0.5	< 1	< 1	< 1.00	< 1.00	< 5.00	--	--	--	--	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	µg/L	700	Method A	< 0.5	< 0.5	< 0.5	< 1	--	< 0.5	< 0.5	< 1	< 1	< 1.00	< 1.00	< 5.00	--	--	--	--	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	µg/L	1000	Method A	< 5	< 5	< 5	< 5	--	< 5	< 5	< 5	< 5	< 5.00	< 1.00	< 5.00	--	--	--	--	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	< 0.500	< 2.50	--	--	--	--	--	--	--	--	--	--
Xylene, total	µg/L	1000	Method A	< 1.5	< 1.5	< 1.5	< 3	--	< 1.5	< 1.5	< 3	< 3	< 3.00	--	--	--	--	--	--	--	< 1	< 1.5	< 1	< 1.5	< 1.5
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	4800	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.100	--	< 0.100	< 0.100	< 0.100
Benzo(a)pyrene	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.100	--	--	< 0.100	< 0.100
Benzo(b)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.100	--	--	< 0.100	< 0.100
Benzo(k)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.100	--	--	< 0.100	< 0.100
Chrysene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.100	--	< 0.100	< 0.100	< 0.100
Dibenz(a,h)Anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.200	--	--	< 0.200	< 0.200
Indeno(1,2,3-c,d)Pyrene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.100	--	--	< 0.100	< 0.100
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.050		< 0.050	< 0.050	< 0.050
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.00	--	< 0.00	< 0.00	< 0.00
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			--	--	--	640	--	--	--	510	--	413	260	396	365	559	514	460	390	--	--	--	--	--
Nitrogen, Nitrate-Nitrite	µg/L			--	--	--	< 100	--	--	--	< 100	--	< 100	< 100	< 100	1800 J	200	233	< 100	< 100	--	--	--	--	--
Sulfate (as SO4)	µg/L			--	--	--	< 5000	--	--	--	< 5000	--	7840	< 5000	5160	9060	< 100000	< 100000	< 5000	7150	--	--	--	--	--
Sulfide	µg/L			--	--	--	< 50	--	--	--	< 50	--	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	--	--	--	--	--
Gases																									
Ethane	µg/L			--	--	--	--	--	--	--	--	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	--	--	--	--	--
Ethylene	µg/L			--	--	--	--	--	--	--	--	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	--	--	--	--	--
Methane	µg/L			--	--	--	900	--	--	--	3600	--	283	288	1670	2000	909	898	1480	2230	--	--	--	--	--
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	--	--	--	< 100	--	--	--	240	--	10400	4780	9840	7680	11700	10800	9720	9540	--	--	--	--	--
Manganese, Dissolved	µg/L	2240	B Non Cancer	--	--	--	--	--	--	--	--	--	5030	2190	4520	5950	6750	6700	5360	5900	--	--	--	--	--
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.03	7.05
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	58	58
Lead, Dissolved	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	< 5.00	< 2.00	< 2.00	--	--	--	--	--	--	--	--	--	--
Lead, Total	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	< 5.00	< 2.00	< 2.00	--	--	--	--	--	--	--	--	< 1	< 1

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05
			Sample Date	7/13/2004	7/13/2004	11/9/2006	11/9/2006	7/3/2007	8/16/2007	4/16/2008	8/21/2008	3/12/2009	9/10/2009	7/7/2011	3/12/2012	3/12/2012	9/11/2012	9/11/2012	3/15/2013	3/15/2013	11/6/2013	11/5/2013	4/8/2014	4/8/2014	9/29/2014
			Sample Type	N	FD	N	FD	N	N	N	N	N	N	N	N	FD	N	FD	N	FD	N	FD	N	FD	N
			Sample ID	WMW-5-20040713	WMW-5-20040713-DUP	WMW-5-20061109	WMW-5-20061109-DUP	WMW-5-20070703	WMW-5-20070816	WMW-5-20080416	WMW-5-20080821	WMW-5-20090312	WMW-5-20090910	WMW-5-20110707	WMW-5-20120312	WMW-5-20120312-DUP	WMW-5-20120911	WMW-5-20120911-H	WMW-5-20130315	WMW-5-20130315-H	WMW-5-20131106	WMW-5-20131105-H	WMW-5-20140408	WMW-5-20140408-H	WMW-5-20140929
			Parent Sample ID		WMW-5-20040713		WMW-5-20061109									WMW-5-20120312		WMW-5-20120911		WMW-5-20130315		WMW-5-20131106		WMW-5-20140408	
			Sample Delivery Group																						
			Screen Interval	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft
Chemical	**Unit**	**MTCA A then Lowest B**																Hydrasleeve		Hydrasleeve		Hydrasleeve		Hydrasleeve	
Field																									
Depth to Water	ft			**10.40**	--	**11.00**	--	**9.79**	**10.35**	**9.91**	**10.53**	**10.09**	**10.62**	**9.80**	**10.18**	--	**10.37**	--	**10.68**	--	**10.79**	--	**10.32**	--	**10.72**
Oxidation-Reduction Potential	mV			--	--	--	--	--	--	--	--	--	--	--	**239**	--	--	--	--	--	**112**	--	--	--	**91**
Oxygen, dissolved	mg/L			--	--	--	--	--	--	--	--	--	--	--	**1.16**	--	--	--	--	--	**0.31**	--	--	--	**1.60**
pH	SU			--	--	--	--	--	--	--	--	--	--	--	**7.43**	--	--	--	--	--	**7.68**	--	--	--	**7.46**
Specific Conductance	µS/cm			--	--	--	--	--	--	--	--	--	--	--	**466**	--	--	--	--	--	**468**	--	--	--	**494**
Temperature	deg c			--	--	--	--	--	--	--	--	--	--	--	**14.42**	--	--	--	--	--	**16.2**	--	--	--	**17.93**
Turbidity	ntu			--	--	--	--	--	--	--	--	--	--	--	**0.800**	--	--	--	--	--	**16.2**	--	--	--	--
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	< 80	< 80	< 50	< 50	< 50	< 50	< 50	< 50	< 50	**63**	< 50	**24 J**	< 50	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	< 250	--	< 250	< 248	< 248	< 250	< 245	< 240	< 245	< 120	< 77	< 120	--	< 100	**110**	< 100	**100**	< 100	**200**	< 100	< 100	< 100
Oil-Range Organics	µg/L	500	Method A	< 500	--	< 500	< 495	< 495	< 500	< 490	< 481	< 490	< 250	< 380	**51 J**	--	< 250	< 250	< 250	< 250	< 250	**660**	< 250	< 250	< 250
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	< 125	--	< 125	< 124	< 124	< 125	< 123	< 120	< 123	< 60.0	< 38.5	**111**	--	< 50.0	**235**	< 50.0	**225**	< 50.0	**860**	< 50.0	< 50.0	< 50.0
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	**51.0**	--	ND	**110**	ND	**100**	ND	**860**	ND	ND	ND
BTEX																									
Benzene	µg/L	5	Method A	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 0.5	< 0.5	< 1
Ethylbenzene	µg/L	700	Method A	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 0.5	< 0.5	< 1
Toluene	µg/L	1000	Method A	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 1	< 1	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	µg/L	1000	Method A	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 3	< 3	< 3	< 3	< 1.5	< 1.5	< 1.5	< 1.5	< 3	< 3	< 1.5	< 1.5	< 3
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	4800	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L			< 0.100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L			< 0.100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	< 0.050	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	< 0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			- -	--	--	--	--	--	--	--	--	--	--	< 100	< 100	--	--	--	--	< 100	--	--	--	< 2500
Nitrogen, Nitrate-Nitrite	µg/L			--	--	--	--	--	--	--	--	--	--	--	**2000**	**1900**	--	--	--	--	**1800**	--	--	--	**1900**
Sulfate (as SO4)	µg/L			--	--	--	--	--	--	--	--	--	--	--	**20000**	**20000**	--	--	--	--	**22000**	--	--	--	**21000**
Sulfide	µg/L			--	--	--	--	--	--	--	--	--	--	--	**1500**	**1500**	--	--	--	--	< 50	--	--	--	< 50
Gases																									
Ethane	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methane	µg/L			--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	--	--	--	--	< 10	--	--	--	< 10
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	< 40	**13 J**	--	--	--	--	< 100	--	--	--	< 100
Manganese, Dissolved	µg/L	2240	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Total	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

Location				WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-05	WMW-06	WMW-06	WMW-07	WMW-07	WMW-07	WMW-07	WMW-07	WMW-07	WMW-07	WMW-07	WMW-07	WMW-07	WMW-07	WMW-07
Sample Date				4/27/2015	11/17/2016	4/18/2017	9/20/2017	4/25/2018	8/23/2018	5/8/2019	8/20/2019	4/16/2004	7/13/2004	4/16/2004	7/13/2004	7/3/2007	7/3/2007	8/16/2007	4/16/2008	4/16/2008	8/21/2008	8/21/2008	3/12/2009	3/12/2009	4/9/2014
Sample Type				N	N	N	N	N	N	N	N	N	N	N	N	N	FD	N	N	FD	N	FD	N	FD	N
Sample ID				WMW-5-20150427	WMW-5-20161117	WMW-5-20170418	WMW-5-20170920	WMW-05-20180425	WMW-05-20180823	WMW-05-20190508	WMW-05-20190820	WMW-6-20040416	WMW-6-20040713	WMW-7-20040416	WMW-7-20040713	WMW-7-20070703	WMW-7-20070703-DUP	WMW-7-20070816	WMW-7-20080416	WMW-7-20080416-DUP	WMW-7-20080821	WMW-7-20080821-DUP	WMW-7-20090312	WMW-7-20090312-DUP	WMW-7-20140409
Parent Sample ID																	WMW-7-20070703			WMW-7-20080416		WMW-7-20080821		WMW-7-20090312	
Sample Delivery Group					L873914	L903886	L938609	L989723	L1020953	L1098098	L1131661														
Screen Interval				15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft	15.0-25.0 ft			10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft
Chemical	Unit	MTCA A then Lowest B																							
Field																									
Depth to Water	ft			10.28	10.61	9.74	10.32	10.43	10.41	9.59	9.93	10.46	10.83	10.43	11.04	10.58	--	11.00	10.66	--	12.19	--	11.45	--	11.81
Oxidation-Reduction Potential	mV			229.5	133.6	38.6	279.8	112.8	24.2	118.8	104.6	211	--	236	--	--	--	--	--	--	--	--	--	--	--
Oxygen, dissolved	mg/L			1.18	3.71	0.93	7.14	1.69	0.96	1.78	0.37	0.97	--	1.41	--	--	--	--	--	--	--	--	--	--	--
pH	SU			7.88	8.17	8.74	7.82	7.76	7.67	7.72	7.53	7.14	--	7.15	--	--	--	--	--	--	--	--	--	--	--
Specific Conductance	µS/cm			534	272	539	2410	440	460	372	468	1009	--	1397	--	--	--	--	--	--	--	--	--	--	--
Temperature	deg c			15.9	16.61	16.07	16.41	18.78	18.98	16.07	18.78	17.5	--	16.4	--	--	--	--	--	--	--	--	--	--	--
Turbidity	ntu			--	7.06	3.48	9.67	17.97	2.78	2.57	3.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	< 100	< 100	< 100	< 100	--	--	--	--	212	94.2	1790	316	380	423	454	415	454	284	284	385	390	--
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	--	--	< 200	425	< 200	< 200	< 200	< 200	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	--	--	524	744	362	< 250	356	< 250	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	--	624	1170	462	< 100	456	< 100	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	--	524	1170	362	ND	356	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	140	< 250	--	--	< 200	< 200	< 200	< 200	454	< 250	1220	677	1560	1750	548	661	685	652	632	1900	5290	3400
Oil-Range Organics	µg/L	500	Method A	380	< 500	--	--	< 250	< 250	< 250	< 250	< 500	< 500	< 500	< 500	< 500	*< 532*	< 500	< 490	< 495	< 476	< 476	< 485	< 490	1200
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	520	< 125	--	--	< 100	< 100	< 100	< 100	704	< 125	1470	927	1810	2020	798	906	933	890	870	2140	5540	4600
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	520	ND	--	--	ND	ND	ND	ND	454	ND	1220	677	1560	1750	548	661	685	652	632	1900	5290	4600
BTEX																									
Benzene	µg/L	5	Method A	< 1	< 1.00	< 1.00	< 1.00	--	--	--	--	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	--
Ethylbenzene	µg/L	700	Method A	< 1	< 1.00	< 1.00	< 1.00	--	--	--	--	< 0.5	< 0.5	< 5	< 0.5	0.772	0.786	1.04	0.713	0.731	< 0.5	< 0.5	< 0.5	< 0.5	--
Toluene	µg/L	1000	Method A	< 5	< 5.00	< 1.00	< 1.00	--	--	--	--	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	--
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	< 0.500	< 0.500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	µg/L	1000	Method A	< 3	< 3.00	--	--	--	--	--	--	< 1.5	< 1	< 15	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	--
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	4800	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L			--	--	--	--	--	--	--	--	< 0.400	< 0.100	< 0.400	< 0.100	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	*< 0.400*	--	*< 0.400*	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	< 0.400	--	< 0.400	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	< 0.400	--	< 0.400	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L			--	--	--	--	--	--	--	--	< 0.400	< 0.100	< 0.400	< 0.100	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	µg/L			--	--	--	--	--	--	--	--	< 0.800	--	< 0.800	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	µg/L			--	--	--	--	--	--	--	--	< 0.400	--	< 0.400	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	*< 0.200*	< 0.050	*< 0.200*	< 0.050	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	< 0.00	< 0.00	< 0.00	< 0.00	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			< 250	< 100	< 100	< 100	< 100	< 100	< 100	< 100	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrate-Nitrite	µg/L			2270	1080	2820	2550	5150	3470	2310	2440	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate (as SO4)	µg/L			25900	10700	20000	18900	15500	20900	13600	18300	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	µg/L			< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Gases																									
Ethane	µg/L			--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylene	µg/L			--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methane	µg/L			< 10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	< 100	< 100	< 100	< 100	183	< 100	< 100	< 100	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese, Dissolved	µg/L	2240	B Non Cancer	--	< 10.0	7.49	18.5	10.5	22.5	< 5.00	< 5.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	4.30	3.64	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	122	91.8	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	--	< 5.00	< 2.00	< 2.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Total	µg/L	15	Method A	--	< 5.00	< 2.00	< 2.00	--	--	--	--	< 1	--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	WMW-07	WMW-07	WMW-07	WMW-07	WMW-07	WMW-07	WMW-08	WMW-08	WMW-08	WMW-08	WMW-08	WMW-08	WMW-08	WMW-09	WMW-09	WMW-09	WMW-09	WMW-09	WMW-09	WMW-09	WMW-09
			Sample Date	9/30/2014	4/27/2015	11/17/2016	4/17/2017	9/19/2017	8/23/2018	3/13/2012	11/6/2013	4/9/2014	11/17/2016	4/17/2017	9/19/2017	8/23/2018	3/13/2012	3/13/2012	9/11/2012	3/14/2013	11/6/2013	4/8/2014	9/29/2014	4/27/2015
			Sample Type	N	N	N	N	N	N	N	N	N	N	N	N	N	N	FD	N	N	N	N	N	N
			Sample ID	WMW-7-20140930	WMW-7-20150427	WMW-7-20161117	WMW-07-20170417	WMW-7-20170920	WMW-07-20180823	WMW-8-20120313	WMW-8-20131106	WMW-8-20140409	WMW-8-20161117	WMW-8-20170416	WMW-8-20170920	WMW-08-20180823	WMW-9-20120313	WMW-9-20120313-DUP	WMW-9-20120911	WMW-9-20130314	WMW-9-20131106	WMW-9-20140408	WMW-9-20140929	WMW-9-20150427
			Parent Sample ID															WMW-9-20120313						
			Sample Delivery Group			L873914																		
			Screen Interval	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	10.0-20.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	8.5-23.5 ft	8.5-23.5 ft	8.5-23.5 ft	8.5-23.5 ft	8.5-23.5 ft	8.5-23.5 ft	8.5-23.5 ft	8.5-23.5 ft
Chemical	Unit	MTCA A then Lowest B					Not sampled - sheen in well	Not sampled - sheen in well	Not sampled - sheen in well				Not sampled - LNAPL present	Not sampled - sheen in well	Not sampled - sheen in well	Not sampled - sheen in well								
Field																								
Depth to Water	ft			12.72	12.72	12.28	10.91	11.81	11.68	11.11	12.36	11.36	11.80	10.45	11.41	12.14	10.83	--	11.07	11.33	11.47	10.96	11.42	10.90
Oxidation-Reduction Potential	mV			133	223	154.5	--	-111.6	-93.1	42	-56	--	--	--	-107.6	-126.0	235	--	--	--	55	--	80	326
Oxygen, dissolved	mg/L			2.08	0.25	0.46	--	0.67	0.21	0.61	0.96	--	--	--	--	--	0.50	--	--	--	0.32	--	1.70	1.65
pH	SU			6.90	7.16	7.12	--	7.11	6.99	7.03	7.14	--	--	--	7.18	6.94	7.14	--	--	--	7.33	--	7.16	7.5
Specific Conductance	µS/cm			1030	1040	677	--	1323	1079	925	1320	--	--	--	1237	1250	617	--	--	--	765	--	902	911
Temperature	deg c			18.4	16.1	18.02	--	11.66	18.91	14.6	17	--	--	--	17.72	18.33	14.56	--	--	--	17.6	--	18.82	16.7
Turbidity	ntu			--	--	2.23	--	1.83	3.26	11.5	73.7	--	--	--	2.25	3.97	19.8	--	--	--	17.1	--	--	--
NWTPH-Gx																								
Gasoline-Range Organics	µg/L	800/1000	Method A	< 100	< 100	110	--	--	--	420 B	--	150	--	--	--	--	10 J	--	< 100	< 100	< 100	< 100	< 100	< 100
NWTPH-Dx - without silica gel cleanup																								
Diesel-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - with silica gel cleanup																								
Diesel-Range Organics	µg/L	500	Method A	4000	4900	1350	--	--	--	850 Y	--	4400	--	--	--	--	230 Y	71 J	490	630	2100	380	1500	1400
Oil-Range Organics	µg/L	500	Method A	1700	2200	< 500	--	--	--	74 J	--	1200	--	--	--	--	300 Y	81 J	890	450	1600	< 250	320	2400
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	5700	7100	1600	--	--	--	924	--	5600	--	--	--	--	530	152	1380	1080	3700	505	1820	3800
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	5700	7100	1350	--	--	--	924	--	5600	--	--	--	--	530	152	1380	1080	3700	380	1820	3800
BTEX																								
Benzene	µg/L	5	Method A	< 1	< 1	< 1.00	--	--	--	< 1	--	< 0.5	--	--	--	--	< 1	--	< 0.5	< 0.5	< 1	< 1	< 1	< 1
Ethylbenzene	µg/L	700	Method A	< 1	< 1	< 1.00	--	--	--	< 1	--	< 0.5	--	--	--	--	< 1	--	< 0.5	< 0.5	< 1	< 1	< 1	< 1
Toluene	µg/L	1000	Method A	< 5	< 5	< 5.00	--	--	--	< 1	--	< 5	--	--	--	--	< 1	--	< 5	< 5	< 5	< 5	< 5	< 5
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene, total	µg/L	1000	Method A	< 3	< 3	< 3.00	--	--	--	1.15 J	--	< 1.5	--	--	--	--	< 3	--	< 1.5	< 1.5	< 3	< 3	< 3	< 3
Semi Volatile Organic Compounds																								
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																								
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	4800	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																								
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																								
Nitrogen, Ammonia (as NH3)	µg/L			< 2500	< 250	< 100	--	--	--	< 100	< 100	--	--	--	--	--	< 100	--	--	--	< 100	--	< 250	< 250
Nitrogen, Nitrate-Nitrite	µg/L			990	< 100	659	--	--	--	12	< 100	--	--	--	--	--	4800	--	--	--	2700	--	1800	3820
Sulfate (as SO4)	µg/L			10000	< 5000	11400	--	--	--	17000	9400	--	--	--	--	--	33000	--	--	--	30000	--	45000	81400
Sulfide	µg/L			< 50	< 50	< 50.0	--	--	--	2000	< 50	--	--	--	--	--	2100	--	--	--	< 50	--	< 50	< 50
Gases																								
Ethane	µg/L			--	--	< 13.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylene	µg/L			--	--	< 13.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methane	µg/L			64	529	394	--	--	--	126	140	--	--	--	--	--	< 5	--	--	--	< 10	--	< 10	< 10
Metals																								
Iron, Dissolved	µg/L	11200	B Non Cancer	1500	< 100	2790	--	--	--	310	< 100	--	--	--	--	--	9.70 J	--	--	--	< 100	--	< 100	< 100
Manganese, Dissolved	µg/L	2240	B Non Cancer	--	--	1660	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals																								
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	--	--	< 5.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Total	µg/L	15	Method A	--	--	< 5.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	WMW-09	WMW-09	WMW-09	WMW-09	WMW-09	WMW-09	WMW-09	WMW-10	WMW-10	WMW-10	WMW-10	WMW-10	WMW-10	WMW-10	WMW-10	WMW-10	WMW-10	WMW-10	WMW-10	WMW-10	WMW-10	WMW-10
			Sample Date	11/16/2016	4/17/2017	9/19/2017	4/25/2018	8/23/2018	5/8/2019	8/20/2019	3/13/2012	9/11/2012	3/14/2013	11/6/2013	4/8/2014	4/8/2014	9/29/2014	4/27/2015	11/16/2016	4/17/2017	9/19/2017	4/25/2018	8/23/2018	5/9/2019	8/22/2019
			Sample Type	N	N	N	N	N	N	N	N	N	N	N	N	FD	N	N	N	N	N	N	N	N	N
			Sample ID	WMW-9-20161116	WMW-9-20170417	WMW-9-20170919	WMW-09-20180425	WMW-09-20180823	WMW-09-20190508	WMW-09-20190820	WMW-10-20120313	WMW-10-20120911	WMW-10-20130314	WMW-10-20131106	WMW-10-20140408	WMW-10-20140408-DUP	WMW-10-20140929	WMW-10-20150427	WMW-10-20161116	WMW-10-20170417	WMW-10-20170919	WMW-10-20180425	WMW-10-20180823	WMW-10-20190508	WMW-10-20190822
			Parent Sample ID													WMW-10-20140408									
			Sample Delivery Group	L873914	L903886	L938609	L989723	L1020953	L1098098	L1131721									L873914	L903886	L938609	L989723	L1020953	L1098098	L1132628
			Screen Interval	8.5-23.5 ft	8.5-23.5 ft	8.5-23.5 ft	8.5-23.5 ft	8.5-23.5 ft	8.5-23.5 ft	8.5-23.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft	7.5-22.5 ft
Chemical	**Unit**	**MTCA A then Lowest B**																							
Field																									
Depth to Water	ft			11.23	10.33	10.94	11.02	11.04	10.20	10.54	10.91	10.82	11.28	11.24	10.89	--	11.18	10.75	11.05	10.46	10.96	11.11	10.92	10.16	10.33
Oxidation-Reduction Potential	mV			173.2	393.2	100.6	277.6	55.9	118.9	135	236	--	--	94	--	--	103	341	148.7	393.9	90.0	249.2	57.4	97.4	42.7
Oxygen, dissolved	mg/L			0.35	0.38	0.87	0.46	0.47	0.35	0.34	1.45	--	--	0.81	--	--	2.25	1.86	1.00	1.26	1.72	2.24	1.95	2.55	1.37
pH	SU			7.17	7.07	7.42	7.30	7.20	7.24	7.16	7.41	--	--	7.33	--	--	7.22	7.57	7.38	7.30	7.47	7.41	7.26	7.32	7.27
Specific Conductance	µS/cm			1095	1062	552	674	672	656	568	761	--	--	664	--	--	620	621	887	1004	773	827	688	723	710
Temperature	deg c			17.57	15.01	18.76	14.99	19.63	16.70	20.25	12.01	--	--	16.5	--	--	17.8	15.9	16.76	14.55	19.23	16.06	19.72	18.13	17.72
Turbidity	ntu			6.67	4.35	1.42	4.99	2.10	1.19	1.74	14.6	--	--	30.8	--	--	--	--	2.26	0.84	1.03	7.80	1.72	6.90	2.97
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	< 100	< 100	< 100	--	--	--	--	22 J	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	--	--	--	--
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	--	862	541	746	729	1010	557	--	--	--	--	--	--	--	--	--	444	542	635	389	333	472
Oil-Range Organics	µg/L	500	Method A	--	1720	840	1090	1200	1590	792	--	--	--	--	--	--	--	--	--	996	1260	1390	806	782	1120
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	2580	1380	1840	1930	2600	1350	--	--	--	--	--	--	--	--	--	1440	1800	2030	1200	1120	1590
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	2580	1380	1840	1930	2600	1350	--	--	--	--	--	--	--	--	--	1440	1800	2030	1200	1120	1590
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	411	--	--	402	458	< 200	< 200	< 120	380	430	250	< 100	< 100	< 100	200	< 250	--	--	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	< 500	--	--	353	630	< 250	< 250	63 J	< 250	450	830	< 250	< 250	< 250	520	< 500	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	661	--	--	755	1090	< 100	< 100	123	505	880	1080	< 50.0	< 50.0	< 50.0	720	< 125	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	411	--	--	755	1090	ND	ND	63.0	380	880	1080	ND	ND	ND	720	ND	--	--	--	--	--	--
BTEX																									
Benzene	µg/L	5	Method A	< 1.00	< 1.00	< 1.00	--	--	--	--	< 1	< 0.5	< 0.5	< 1	< 0.5	< 0.5	< 1	< 1	< 1.00	< 1.00	< 1.00	--	--	--	--
Ethylbenzene	µg/L	700	Method A	< 1.00	< 1.00	< 1.00	--	--	--	--	< 1	< 0.5	< 0.5	< 1	< 0.5	< 0.5	< 1	< 1	< 1.00	< 1.00	< 1.00	--	--	--	--
Toluene	µg/L	1000	Method A	< 5.00	< 1.00	< 1.00	--	--	--	--	< 1	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5.00	< 1.00	< 1.00	--	--	--	--
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	< 0.500	< 0.500	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.500	< 0.500	--	--	--	--
Xylene, total	µg/L	1000	Method A	< 3.00	--	--	--	--	--	--	< 3	< 1.5	< 1.5	< 3	< 1.5	< 1.5	< 3	< 3	< 3.00	--	--	--	--	--	--
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	4800	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	--	--	< 100	--	--	< 250000	< 250	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Nitrogen, Nitrate-Nitrite	µg/L			6570	8870	3370	6020	4550	3890	3190	5000	--	--	16000	--	--	8000	7780	12900	7470	8920	8870	11100	12500	9230
Sulfate (as SO4)	µg/L			59600	58900	18300	41200	61800	44100	15900	33000	--	--	38000	--	--	16000	20300	38000	25300	54700	75200	68000	48000	63700
Sulfide	µg/L			< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	6400	--	--	< 50	--	--	< 50	< 50	< 50.0	< 50.0	74.0	< 50.0	< 50.0	< 50.0	< 50.0
Gases																									
Ethane	µg/L			< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	--	--	--	--	--	--	--	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0
Ethylene	µg/L			< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	--	--	--	--	--	--	--	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0
Methane	µg/L			< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	29.9	--	--	< 10	--	--	< 10	< 10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 40	--	--	< 100	--	--	< 100	< 100	< 100	< 100	< 100	135	< 100	< 100	< 100
Manganese, Dissolved	µg/L	2240	B Non Cancer	1020	459	442	361	424	152	989	--	--	--	--	--	--	--	--	< 10.0	< 5.00	< 5.00	30.9	< 5.00	< 5.00	< 5.00
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	< 5.00	< 2.00	< 2.00	--	--	--	--	--	--	--	--	--	--	--	--	< 5.00	< 2.00	< 2.00	--	--	--	--
Lead, Total	µg/L	15	Method A	< 5.00	< 2.00	< 2.00	--	--	--	--	--	--	--	--	--	--	--	--	< 5.00	< 2.00	< 2.00	--	--	--	--

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-11	WMW-12	WMW-12
			Sample Date	3/14/2012	9/11/2012	9/11/2012	3/14/2013	3/14/2013	11/6/2013	11/6/2013	4/8/2014	9/30/2014	9/30/2014	4/27/2015	4/27/2015	11/16/2016	4/17/2017	9/20/2017	4/25/2018	8/23/2018	5/9/2019	8/22/2019	11/17/2016	11/17/2016
			Sample Type	N	N	FD	N	FD	N	FD	N	N	FD	N	FD	N	N	N	N	N	N	N	N	FD
			Sample ID	WMW-11-20120314	WMW-11-20120911	WMW-11-20120911-DUP	WMW-11-20130314	WMW-11-20130314-DUP	WMW-11-20131106	WMW-11-20131106-DUP	WMW-11-20140408	WMW-11-20140930	WMW-11-20140930-DUP	WMW-11-20150427	WMW-11-20150427-DUP	WMW-11-20161116	WMW-11-20170417	WMW-11-20170920	WMW-11-20180425	WMW-11-20180823	WMW-11-20190509	WMW-11-20190822	WMW-12-20161117	DUP-20161117
			Parent Sample ID			WMW-11-20120911		WMW-11-20130314		WMW-11-20131106			WMW-11-20140930		WMW-11-20150427									WMW-12-20161117
			Sample Delivery Group													L873914	L903886	L938609	L989723	L1020953	L1098098	L1132628	L873914	L873914
			Screen Interval	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	7.0-22.0 ft	6.0-21.0 ft	6.0-21.0 ft
Chemical	Unit	MTCA A then Lowest B																					SVOCs run by 8270 without SIM	SVOCs run by 8270 without SIM
Field																								
Depth to Water	ft			10.81	10.78	--	11.23	--	11.10	--	10.84	11.08	--	10.69	--	10.98	10.43	10.92	11.08	10.82	10.12	10.27	11.35	--
Oxidation-Reduction Potential	mV			-74	--	--	--	--	-128	--	--	196	--	436	--	92.6	386.7	-139.6	258.3	-71.7	42.3	-121.3	205.3	--
Oxygen, dissolved	mg/L			0.47	--	--	--	--	0.30	--	--	1.83	--	0.24	--	0.89	0.17	0.44	0.40	0.39	0.20	0.40	0.68	--
pH	SU			6.84	--	--	--	--	7.20	--	--	7.07	--	7.44	--	7.38	7.18	7.44	7.43	7.32	7.41	7.32	7.65	--
Specific Conductance	µS/cm			1032	--	--	--	--	1140	--	--	1080	--	1250	--	932	1593	1061	1197	1071	1060	1163	721	--
Temperature	deg c			15.0	--	--	--	--	17.2	--	--	17.77	--	17.1	--	17.21	14.93	16.08	16.41	20.59	16.57	18.33	17.78	--
Turbidity	ntu			9.65	--	--	--	--	45.4	--	--	--	--	--	--	3.44	5.37	6.61	12.01	3.98	1.70	7.71	1.91	--
NWTPH-Gx																								
Gasoline-Range Organics	µg/L	800/1000	Method A	310 B	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	100	< 100	< 100	< 500	< 100	< 100	--	--	--	--	< 100	< 100
NWTPH-Dx - without silica gel cleanup																								
Diesel-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	4370	4840	5040	4420	4660	4820	--	--
Oil-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	6350	4920	4140	3540	4470	4790	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	10700	9760	9180	7960	9130	9610	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	10700	9760	9180	7960	9130	9610	--	--
NWTPH-Dx - with silica gel cleanup																								
Diesel-Range Organics	µg/L	500	Method A	3700 Y	5100	5000	4000	3800	7300	7200	5800	5200	4800	5400	9500	3460	--	--	--	--	--	--	< 250	< 250
Oil-Range Organics	µg/L	500	Method A	960 Y	2900	3000	4000	3600	5700	5400	4000	2200	2100	2500	7200	3600	--	--	--	--	--	--	< 500	< 500
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	4660	8000	8000	8000	7400	13000	12600	9800	7400	6900	7900	16700	7060	--	--	--	--	--	--	< 125	< 125
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	4660	8000	8000	8000	7400	13000	12600	9800	7400	6900	7900	16700	7060	--	--	--	--	--	--	ND	ND
BTEX																								
Benzene	µg/L	5	Method A	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1.00	< 1.00	< 1.00	--	--	--	--	< 1.00	< 1.00
Ethylbenzene	µg/L	700	Method A	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 0.5	< 1	1	< 1	1	< 1.00	< 1.00	< 1.00	--	--	--	--	< 1.00	< 1.00
Toluene	µg/L	1000	Method A	< 1	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	5	< 5	5	< 5.00	< 1.00	< 1.00	--	--	--	--	< 5.00	< 5.00
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.500	< 0.500	--	--	--	--	--	--
Xylene, total	µg/L	1000	Method A	< 3	< 1.5	< 1.5	< 1.5	< 1.5	< 3	< 3	< 1.5	< 3	3	< 3	3	< 3.00	--	--	--	--	--	--	< 3.00	< 3.00
Semi Volatile Organic Compounds																								
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 11.1	< 11.1
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 11.1	< 11.1
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																								
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	4800	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.11	< 1.11
Benzo(a)anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.11	< 1.11
Benzo(a)pyrene	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	*< 1.11*	*< 1.11*
Benzo(b)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.11	< 1.11
Benzo(k)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.11	< 1.11
Chrysene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.11	< 1.11
Dibenz(a,h)Anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.11	< 1.11
Indeno(1,2,3-c,d)Pyrene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.11	< 1.11
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.11	< 1.11
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.555	< 0.555
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.00	< 0.00
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	*< 0.555*	*< 0.555*
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.00	< 0.00
Volatile Organic Compounds																								
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																								
Nitrogen, Ammonia (as NH3)	µg/L			580	--	--	--	--	620	--	--	540	550	407	460	319	243	357	223	292	< 100	305	< 100	< 100
Nitrogen, Nitrate-Nitrite	µg/L			5 J	--	--	--	--	< 100	--	--	< 100	--	< 100	--	< 100	614	< 100	2370	136	< 100	< 100	15600 J	15900 J
Sulfate (as SO4)	µg/L			62000	--	--	--	--	< 5000	--	--	< 5000	--	< 5000	--	133000	88000	76200	20700	22300	12100	24800	32600 J	32300 J
Sulfide	µg/L			7200	--	--	--	--	< 50	--	--	< 50	--	< 50	--	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0
Gases																								
Ethane	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0
Ethylene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0
Methane	µg/L			220	--	--	--	--	1100	--	--	500	460	1110	1080	1050	496	544	524	238	483	702	< 10.0	< 10.0
Metals																								
Iron, Dissolved	µg/L	11200	B Non Cancer	2900	--	--	--	--	< 100	--	--	120	170	< 100	--	2470	474	2770	228	660	< 100	839	< 100	< 100
Manganese, Dissolved	µg/L	2240	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	2070	1510	1740	1670	1770	1190	1680	225 J	217 J
Metals																								
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	--	--	--	< 5.00	< 2.00	< 2.00	--	--	--	--	< 5.00	< 5.00
Lead, Total	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	--	--	--	< 5.00	< 2.00	< 2.00	--	--	--	--	< 5.00	< 5.00

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	WMW-12	WMW-12	WMW-12	WMW-12	WMW-12	WMW-12	WMW-13	WMW-13	WMW-13	WMW-13	WMW-13	WMW-13	WMW-13	WMW-14	WMW-14	WMW-14	WMW-14	WMW-14	WMW-14	WMW-14	WMW-14	WMW-14
			Sample Date	4/17/2017	9/19/2017	4/30/2018	8/23/2018	5/8/2019	8/21/2019	11/16/2016	4/17/2017	9/19/2017	4/25/2018	8/23/2018	5/9/2019	8/20/2019	11/16/2016	1/27/2017	4/18/2017	9/19/2017	11/30/2017	2/28/2018	4/26/2018	8/22/2018	11/7/2018
			Sample Type	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
			Sample ID	WMW-12-20170417	WMW-12-20170919	WMW-12-20180430	WMW-12-20180823	WMW-12-20190508	WMW-12-20190822	WMW-13-20161116	WMW-13-20170417	WMW-13-20170919	WMW-13-20180425	WMW-13-20180823	WMW-13-20190509	WMW-13-20190820	WMW-14-20161116	MW-14-20170127	WMW-14-20170418	WMW-14-20170919	WMW-14-20171130	WMW-14-20180227	WMW-14-20180426	WMW-14-20180822	WMW-14-20181107
			Parent Sample ID																						
			Sample Delivery Group	L903886	L938609	L990329	L1020953	L1097209	L1132628	L873914	L903886	L938609	L989723	L1020953	L1098098	L1131721	L873914	L886938	L903886	L938609	L954618	L974320	L989723	L1020953	L1042805
			Screen Interval	6.0-21.0 ft	6.0-21.0 ft	6.0-21.0 ft	6.0-21.0 ft	6.0-21.0 ft	6.0-21.0 ft	6.0-21.0 ft	6.0-21.0 ft	6.0-21.0 ft	6.0-21.0 ft	6.0-21.0 ft	6.0-21.0 ft	6.0-21.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft
Chemical	**Unit**	**MTCA A then Lowest B**								SVOCs run by 8270 without SIM															
Field																									
Depth to Water	ft			10.11	11.10	10.80	11.30	10.10	10.73	11.66	10.81	11.53	11.51	11.52	10.69	11.02	15.31	15.11	14.74	15.17	15.11	13.41	15.03	15.04	15.13
Oxidation-Reduction Potential	mV			386.9	39.0	98.2	4.0	115.5	95.5	135.1	393.0	102.2	285.4	79.0	109.0	136	152.9	-16.3	30.6	187.6	79.3	42.4	45.7	79.3	40.0
Oxygen, dissolved	mg/L			1.97	0.58	1.62	1.78	3.68	1.18	0.47	0.49	3.38	2.53	3.64	0.81	1.26	0.65	0.83	1.86	2.37	1.60	1.84	1.62	6.21	0.83
pH	SU			7.52	7.68	7.66	7.64	7.68	7.49	7.69	7.44	7.73	7.54	7.41	7.45	7.46	7.85	7.79	8.64	7.83	7.78	8.05	7.59	7.44	8.01
Specific Conductance	µS/cm			1350	958	897	890	914	959	655	1204	706	804	674	815	700	405	235	384	612	642	593	570	249	226
Temperature	deg c			14.57	17.83	15.27	18.76	16.03	19.55	17.17	15.54	18.55	14.78	18.86	17.45	21.90	16.36	14.82	14.87	16.67	16.17	14.24	15.05	17.22	16.21
Turbidity	ntu			2.69	1.58	16.31	6.58	3.90	4.07	1.86	2.35	1.80	41.27	2.26	1.24	2.03	4.73	0.79	5.01	0.65	18.37	5.09	11.98	1.73	1.96
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	< 100	< 100	--	--	--	--	< 100	< 100	< 100	--	--	--	--	< 100	< 100	< 100	< 100	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	< 200	< 200	< 200	< 200	< 200	< 200	--	< 200	< 200	< 200	< 200	< 200	< 200	--	< 250	< 200	< 200	< 200	**250**	**230**	< 200	< 200
Oil-Range Organics	µg/L	500	Method A	< 250	< 250	< 250	< 250	< 250	< 250	--	< 250	**322**	< 250	< 250	**599**	< 250	--	< 500	**377**	**487**	**269**	**518**	**531**	< 250	< 250
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	< 100	< 100	< 100	< 100	< 100	< 100	--	< 100	**422**	< 100	< 100	**699**	< 100	--	< 125	**477**	**587**	**369**	**768**	**761**	< 100	< 100
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	ND	ND	ND	ND	ND	ND	--	ND	**322**	ND	ND	**599**	ND	--	ND	**377**	**487**	**269**	**768**	**761**	ND	ND
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	< 250	--	--	--	--	--	--	< 250	--	--	--	< 200	--	< 200	< 200	--
Oil-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	< 500	--	--	--	--	--	--	< 500	--	--	--	< 250	--	< 250	< 250	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	--	--	--	--	--	< 125	--	--	--	--	--	--	< 125	--	--	--	< 100	--	< 100	< 100	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	--	--	--	--	--	ND	--	--	--	--	--	--	ND	--	--	--	ND	--	ND	ND	--
BTEX																									
Benzene	µg/L	5	Method A	< 1.00	< 1.00	--	--	--	--	< 1.00	< 1.00	< 1.00	--	--	--	--	< 1.00	< 1	< 1.00	< 1.00	--	--	--	--	--
Ethylbenzene	µg/L	700	Method A	< 1.00	< 1.00	--	--	--	--	< 1.00	< 1.00	< 1.00	--	--	--	--	< 1.00	< 1	< 1.00	< 1.00	--	--	--	--	--
Toluene	µg/L	1000	Method A	< 1.00	< 1.00	--	--	--	--	< 5.00	< 1.00	< 1.00	--	--	--	--	< 5.00	< 1	< 1.00	< 1.00	--	--	--	--	--
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	< 0.500	< 0.500	--	--	--	--	--	< 0.500	< 0.500	--	--	--	--	--	--	< 0.500	< 0.500	--	--	--	--	--
Xylene, total	µg/L	1000	Method A	--	--	--	--	--	--	< 3.00	--	--	--	--	--	--	< 3.00	< 3	--	--	--	--	--	--	--
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	< 10.0	< 10.0	--	--	--	--	< 10.0	< 10.0	< 10.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			< 10.0	< 10.0	--	--	--	--	< 10.0	< 10.0	< 10.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	< 0.250	< 0.250	--	--	--	--	--	< 0.250	< 0.250	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	< 0.250	< 0.250	--	--	--	--	--	< 0.250	< 0.250	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	4800	B Non cancer	< 0.0500	< 0.0500	--	--	--	--	< 1.00	< 0.0500	< 0.0500	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L			< 0.0500	< 0.0500	--	--	--	--	< 1.00	< 0.0500	< 0.0500	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	Method A	< 0.0500	< 0.0500	--	--	--	--	*< 1.00*	< 0.0500	< 0.0500	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	µg/L			< 0.0500	< 0.0500	--	--	--	--	< 1.00	< 0.0500	< 0.0500	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	µg/L			< 0.0500	< 0.0500	--	--	--	--	< 1.00	< 0.0500	< 0.0500	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L			< 0.0500	< 0.0500	--	--	--	--	< 1.00	< 0.0500	< 0.0500	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)Anthracene	µg/L			< 0.0500	< 0.0500	--	--	--	--	< 1.00	< 0.0500	< 0.0500	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	µg/L			< 0.0500	< 0.0500	--	--	--	--	< 1.00	< 0.0500	< 0.0500	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	160	Method A	< 0.250	< 0.250	--	--	--	--	< 1.00	< 0.250	< 0.250	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	< 0.125	< 0.125	--	--	--	--	< 0.500	< 0.125	< 0.125	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	< 0.00	< 0.00	--	--	--	--	< 0.00	< 0.00	< 0.00	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	< 0.0250	< 0.0250	--	--	--	--	*< 0.500*	< 0.0250	< 0.0250	--	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	< 0.00	< 0.00	--	--	--	--	< 0.00	< 0.00	< 0.00	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Nitrogen, Nitrate-Nitrite	µg/L			**31700**	**22200**	**23200**	**29000**	**28100**	**32400**	**380**	**7450**	**3280**	**7420**	**6610**	**8200**	**5220**	**789**	**1150**	**1850**	**18400**	**17500**	**17400**	**16600**	**1400**	**408**
Sulfate (as SO4)	µg/L			**34400**	**42500**	**38400 J**	**39400**	**37000**	**37100**	**32300**	**31700**	**25200**	**27700**	**26500**	**33200**	**24300**	**11200**	**7350**	**11700**	**28900**	**26600**	**26700**	**21900**	**10800**	**9630**
Sulfide	µg/L			< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0
Gases																									
Ethane	µg/L			< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0
Ethylene	µg/L			< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0
Methane	µg/L			< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Manganese, Dissolved	µg/L	2240	B Non Cancer	< 5.00	**7.24**	< 5.00	< 5.00	< 5.00	< 5.00	**856**	**36.7**	< 5.00	**6.15**	**7.17**	**8.91**	< 5.00	**200**	< 10	< 5.00	**20.6**	**16.1**	**6.09**	< 5.00	< 5.00	< 5.00
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	< 2.00	< 2.00	--	--	--	--	< 5.00	< 2.00	< 2.00	--	--	--	--	< 5.00	< 5	< 2.00	< 2.00	--	--	--	--	--
Lead, Total	µg/L	15	Method A	< 2.00	< 2.00	--	--	--	--	< 5.00	< 2.00	< 2.00	--	--	--	--	< 5.00	< 5	< 2.00	< 2.00	--	--	--	--	--

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	WMW-14	WMW-14	WMW-14	WMW-14	WMW-15	WMW-15	WMW-15	WMW-15	WMW-15	WMW-15	WMW-15	WMW-15	WMW-15	WMW-15	WMW-15	WMW-15	WMW-15	WMW-15	WMW-16	WMW-16	WMW-16	WMW-16
			Sample Date	3/1/2019	5/7/2019	8/22/2019	11/14/2019	11/17/2016	1/27/2017	1/27/2017	4/18/2017	9/19/2017	11/30/2017	2/28/2018	4/26/2018	8/22/2018	11/7/2018	3/1/2019	5/7/2019	8/22/2019	11/14/2019	11/16/2016	1/27/2017	4/18/2017	9/19/2017
			Sample Type	N	N	N	N	N	FD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
			Sample ID	WMW-14-20190301	WMW-14-20190507	WMW-14-20190822	WMW-14-20191114	WMW-15-20161117	DUP-20170127	MW-15-20170127	WMW-15-20170418	WMW-15-20170919	WMW-15-20171130	WMW-15-20180227	WMW-15-20180426	WMW-15-20180822	WMW-15-20181107	WMW-15-20190301	WMW-15-20190507	WMW-15-20190822	WMW-15-20191114	WMW-16-20161116	MW-16-20170127	WMW-16-20170418	WMW-16-20170919
			Parent Sample ID						MW-15-20170127																
			Sample Delivery Group	L1075084	L1097209	L1132628	L1161399	L873914	L886938	L886938	L903886	L938609	L954618	L974320	L989723	L1020953	L1042805	L1075084	L1097209	L1132628	L1161399	L873914	L886938	L903886	L938609
			Screen Interval	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	11.3-26.3 ft	11.3-26.3 ft	11.3-26.3 ft	11.3-26.3 ft
Chemical	Unit	MTCA A then Lowest B																				SVOCs run by 8270 without SIM			
Field																									
Depth to Water	ft			14.85	14.22	14.26	15.24	14.98	--	14.96	14.60	15.01	14.97	15.34	14.91	14.80	14.94	14.75	14.14	14.16	15.12	14.90	14.70	14.36	14.74
Oxidation-Reduction Potential	mV			52.6	138.6	112.9	133.5	132.1	--	41.3	39.5	233.3	-111.4	-119.6	-28.0	48.8	47.8	59.9	77.4	106.3	-84	117.2	-7.2	77.9	151.5
Oxygen, dissolved	mg/L			1.71	1.87	2.03	1.01	0.65	--	0.71	0.61	0.33	0.36	0.37	0.14	0.48	0.35	0.79	0.26	0.75	0.36	0.85	0.35	3.51	0.29
pH	SU			7.44	7.77	7.93	7.6	7.28	--	7.17	7.81	7.27	7.23	7.48	7.21	7.08	7.29	6.86	7.21	7.31	7.17	6.87	6.82	7.29	6.76
Specific Conductance	µS/cm			243	242	295	345	748	--	897	1117	858	948	893	917	869	604	713	780	923	851	535	500	415	533
Temperature	deg c			12.27	14.33	17.57	15.9	16.67	--	14.97	14.27	17.35	15.76	14.65	15.65	19.54	17.37	14.04	14.86	17.43	16.04	17.49	15.50	12.66	18.53
Turbidity	ntu			5.19	4.83	4.03	4.39	2.32	--	2.42	1.05	1.90	23.67	12.18	36.17	3.00	3.93	1.52	2.79	2.94	0.79	--	1.27	2.19	2.59
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	--	--	--	--	< 500	< 100	< 100	< 100	< 100	--	--	--	--	--	--	--	--	--	107	< 100	< 100	< 100
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	< 200	< 200	< 200	< 200	--	3630	3360	3980	5920	6910	6400	5850	5280	2600	2800	4430	4940	5160	--	13500	2820	14300
Oil-Range Organics	µg/L	500	Method A	< 250	< 250	< 250	< 250	--	4840	4180	4600	3660	4550	5960	4810	4380	2160	2680	4150	4130	2980	--	6650	2380	5610
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	< 100	< 100	< 100	< 100	--	8470	7540	8580	9580	11500	12400	10700	9660	4760	5480	8580	9070	8140	--	20200	5200	19900
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	ND	ND	ND	ND	--	8470	7540	8580	9580	11500	12400	10700	9660	4760	5480	8580	9070	8140	--	20200	5200	19900
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	--	< 200	< 200	--	2240	--	--	--	--	5320	--	--	--	--	--	--	--	--	10800	--	--	--
Oil-Range Organics	µg/L	500	Method A	--	< 250	< 250	--	1440	--	--	--	--	2590	--	--	--	--	--	--	--	--	2280	--	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	< 100	< 100	--	3680	--	--	--	--	7910	--	--	--	--	--	--	--	--	13100	--	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	ND	ND	--	3680	--	--	--	--	7910	--	--	--	--	--	--	--	--	13100	--	--	--
BTEX																									
Benzene	µg/L	5	Method A	--	--	--	--	< 1.00	< 1	< 1	< 1.00	< 1.00	--	--	--	--	--	--	--	--	--	< 1.00	< 1	< 1.00	< 5.00
Ethylbenzene	µg/L	700	Method A	--	--	--	--	< 1.00	< 1	< 1	< 1.00	< 1.00	--	--	--	--	--	--	--	--	--	< 1.00	< 1	< 1.00	< 5.00
Toluene	µg/L	1000	Method A	--	--	--	--	< 5.00	< 1	< 1	< 1.00	< 1.00	--	--	--	--	--	--	--	--	--	< 5.00	< 1	< 1.00	< 5.00
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	--	--	--	--	< 0.500	< 0.500	--	--	--	--	--	--	--	--	--	--	--	< 0.500	< 2.50
Xylene, total	µg/L	1000	Method A	--	--	--	--	< 3.00	< 3	< 3	--	--	--	--	--	--	--	--	--	--	--	< 3.00	< 3	--	--
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 10.0	< 10	< 11.1	< 10.0
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 10.0	< 10	< 11.1	< 10.0
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.59 J	< 0.250	0.445
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.25	< 0.250	< 0.250
Anthracene	µg/L	4800	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	0.0536	< 0.0500
Benzo(a)anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500
Benzo(a)pyrene	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	*< 1.00*	< 0.05	< 0.0500	< 0.0500
Benzo(b)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500
Benzo(k)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500
Chrysene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500
Dibenz(a,h)Anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500
Indeno(1,2,3-c,d)Pyrene	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.25	< 0.250	< 0.250
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.500	6.84	< 0.125	5.70
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.00	1.59	< 0.00	0.445
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	*< 0.500*	< 0.0250	< 0.0250	< 0.0250
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.00	< 0.00	< 0.00	< 0.00
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			< 100	< 100	< 100	< 100	548	451	435	274	264	469	305	< 100	161	159	< 100	< 100	159	206	886	862	< 100	1410
Nitrogen, Nitrate-Nitrite	µg/L			204	659	1010	2990	< 100	122	115	538	368	< 100	161	1890	386	300	217	373	< 100	< 100	< 100	< 100	3250	< 100
Sulfate (as SO4)	µg/L			11900	11400	9190	10400	10100	18100	17200	21400	6010	< 5000	13200	13800	13000	15300	16800	19600	11500	10900	< 5000	< 5000	35500	< 5000
Sulfide	µg/L			< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0
Gases																									
Ethane	µg/L			< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0
Ethylene	µg/L			< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0
Methane	µg/L			< 10	< 10.0	< 10.0	< 10.0	651	790	724	88.9	805	1630	441	999	272	262	176	206	447	351	3140	5350	< 10.0	5020
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	< 100	< 100	< 100	< 100	1800	3400	3080	< 100	2800	5630	3120	899	< 100	193	< 100	262	473	1960	10400	9340	< 100	13100
Manganese, Dissolved	µg/L	2240	B Non Cancer	< 5	8.55	< 5.00	< 5.00	1650	1640	1610	850	800	1080	912	738	757	589	618	562	814	984	3310	2600	184	2480
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	--	--	--	--	< 5.00	< 5	< 5	< 2.00	< 2.00	--	--	--	--	--	--	--	--	--	< 5.00	< 5	< 2.00	< 2.00
Lead, Total	µg/L	15	Method A	--	--	--	--	< 5.00	< 5	< 5	< 2.00	< 2.00	--	--	--	--	--	--	--	--	--	< 5.00	< 5	< 2.00	< 2.00

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	WMW-16	WMW-16	WMW-16	WMW-16	WMW-16	WMW-16	WMW-16	WMW-16	WMW-16	WMW-16	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17
			Sample Date	11/30/2017	2/28/2018	4/26/2018	4/30/2018	8/22/2018	11/7/2018	3/1/2019	5/7/2019	8/21/2019	11/13/2019	11/16/2016	1/27/2017	4/17/2017	4/17/2017	9/20/2017	9/20/2017	11/30/2017	11/30/2017	2/27/2018	2/27/2018	4/25/2018	4/25/2018
			Sample Type	N	N	N	N	N	N	N	N	N	N	N	N	N	FD	N	FD	N	FD	N	FD	N	FD
			Sample ID	WMW-16-20171130	WMW-16-20180227	WMW-16-20180426	WMW-16-20180430	WMW-16-20180822	WMW-16-20181107	WMW-16-20190301	WMW-16-20190507	WMW-16-20190821	WMW-16-20191113	WMW-17-20161116	MW-17-20170127	WMW-17-20170417	D-1-20170417	WMW-17-20170920	D-1-20170920	WMW-17-20171130	D-1-20171130	WMW-17-20180227	DUP-20180227	WMW-17-20180425	D-1-20180425
			Parent Sample ID														WMW-17-20170417		WMW-17-20170920		WMW-17-20171130		WMW-17-20180227		WMW-17-20180425
			Sample Delivery Group	L954618	L974320	L989723	L990329	L1020953	L1042805	L1075084	L1097209	L1131738	L1161399	L873914	L886938	L903886	L903886	L938609	L938609	L954618	L954618	L974320	L974320	L989723	L989723
			Screen Interval	11.3-26.3 ft	11.3-26.3 ft	11.3-26.3 ft	11.3-26.3 ft	11.3-26.3 ft	11.3-26.3 ft	11.3-26.3 ft	11.3-26.3 ft	11.3-26.3 ft	11.3-26.3 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft
Chemical	Unit	MTCA A then Lowest B												Arsenic run by 6010	Arsenic run by 6010										
Field																									
Depth to Water	ft			14.70	14.97	14.75	13.46	14.45	14.71	14.36	14.11	14.90	14.83	14.55	14.58	14.54	--	14.28	--	14.71	--	14.85	--	14.97	--
Oxidation-Reduction Potential	mV			-135.4	-96.2	21.9	110.3	-2.2	36.4	66.5	-52.1	94.7	-102.9	146.6	34.2	-126.1	--	-170.6	--	-146.7	--	-166.7	--	-168.5	--
Oxygen, dissolved	mg/L			0.33	0.47	0.37	5.15	0.50	0.32	1.07	0.11	3.34	0.38	0.65	0.44	0.41	--	0.30	--	0.43	--	0.39	--	0.19	--
pH	SU			6.90	7.20	7.05	6.94	6.75	6.81	6.75	6.93	7.19	6.89	7.14	6.93	7.92	--	6.99	--	7.11	--	7.23	--	7.00	--
Specific Conductance	µS/cm			734	415	316	246	302	348	372	392	241	432	307	622	980	--	620	--	839	--	750	--	744	--
Temperature	deg c			16.91	13.82	15.00	14.00	19.34	18.65	13.36	14.59	18.38	16.13	16.99	14.45	14.52	--	17.17	--	15.93	--	13.50	--	15.11	--
Turbidity	ntu			4.49	2.17	6.45	4.39	3.40	1.87	3.11	1.97	3.02	0.8	3.78	2.37	2.47	--	1.04	--	3.94	--	2.49	--	9.11	--
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	< 100	< 100	< 100	--	< 100	< 100	< 100	< 100	< 100	< 100	115	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	155 J+	< 100
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	28600	8960	3210	--	2500	3760	5750	10300	516	7430	--	2590	4140	4130	2690	2410	3550	3800	3160	3000	2960	2910
Oil-Range Organics	µg/L	500	Method A	7670	2790	2670	--	1690	2340	2750	2690	884	1830	--	2310	4440	4380	2040	1960	3470	3470	2960	2960	2910	2720
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	36300	11800	5880	--	4190	6100	8500	13000	1400	9260	--	4900	8580	8510	4730	4370	7020	7270	6120	5960	5870	5630
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	36300	11800	5880	--	4190	6100	8500	13000	1400	9260	--	4900	8580	8510	4730	4370	7020	7270	6120	5960	5870	5630
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	21100	--	1490	--	1640	--	--	1730	< 200	--	885	--	--	--	--	--	2320	2670	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	3810 J-	--	454	--	612	--	--	< 250	< 250	--	603	--	--	--	--	--	1310	1410	--	--	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	24900	--	1940	--	2250	--	--	1860	< 100	--	1490	--	--	--	--	--	3630	4080	--	--	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	24900	--	1940	--	2250	--	--	1730	ND	--	1490	--	--	--	--	--	3630	4080	--	--	--	--
BTEX																									
Benzene	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	--	--	--	--	--	--
Ethylbenzene	µg/L	700	Method A	--	--	--	--	--	--	--	--	--	--	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	--	--	--	--	--	--
Toluene	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	< 5.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	< 0.500	< 0.500	< 0.500	< 0.500	--	--	--	--	--	--
Xylene, total	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	< 3.00	< 3	--	--	--	--	--	--	--	--	--	--
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	3.06	0.408	--	< 0.250	< 0.250	15.0	< 2.5	0.441	< 0.250	0.298	0.576	< 0.25	< 0.250	< 0.250	< 0.250	< 0.250	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	1.95	< 0.250	--	< 0.250	< 0.250	1.51	< 2.5	< 0.250	< 0.250	< 0.250	< 0.250	< 0.25	< 0.250	< 0.250	< 0.250	< 0.250	--	--	--	--	--	--
Anthracene	µg/L	4800	B Non cancer	0.113	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.05 R	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.05	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	--	--	--	--	--
Benzo(a)anthracene	µg/L			< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.05 R	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.05	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	Method A	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.05 R	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.05	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	--	--	--	--	--
Benzo(b)Fluoranthene	µg/L			< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.05 R	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.05	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	--	--	--	--	--
Benzo(k)Fluoranthene	µg/L			< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.05 R	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.05	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	--	--	--	--	--
Chrysene	µg/L			< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.05 R	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.05	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	--	--	--	--	--
Dibenz(a,h)Anthracene	µg/L			< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.05 R	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.05	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	µg/L			< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.05 R	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.05	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	--	--	--	--	--
Naphthalene	µg/L	160	Method A	0.669	< 0.250	--	< 0.250	< 0.250	0.789	< 2.5	< 0.250	< 0.250	< 0.250	< 0.250	< 0.25	< 0.250	< 0.250	< 0.250	< 0.250	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	5.68	0.658	--	< 0.125	< 0.125	17.3	< 1.25	0.691	< 0.125	0.548	0.826	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	5.68	0.408	--	< 0.00	< 0.00	17.3	< 0.00	0.441	< 0.00	0.298	0.576	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	< 0.0250	< 0.0250	--	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	< 0.00	< 0.00	--	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	--	--	--	--	--	--
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			1830	509	< 100	--	226	897	202	128 J	< 100	575	< 100	234	361	--	270	256	310	--	299	292	232	232
Nitrogen, Nitrate-Nitrite	µg/L			< 100	< 100	1730	--	< 100	< 100	564	146	341	< 100	< 100	< 100	< 100	--	< 100	< 100	< 100	--	< 100	< 100	1750	1740
Sulfate (as SO4)	µg/L			< 5000	5010	9670	--	5480	< 5000	5800	8110	7730	< 5000	6480	< 5000	< 5000	--	10400000	< 5000	< 5000	--	< 5000	< 5000	< 5000	< 5000
Sulfide	µg/L			< 50.0	< 50.0	< 50.0 J	--	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	--	< 50.0	< 50.0	< 50.0	--	< 50.0	< 50.0	< 50.0	< 50.0
Gases																									
Ethane	µg/L			< 13.0	< 13.0	< 13.0	--	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	--	< 13.0	< 13.0	< 13.0	--	< 13.0	< 13.0	< 13.0	< 13.0
Ethylene	µg/L			< 13.0	< 13.0	< 13.0	--	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	--	< 13.0	< 13.0	< 13.0	--	< 13.0	< 13.0	< 13.0	< 13.0
Methane	µg/L			6800	2400	1230	--	787	2410	1460	995	29.7	3500	399	2980	789	--	3460	2700	3190	--	3130	3270	3890	4210
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	18400	6050	517	--	541	2050	< 100	1090	< 100	4940	2100	5090	3490	--	3480	3370	4790	--	4470	4530	4270	4320
Manganese, Dissolved	µg/L	2240	B Non Cancer	3110	1380	400	--	287	944	508	611	10.7	1080	849	1690	2330	--	1370	1330	2060	--	1900	1940	1820	1820
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	< 10.0	13.3	24.6	23.1	7.32	7.23	23.4 J	35.9 J	25.2	24.7	22.6	22.9
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	< 10.0	< 10	25.5	24.9	9.20	7.29	23.1 J	34.9 J	26.5	26.2	25.4	25.1
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	--	< 5.00	< 5	< 2.00	< 2.00	< 2.00	< 2.00	--	--	--	--	--	--
Lead, Total	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	--	< 5.00	< 5	< 2.00	< 2.00	< 2.00	< 2.00	--	--	--	--	--	--

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

Location				WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-17	WMW-18	WMW-18	WMW-18	WMW-18	WMW-18	WMW-18	WMW-18	WMW-18	WMW-18	WMW-18
Sample Date				8/22/2018	11/7/2018	11/7/2018	2/28/2019	2/28/2019	5/8/2019	5/8/2019	8/21/2019	8/21/2019	11/14/2019	11/14/2019	11/15/2016	1/27/2017	4/17/2017	9/20/2017	11/29/2017	2/27/2018	4/25/2018	8/22/2018	11/7/2018	2/28/2019
Sample Type				N	N	FD	N	FD	N	FD	N	FD	N	FD	N	N	N	N	N	N	N	N	N	N
Sample ID				WMW-17-20180822	WMW-17-20181107	D-2-20181107	WMW-17-20190228	D-1-20190228	WMW-17-20190508	DUP-02-20190508	WMW-17-20190821	DUP-01-20190821	WMW-17-20191114	DUP-02-20191114	WMW-18-20161115	MW-18-20170127	WMW-18-20170417	WMW-18-20170920	WMW-18-20171129	WMW-18-20180227	WMW-18-20180425	WMW-18-20180822	WMW-18-20181107	WMW-18-20190228
Parent Sample ID						WMW-17-20181107		WMW-17-20190228		WMW-17-20190508		WMW-17-20190821		WMW-17-20191114										
Sample Delivery Group				L1020953	L1042805	L1042805	L1075084	L1075084	L1097209	L1097209	L1131642	L1131642	L1161399	L1161399	L873914	L886938	L903886	L938609	L954618	L974320	L989723	L1020953	L1042805	L1075084
Screen Interval				12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft
Chemical	Unit	MTCA A then Lowest B													SVOCs by 8270 without SIM, Arsenic by 6010	Arsenic run by 6010								
Field																								
Depth to Water	ft			**14.08**	**14.50**	--	**14.57**	--	**13.60**	--	**13.73**	--	**14.89**	--	**14.85**	**14.69**	**14.41**	**14.61**	**14.71**	**14.84**	**14.99**	**14.46**	**14.81**	**14.85**
Oxidation-Reduction Potential	mV			**-83.1**	**-145.1**	--	**-22.6**	--	**-107.3**	--	**44.8**	--	**-159.9**	--	**214.6**	**130.2**	**26.9**	**95.8**	**226.0**	**168.4**	**71.9**	**98.6**	**168.6**	**72.2**
Oxygen, dissolved	mg/L			**0.79**	**0.25**	--	**0.31**	--	**1.51**	--	**4.65**	--	**0.32**	--	**0.96**	**1.03**	**0.45**	**0.30**	**0.41**	**0.79**	**0.20**	**1.43**	**0.44**	**0.28**
pH	SU			**6.88**	**6.82**	--	**6.61**	--	**6.78**	--	**6.97**	--	**6.97**	--	**7.35**	**7.30**	**8.15**	**7.40**	**7.36**	**7.61**	**7.38**	**7.13**	**6.96**	**6.89**
Specific Conductance	µS/cm			**273**	**356**	--	**677**	--	**621**	--	**293**	--	**1039**	--	**401**	**549**	**654**	**619**	**615**	**560**	**567**	**354**	**325**	**587**
Temperature	deg c			**19.51**	**16.88**	--	**14.15**	--	**13.14**	--	**17.32**	--	**15.78**	--	**16.64**	**13.87**	**14.29**	**16.51**	**16.38**	**14.96**	**15.15**	**18.32**	**16.36**	**14.22**
Turbidity	ntu			**5.93**	**2.33**	--	**3.01**	--	**4.11**	--	**6.14**	--	**1.90**	--	**2.87**	**0.47**	**1.52**	**2.64**	**3.12**	**1.32**	**9.92**	**2.57**	**1.75**	**3.67**
NWTPH-Gx																								
Gasoline-Range Organics	µg/L	800/1000	Method A	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																								
Diesel-Range Organics	µg/L	500	Method A	**614**	**883**	**853**	**1590**	**1380**	**2000**	**2030**	**310**	**318**	**3680**	**3510**	--	< 250	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200
Oil-Range Organics	µg/L	500	Method A	**541**	**942**	**896**	**1850**	**1560**	**2200**	**2250**	**517**	**529**	**1950**	**2010**	--	< 500	**472**	**571**	**442**	< 250	< 250	< 250	< 250	**342**
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	**1160**	**1830**	**1750**	**3440**	**2940**	**4200**	**4280**	**827**	**847**	**5630**	**5520**	--	< 125	**572**	**671**	**542**	< 100	< 100	< 100	< 100	**442**
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	**1160**	**1830**	**1750**	**3440**	**2940**	**4200**	**4280**	**827**	**847**	**5630**	**5520**	--	ND	**472**	**571**	**442**	ND	ND	ND	ND	**342**
NWTPH-Dx - with silica gel cleanup																								
Diesel-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	< 250	--	--	--	< 200	--	< 200	< 200	--	--
Oil-Range Organics	µg/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	< 500	--	--	--	< 250	--	< 250	< 250	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	< 125	--	--	--	< 100	--	< 100	< 100	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	--	ND	--	ND	ND	--	--
BTEX																								
Benzene	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 1	< 1.00	< 1.00	--	--	--	--	--	--
Ethylbenzene	µg/L	700	Method A	--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 1	< 1.00	< 1.00	--	--	--	--	--	--
Toluene	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	< 5.00	< 1	< 1.00	< 1.00	--	--	--	--	--	--
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.500	< 0.500	--	--	--	--	--	--
Xylene, total	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	< 3.00	< 3	--	--	--	--	--	--	--	--
Semi Volatile Organic Compounds																								
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	< 10.0	< 10	< 11.1	< 10.0	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	< 10.0	< 10	< 11.1	< 10.0	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																								
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	< 0.25	< 0.250	< 0.250	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	--	< 0.25	< 0.250	< 0.250	--	--	--	--	--	--
Anthracene	µg/L	4800	B Non cancer	--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500	--	--	--	--	--	--
Benzo(a)anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	*< 1.00*	< 0.05	< 0.0500	< 0.0500	--	--	--	--	--	--
Benzo(b)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500	--	--	--	--	--	--
Benzo(k)Fluoranthene	µg/L			--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500	--	--	--	--	--	--
Chrysene	µg/L			--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500	--	--	--	--	--	--
Dibenz(a,h)Anthracene	µg/L			--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500	--	--	--	--	--	--
Indeno(1,2,3-c,d)Pyrene	µg/L			--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.05	< 0.0500	< 0.0500	--	--	--	--	--	--
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	< 1.00	< 0.25	< 0.250	< 0.250	--	--	--	--	--	--
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	< 0.500	< 0.125	< 0.125	< 0.125	--	--	--	--	--	--
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	< 0.00	< 0.00	< 0.00	< 0.00	--	--	--	--	--	--
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	*< 0.500*	< 0.0250	< 0.0250	< 0.0250	--	--	--	--	--	--
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	--	--	--	--	--	--	--	--	--	--	--	< 0.00	< 0.00	< 0.00	< 0.00	--	--	--	--	--	--
Volatile Organic Compounds																								
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																								
Nitrogen, Ammonia (as NH3)	µg/L			< 100	**194**	**188**	**260 J**	**198 J**	**216**	**223**	< 100	< 100	**368**	**360**	< 100	**173**	**138**	**179**	**208**	**173**	< 100	< 100	< 100	< 100
Nitrogen, Nitrate-Nitrite	µg/L			< 100	< 100	< 100	< 100	< 100	< 100 J	**4490 J**	< 100	< 100	< 100	< 100	**877**	**1240**	**1830**	**1540**	**1330**	**1160**	**2740 J**	**999**	**163**	**1550 J**
Sulfate (as SO4)	µg/L			< 5000	< 5000	< 5000	< 5000	< 5000	**9440**	**9330**	< 5000	< 5000	< 5000	< 5000	**19700**	**18500**	**23600**	**25500**	**22400**	**22600**	**23700**	**16100**	**13400**	**22200**
Sulfide	µg/L			< 50.0	< 50.0	< 50.0	< 50	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50
Gases																								
Ethane	µg/L			< 13.0	< 13.0	< 13.0	< 13	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13
Ethylene	µg/L			< 13.0	< 13.0	< 13.0	< 13	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13
Methane	µg/L			**127**	**586**	**559**	**1430 J**	**165 J**	**703**	**804**	**155**	**132**	**1890**	**2130**	< 10.0	**70.3**	**91.7**	**124**	**8170**	**103**	**67.4**	< 10.0	< 10.0	**60.9**
Metals																								
Iron, Dissolved	µg/L	11200	B Non Cancer	**2240**	**2050**	**2000**	< 100	< 100	**1150**	**1180**	**471**	**482**	**4690**	**4720**	**155**	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Manganese, Dissolved	µg/L	2240	B Non Cancer	**471**	**687**	**677**	**1370**	**1310**	**1330**	**1390**	**280**	**290**	**1820**	**1840**	**272**	**640**	**212**	**683**	**730**	**437**	**269**	**187**	< 5.00	**48.1**
Metals																								
Arsenic, Dissolved	µg/L	5	Method A	**5.76**	**4.35**	**3.74**	**11.5 J**	**9.26 J**	**17.2**	**18.3**	**4.29**	**4.26**	**17.6**	**18.2**	*< 10.0*	**15.9**	**12.8**	**14.6**	**14.4**	**14.0**	**13.9**	**7.14**	**5.25**	**12.2**
Arsenic, Total	µg/L	5	Method A	**6.05**	**4.76**	**4.51**	**11.1 J**	**8.53 J**	**15.6**	**14.0**	**3.83**	**4.05**	**27.7**	**25.5**	*< 10.0*	**14.9**	**13.1**	**14.5**	**14.3**	**12.9**	**15.8**	**6.81**	**5.36**	**12.4**
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	--	--	< 5.00	< 5	< 2.00	< 2.00	--	--	--	--	--	--
Lead, Total	µg/L	15	Method A	--	--	--	--	--	--	--	--	--	--	--	< 5.00	< 5	< 2.00	< 2.00	--	--	--	--	--	--

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

Chemical	Unit	MTCA A then Lowest B		WMW-18	WMW-18	WMW-18	WMW-19	WMW-19	WMW-19	WMW-19	WMW-19	WMW-19	WMW-20	WMW-20	WMW-20	WMW-20	WMW-20	WMW-20	WMW-21	WMW-21	WMW-21	WMW-21	WMW-21	WMW-21	WMW-22
			Sample Date	5/9/2019	8/22/2019	11/13/2019	8/27/2018	11/7/2018	3/1/2019	5/7/2019	8/22/2019	11/13/2019	8/27/2018	11/6/2018	2/28/2019	5/8/2019	8/20/2019	11/13/2019	8/27/2018	11/6/2018	2/28/2019	5/8/2019	8/20/2019	11/13/2019	8/27/2018
			Sample Type	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
			Sample ID	WMW-18-20190509	WMW-18-20190822	WMW-18-20191113	WMW-19-20180827	WMW-19-20181107	WMW-19-20190301	WMW-19-20190507	WMW-19-20190822	WMW-19-20191113	WMW-20-20180827	WMW-20-20181106	WMW-20-20190228	WMW-20-20190508	WMW-20-20190820	WMW-20-20191113	WMW-21-20180827	WMW-21-20181106	WMW-21-20190228	WMW-21-20190508	WMW-21-20190820	WMW-21-20191113	WMW-22-20180827
			Parent Sample ID																						
			Sample Delivery Group	L1107629	L1132636	L1161399	L1021969	L1042954	L1075084	L1097209	L1132612	L1161399	L1021969	L1042954	L1075084	L1098098	L1131652	L1161399	L1021969	L1042954	L1075084	L1098098	L1131652	L1161399	L1021969
			Screen Interval	12.0-27.0 ft	12.0-27.0 ft	12.0-27.0 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft
Field																									
Depth to Water	ft			13.90	13.88	14.78	14.16	15.03	14.72	14.09	14.11	15.10	15.13	14.74	15.03	14.16	14.29	14.99	14.28	13.90	14.36	13.35	13.55	14.20	14.90
Oxidation-Reduction Potential	mV			91.3	92.9	114.4	-101.6	82.0	53.6	140.5	85.2	100.6	-160.1	-28.1	122.3	8.6	229	74.5	36.5	112.7	117.8	77.7	126.2	114.7	43.6
Oxygen, dissolved	mg/L			0.53	3.85	0.38	1.18	0.44	2.29	3.48	1.38	0.33	0.18	0.35	0.30	0.48	1.90	0.31	0.30	0.35	0.69	1.54	1.23	0.58	1.76
pH	SU			7.23	7.39	7.34	7.47	7.86	7.22	7.40	7.23	7.25	7.14	7.07	6.66	7.17	7.55	7.11	7.43	7.28	6.97	7.31	7.29	7.31	7.36
Specific Conductance	µS/cm			556	537	588	236	248	267	303	299	278	556	430	540	463	375	532	488	602	524	496	572	545	637
Temperature	deg c			13.83	18.31	15.43	17.13	15.99	13.26	13.38	17.90	15.1	18.11	16.65	14.10	13.73	18.40	16.03	17.95	16.64	15.08	15.15	17.52	15.48	19.84
Turbidity	ntu			1.98	3.62	1.52	7.39	4.35	4.84	2.23	3.74	2.13	4.66	4.88	2.98	14.23	18.37	41.88	6.37	2.99	3.69	2.84	0.40	0.74	4.29
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	292	< 200	251	214	< 200	235	< 200	< 200	< 200	< 200	< 200	< 200	< 200
Oil-Range Organics	µg/L	500	Method A	< 250	294	< 250	< 250	< 250	< 250	< 250	< 250	< 250	588	274	493	818	< 250	351	< 250	252	< 250	291	263	< 250	< 250
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	< 100	394	< 100	< 100	< 100	< 100	< 100	< 100	< 100	880	374	744	1030	< 100	586	< 100	352	< 100	391	363	< 100	< 100
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	ND	294	ND	ND	ND	ND	ND	ND	ND	880	274	744	1030	ND	586	ND	252	ND	291	263	ND	ND
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	< 200	< 200	--	--	--	--	--	--	--	--	--	--	--	--	--	< 200	< 200	--	< 200	< 200	--	< 200
Oil-Range Organics	µg/L	500	Method A	< 250	< 250	--	--	--	--	--	--	--	--	--	--	--	--	--	< 250	< 250	--	< 250	< 250	--	< 250
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	< 100	< 100	--	--	--	--	--	--	--	--	--	--	--	--	--	< 100	< 100	--	< 100	< 100	--	< 100
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	ND	--	ND	ND	--	ND
BTEX																									
Benzene	µg/L	5	Method A	--	--	--	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00
Ethylbenzene	µg/L	700	Method A	--	--	--	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00
Toluene	µg/L	1000	Method A	--	--	--	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500
Xylene, total	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250
Anthracene	µg/L	4800	B Non cancer	--	--	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500
Benzo(a)anthracene	µg/L			--	--	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500
Benzo(a)pyrene	µg/L	0.1	Method A	--	--	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500
Benzo(b)Fluoranthene	µg/L			--	--	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500
Benzo(k)Fluoranthene	µg/L			--	--	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500
Chrysene	µg/L			--	--	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500
Dibenz(a,h)Anthracene	µg/L			--	--	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500
Indeno(1,2,3-c,d)Pyrene	µg/L			--	--	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500
Naphthalene	µg/L	160	Method A	--	--	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	--	< 0.125	--	--	< 0.125	< 0.125	--	< 0.125	--	--	< 0.125	< 0.125	--	< 0.125	--	--	< 0.125	< 0.125	--	< 0.125
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	--	--	--	< 0.0250	--	--	< 0.0250	< 0.0250	--	< 0.0250	--	--	< 0.0250	< 0.0250	--	< 0.0250	--	--	< 0.0250	< 0.0250	--	< 0.0250
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	--	--	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			208	< 100	290	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Nitrogen, Nitrate-Nitrite	µg/L			810	1610	322	139	< 100	183	3460	1460	1160	< 100	< 100	137	862	243	189	1780	1210	3340	3380	4340	4870	3380
Sulfate (as SO4)	µg/L			22500	21900	20200	7040	8560	11500	9110	6880	< 5000	9920	10600	12200	17800	15000	17500	14400	11800	16000	18000	20800	19900	37200
Sulfide	µg/L			< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0
Gases																									
Ethane	µg/L			< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0
Ethylene	µg/L			< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0
Methane	µg/L			90.0	< 10.0	61.7	< 10.0	45.4	34.2	< 10.0	32.1	< 10.0	429	367	282	< 10.0	31.2	107	< 10.0	< 10.0	18.1	< 10.0	< 10.0	< 10.0	< 10.0
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	< 100	< 100	< 100	368	712	< 100	< 100	< 100	< 100	4210	1170	< 100	< 100	< 100	171	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Manganese, Dissolved	µg/L	2240	B Non Cancer	150	< 5.00	281	420	361	230	8.45	12.9	27.9	2410	1150	1450	419	37.2	967	939	892	152	< 5.00	< 5.00	< 5.00	30.4
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	14.5	8.83	15.3	--	--	--	--	--	--	7.59	--	--	3.83	2.21	--	5.82	--	--	5.85	6.76	--	5.90
Arsenic, Total	µg/L	5	Method A	15.7	7.98	16.0	--	--	--	--	--	--	7.58	--	--	4.12	2.35	--	6.25	--	--	6.16	6.43	--	5.35
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	46.2	--	--	35.7	26.5	--	22.0	--	--	17.7	20.0	--	32.6
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	47.9	--	--	37.0	32.1	--	23.3	--	--	15.9	19.8	--	32.3
Lead, Dissolved	µg/L	15	Method A	--	--	--	< 2.00	--	--	< 2.00	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	< 2.00
Lead, Total	µg/L	15	Method A	--	--	--	< 2.00	--	--	< 2.00	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	< 2.00

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	WMW-22	WMW-22	WMW-22	WMW-22	WMW-22	WMW-23	WMW-23	WMW-23	WMW-23	WMW-23	WMW-23	WMW-24	WMW-24	WMW-24	WMW-24	WMW-24	WMW-24	WMW-24	WMW-26	WMW-26	WMW-26	WMW-26
			Sample Date	11/6/2018	2/28/2019	5/8/2019	8/20/2019	11/13/2019	8/27/2018	11/6/2018	2/28/2019	5/8/2019	8/20/2019	11/13/2019	8/30/2018	11/6/2018	2/28/2019	5/7/2019	8/20/2019	11/12/2019	11/12/2019	8/29/2018	11/6/2018	2/28/2019	5/7/2019
			Sample Type	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	FD	N	N	N	N
			Sample ID	WMW-22-20181106	WMW-22-20190228	WMW-22-20190508	WMW-22-20190820	WMW-22-20191113	WMW-23-20180827	WMW-23-20181106	WMW-23-20190228	WMW-23-20190508	WMW-23-20190820	WMW-23-20191113	WMW-24-20180830	WMW-24-20181106	WMW-24-20190228	WMW-24-20190507	WMW-24-20190820	WMW-24-20191112	DUP-01-20191112	WMW-26-20180829	WMW-26-20181106	WMW-26-20190228	WMW-26-20190507
			Parent Sample ID																		WMW-24-20191112				
			Sample Delivery Group	L1042954	L1075084	L1098098	L1131652	L1161399	L1021969	L1042954	L1075084	L1098098	L1131652	L1161399	L1022656	L1042954	L1075084	L1097209	L1131661	L1161399	L1161399	L1022656	L1042954	L1075084	L1097209
			Screen Interval	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	11.5-21.5 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft
Chemical	**Unit**	**MTCA A then Lowest B**																							
Field																									
Depth to Water	ft			**14.20**	**14.92**	**13.89**	**13.88**	**14.58**	**14.68**	**13.92**	**14.73**	**13.76**	**13.74**	**14.36**	**11.12**	**10.98**	**10.65**	**10.05**	**10.51**	**11.09**	--	**11.18**	**11.17**	**10.54**	**10.12**
Oxidation-Reduction Potential	mV			**97.1**	**126.0**	**73.0**	**80.6**	**125.2**	**14.7**	**51.0**	**154.3**	**58.4**	**68.6**	**110.4**	**115.6**	**61.6**	**-111.7**	**132.3**	**107.6**	**162.9**	--	**115.2**	**79.0**	**-73.1**	**163.6**
Oxygen, dissolved	mg/L			**1.99**	**0.71**	**0.59**	**5.02**	**0.31**	**0.22**	**3.00**	**0.51**	**0.33**	**0.67**	**0.40**	**1.42**	**0.55**	**2.74**	**1.18**	**0.99**	**0.99**	--	**3.93**	**1.57**	**0.97**	**2.47**
pH	SU			**7.17**	**7.00**	**7.30**	**7.42**	**7.38**	**7.59**	**7.16**	**7.05**	**7.59**	**4.46**	**7.63**	**7.54**	**7.94**	**7.55**	**7.39**	**7.26**	**7.34**	--	**7.25**	**7.06**	**7.19**	**7.03**
Specific Conductance	µS/cm			**419**	**917**	**904**	**481**	**944**	**791**	**406**	**853**	**781**	**891**	**848**	**578**	**579**	**541**	**604**	**603**	**598**	--	**610**	**622**	**556**	**542**
Temperature	deg c			**18.19**	**15.07**	**15.69**	**18.99**	**16.01**	**18.16**	**17.84**	**14.96**	**16.08**	**18.19**	**15.98**	**19.27**	**17.76**	**11.56**	**17.46**	**20.57**	**16.89**	--	**21.83**	**16.69**	**13.84**	**15.27**
Turbidity	ntu			**4.26**	**5.31**	**3.83**	**0.58**	**1.60**	**1.18**	**5.57**	**2.89**	**3.39**	**2.12**	**0.4**	**2.79**	**1.30**	**0.10**	**1.57**	**2.61**	**0.49**	--	**22.68**	**19.28**	**3.77**	**1.99**
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	< 200	< 200	< 200	< 200	< 200	**203**	< 200	< 200	< 200	< 200	< 200	**287**	**435**	**213**	**244**	< 200	< 200	< 200	**793**	**628**	**464**	**371**
Oil-Range Organics	µg/L	500	Method A	< 250	< 250	< 250	< 250	< 250	**341**	< 250	**255**	< 250	**285**	< 250	**719**	**794**	**739**	**670**	< 250	**497**	**564**	**1690**	**1330**	**1060**	**800**
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	< 100	< 100	< 100	< 100	< 100	**544**	< 100	**355**	< 100	**385**	< 100	**1010**	**1230**	**952**	**914**	< 100	**597**	**664**	**2480**	**1960**	**1520**	**1170**
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	ND	ND	ND	ND	ND	**544**	ND	**255**	ND	**285**	ND	**1010**	**1230**	**952**	**914**	ND	**497**	**564**	**2480**	**1960**	**1520**	**1170**
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	< 200	--	< 200	< 200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**304**	< 200	--	< 200
Oil-Range Organics	µg/L	500	Method A	< 250	--	< 250	< 250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**397**	< 250	--	< 250
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	< 100	--	< 100	< 100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**701**	< 100	--	< 100
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	ND	--	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**701**	ND	--	ND
BTEX																									
Benzene	µg/L	5	Method A	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00
Ethylbenzene	µg/L	700	Method A	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00
Toluene	µg/L	1000	Method A	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	**1.57**	< 1.00	< 1	< 1.00
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500
Xylene, total	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	--	< 0.250	--	--	< 0.250
2-Methylnaphthalene	µg/L	32	B Non cancer	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	--	< 0.250	--	--	< 0.250
Anthracene	µg/L	4800	B Non cancer	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	--	< 0.0500	--	--	< 0.0500
Benzo(a)anthracene	µg/L			--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	--	< 0.0500	--	--	< 0.0500
Benzo(a)pyrene	µg/L	0.1	Method A	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	--	< 0.0500	--	--	< 0.0500
Benzo(b)Fluoranthene	µg/L			--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	--	< 0.0500	--	--	< 0.0500
Benzo(k)Fluoranthene	µg/L			--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	--	< 0.0500	--	--	< 0.0500
Chrysene	µg/L			--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	--	< 0.0500	--	--	< 0.0500
Dibenz(a,h)Anthracene	µg/L			--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	--	< 0.0500	--	--	< 0.0500
Indeno(1,2,3-c,d)Pyrene	µg/L			--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	--	< 0.0500	--	--	< 0.0500
Naphthalene	µg/L	160	Method A	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	--	< 0.250	--	--	< 0.250
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	--	--	< 0.125	< 0.125	--	< 0.125	--	--	< 0.125	< 0.125	--	< 0.125	--	--	< 0.125	< 0.125	--	--	< 0.125	--	--	< 0.125
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	--	--	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	--	< 0.00	--	--	< 0.00
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	--	--	< 0.0250	< 0.0250	--	< 0.0250	--	--	< 0.0250	< 0.0250	--	< 0.0250	--	--	< 0.0250	< 0.0250	--	--	< 0.0250	--	--	< 0.0250
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	--	--	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	--	< 0.00	--	--	< 0.00
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	< 5.00	< 5.00	< 5	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5	< 5.00
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Nitrogen, Nitrate-Nitrite	µg/L			**1400**	**2830**	**5780**	**2300**	**5310**	**7470**	**860**	**6120**	**7020**	**8260**	**6280**	**5610**	**2940**	**3900**	**4820**	**5660**	**5030**	**4860**	**794**	**596**	**2380**	**3700**
Sulfate (as SO4)	µg/L			**17800**	**40300**	**33700**	**20500**	**35000**	**37300**	**17700**	**34900**	**38500**	**36200**	**36000**	**33800**	**34300**	**29500**	**30600**	**31100**	**30300**	**30300**	**32100**	**26000**	**21500**	**18400**
Sulfide	µg/L			< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0
Gases																									
Ethane	µg/L			< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0
Ethylene	µg/L			< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0
Methane	µg/L			< 10.0	< 10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	**58.7**	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	**25.1**	< 10.0
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	**683**	< 100	< 100
Manganese, Dissolved	µg/L	2240	B Non Cancer	< 5.00	**14.5**	< 5.00	< 5.00	< 5.00	**109**	< 5.00	**60**	**17.3**	< 5.00	**202**	**489**	**370**	**134**	**100**	**220**	**322**	**320**	**1760**	**2550**	**7.77**	**5.39**
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	--	--	**5.42**	**3.83**	--	**17.6**	--	--	**14.4**	**10.7**	--	**37.0**	--	--	**28.1**	**30.7**	--	--	**2.42**	--	--	**2.27**
Arsenic, Total	µg/L	5	Method A	--	--	**5.38**	**3.79**	--	**17.8**	--	--	**15.6**	**14.5**	--	**35.5**	--	--	**25.7**	**33.5**	--	--	**2.33**	--	--	**2.18**
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	**30.1**	**19.8**	--	**22.6**	--	--	**21.3**	**22.3**	--	**37.3**	--	--	**33.0**	**32.1**	--	--	**73.2**	--	--	**54.5**
Barium, Total	µg/L	3200	B Non Cancer	--	--	**29.5**	**20.9**	--	**22.5**	--	--	**29.8**	**23.2**	--	**36.6**	--	--	**34.4**	**34.2**	--	--	**68.5**	--	--	**55.9**
Lead, Dissolved	µg/L	15	Method A	--	--	< 2.00	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	--	< 2.00	--	--	< 2.00
Lead, Total	µg/L	15	Method A	--	--	< 2.00	< 2.00	--	< 2.00	--	--	**9.68**	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	--	< 2.00	--	--	< 2.00

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	WMW-26	WMW-26	WMW-27	WMW-27	WMW-27	WMW-27	WMW-27	WMW-27	WMW-28	WMW-28	WMW-28	WMW-28	WMW-28	WMW-28	WMW-28	WMW-28	WMW-28	WMW-28	WMW-29	WMW-29	WMW-29	WMW-29
			Sample Date	8/19/2019	11/13/2019	8/30/2018	11/6/2018	2/28/2019	5/9/2019	8/20/2019	11/13/2019	8/29/2018	8/29/2018	11/6/2018	11/6/2018	2/28/2019	5/7/2019	5/7/2019	8/22/2019	8/22/2019	11/12/2019	8/31/2018	11/6/2018	2/28/2019	5/7/2019
			Sample Type	N	N	N	N	N	N	N	N	N	FD	N	FD	N	N	FD	N	FD	N	N	N	N	N
			Sample ID	WMW-26-20190820	WMW-26-20191113	WMW-27-20180830	WMW-27-20181106	WMW-27-20190228	WMW-27-20190509	WMW-27-20190820	WMW-27-20191113	WMW-28-20180827	D-1-20180829	WMW-28-20181106	D-1-20181106	WMW-28-20190228	WMW-28-20190507	DUP-01-20190507	WMW-28-20190822	DUP-02-20190822	WMW-28-20191113	WMW-29-20180831	WMW-29-20181106	WMW-29-20190228	WMW-29-20190507
			Parent Sample ID										WMW-28-20180827		WMW-28-20181106			WMW-28-20190507		WMW-28-20190822					
			Sample Delivery Group	L1131661	L1161399	L1022664	L1042954	L1075084	L1098098	L1131721	L1161399	L1021969	L1021969	L1042954	L1042954	L1075084	L1097209	L1097209	L1132612	L1132612	L1161399	L1022689	L1042954	L1075084	L1097209
			Screen Interval	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft
Chemical	**Unit**	**MTCA A then Lowest B**																							
Field																									
Depth to Water	ft			10.67	11.22	10.02	9.91	11.83	9.09	9.51	10.03	10.22	--	9.98	--	9.80	9.11	--	9.48	--	10.18	11.21	11.14	9.80	10.06
Oxidation-Reduction Potential	mV			148.1	168.7	120.7	67.2	-104.1	97.0	107	136.6	73.5	--	54.6	--	-91.8	132.2	--	85.3	--	107.4	62.2	-16.0	-67.6	35.8
Oxygen, dissolved	mg/L			3.36	1.65	1.19	0.57	4.98	2.03	1.05	1.29	0.31	--	0.36	--	4.79	3.83	--	1.77	--	2.19	3.19	0.60	0.94	1.55
pH	SU			7.05	7.05	7.59	7.75	7.75	7.46	7.46	7.35	7.58	--	7.84	--	7.78	7.61	--	7.46	--	7.41	7.08	6.84	7.11	7.08
Specific Conductance	µS/cm			579	458	319	347	245	345	332	304	427	--	433	--	312	392	--	382	--	330	1323	1518	1248	1243
Temperature	deg c			18.09	17	20.54	17.48	11.34	18.05	19.87	15.1	18.83	--	17.60	--	11.14	16.35	--	19.44	--	16.2	19.53	17.90	14.13	16.90
Turbidity	ntu			4.07	2.96	2.83	2.30	180.80	6.76	5.66	6.71	14.21	--	1.64	--	0.39	1.95	--	3.15	--	0.86	2.86	2.99	3.88	2.63
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	386	484	< 200	229	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	3940	3800	2800	3440
Oil-Range Organics	µg/L	500	Method A	747	743	< 250	371	334	< 250	< 250	< 250	335	351	411	587	< 250	< 250	< 250	< 250	< 250	< 250	3830	4290	3450	3970
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	1130	1230	< 100	600	434	< 100	< 100	< 100	435	451	511	687	< 100	< 100	< 100	< 100	< 100	< 100	7770	8090	6250	7410
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	1130	1230	ND	600	334	ND	ND	ND	335	351	411	587	ND	ND	ND	ND	ND	ND	7770	8090	6250	7410
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	< 200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	< 250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	< 100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BTEX																									
Benzene	µg/L	5	Method A	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 5	< 1.00
Ethylbenzene	µg/L	700	Method A	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 5	< 1.00
Toluene	µg/L	1000	Method A	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	4.76	< 1.00	< 5	< 1.00
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 2.50	< 0.500
Xylene, total	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	< 0.250	--	--	--	< 0.250	< 0.250	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250
2-Methylnaphthalene	µg/L	32	B Non cancer	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	< 0.250	--	--	--	< 0.250	< 0.250	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250
Anthracene	µg/L	4800	B Non cancer	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	--	--	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	0.0782	--	--	0.0789
Benzo(a)anthracene	µg/L			< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	--	--	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500
Benzo(a)pyrene	µg/L	0.1	Method A	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	--	--	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500
Benzo(b)Fluoranthene	µg/L			< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	--	--	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500
Benzo(k)Fluoranthene	µg/L			< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	--	--	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500
Chrysene	µg/L			< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	--	--	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500
Dibenz(a,h)Anthracene	µg/L			< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	--	--	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500
Indeno(1,2,3-c,d)Pyrene	µg/L			< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	--	--	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500
Naphthalene	µg/L	160	Method A	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	< 0.250	--	--	--	< 0.250	< 0.250	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	< 0.125	--	< 0.125	--	--	< 0.125	< 0.125	--	< 0.125	< 0.125	--	--	--	< 0.125	< 0.125	< 0.125	< 0.125	--	< 0.125	--	--	< 0.125
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	< 0.00	--	--	--	< 0.00	< 0.00	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	< 0.0250	--	< 0.0250	--	--	< 0.0250	< 0.0250	--	< 0.0250	< 0.0250	--	--	--	< 0.0250	< 0.0250	< 0.0250	< 0.0250	--	< 0.0250	--	--	< 0.0250
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	< 0.00	--	--	--	< 0.00	< 0.00	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	< 5.00	< 5.00	< 5.00	< 5.00	< 5	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 25	< 5.00
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			< 100	< 100	< 100	< 100	< 100	< 100	< 100 J	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	--	< 100	< 100	< 100	< 100	< 100
Nitrogen, Nitrate-Nitrite	µg/L			2320	911	447	697	1190	3730	1830	2030	3330	3320	2410	2480	2700	4110	4020	3750	--	2800	< 100	< 100	280	449
Sulfate (as SO4)	µg/L			19300	23400	7070	5670	< 5000	8590	8370	7720	11300	11100	11000	10700	5910	10600	10500	8640	--	6380	14600	12200	13900	16600
Sulfide	µg/L			< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0 J	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	--	< 50.0	< 50.0	< 50.0	< 50	< 50.0
Gases																									
Ethane	µg/L			< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	--	< 13.0	< 13.0	< 13.0	< 13	< 13.0
Ethylene	µg/L			< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	--	< 13.0	< 13.0	< 13.0	< 13	< 13.0
Methane	µg/L			< 10.0	< 10.0	< 10.0	< 10.0	32.7	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10	< 10.0	< 10.0	< 10.0	--	< 10.0	15.6	35.6	17.8	< 10.0
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	< 100	< 100	< 100	< 100	298	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	--	< 100	191	600	< 100	< 100
Manganese, Dissolved	µg/L	2240	B Non Cancer	141	866	307	361	140	< 5.00	5.23	10.3	160	163	132	149	5.12	< 5.00	< 5.00	< 5.00	--	< 5.00	5160	5570	4500	4100
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	2.32	--	4.96	--	--	4.73	4.68	--	7.60	8.15	--	--	--	6.41	6.63	7.62	7.10	--	3.42	--	--	< 2.00
Arsenic, Total	µg/L	5	Method A	2.27	--	4.31	--	--	4.50	4.62	--	7.38	7.39	--	--	--	6.24	5.71	7.25	7.19	--	3.70	--	--	2.14
Barium, Dissolved	µg/L	3200	B Non Cancer	58.8	--	26.5	--	--	23.0	25.1	--	27.0	27.5	--	--	--	22.3	22.1	21.4	21.5	--	152	--	--	127
Barium, Total	µg/L	3200	B Non Cancer	55.1	--	24.1	--	--	23.7	25.5	--	28.4	28.3	--	--	--	22.6	22.0	20.7	20.9	--	160	--	--	129
Lead, Dissolved	µg/L	15	Method A	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	< 2.00	< 2.00	--	--	--	< 2.00	< 2.00	< 2.00	< 2.00	--	< 2.00	--	--	< 2.00
Lead, Total	µg/L	15	Method A	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	< 2.00	< 2.00	--	--	--	< 2.00	< 2.00	< 2.00	< 2.00	--	< 2.00	--	--	< 2.00

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	WMW-29	WMW-29	WMW-30	WMW-30	WMW-30	WMW-30	WMW-30	WMW-30	WMW-31	WMW-31	WMW-31	WMW-31	WMW-31	WMW-31	WMW-32	WMW-32	WMW-32	WMW-32	WMW-32	WMW-32	RMD-1	RMD-1
			Sample Date	8/19/2019	11/13/2019	8/29/2018	11/6/2018	3/1/2019	5/7/2019	8/20/2019	11/13/2019	8/28/2018	11/6/2018	3/1/2019	5/8/2019	8/21/2019	11/13/2019	8/28/2018	11/6/2018	3/1/2019	5/9/2019	8/22/2019	11/13/2019	11/17/2016	4/18/2017
			Sample Type	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
			Sample ID	WMW-29-20190820	WMW-29-20191113	WMW-30-20180829	WMW-30-20181106	WMW-30-20190301	WMW-30-20190507	WMW-30-20190820	WMW-30-20191113	WMW-31-20180827	WMW-31-20181106	WMW-31-20190301	WMW-31-20190508	WMW-31-20190821	WMW-31-20191113	WMW-32-20180827	WMW-32-20181106	WMW-32-20190301	WMW-32-20190509	WMW-32-20190822	WMW-32-20191113	RMD-1-20161117	RMD-1-20170418
			Parent Sample ID																						
			Sample Delivery Group	L1131661	L1161399	L1022656	L1042954	L1075084	L1097209	L1131661	L1161399	L1021969	L1042954	L1075084	L1098098	L1131738	L1161399	L1021969	L1042954	L1075084	L1098098	L1132612	L1161399	L873914	L903886
			Screen Interval	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	7.0-17.0 ft	29.6-44.6 ft	29.6-44.6 ft
Chemical	**Unit**	**MTCA A then Lowest B**																							
Field																									
Depth to Water	ft			10.56	11.15	10.51	10.59	9.85	9.31	10.19	10.50	10.53	10.73	9.19	8.73	9.56	10.09	11.20	11.35	9.52	8.80	10.40	10.72	14.93	14.58
Oxidation-Reduction Potential	mV			150	80.0	99.0	154.8	-88.5	142.6	77.6	115.5	79.3	77.1	-43.5	105.8	46.8	134.4	66.4	95.7	-63.0	111.9	101.1	138.5	199.3	-100.8
Oxygen, dissolved	mg/L			2.80	1.17	2.70	1.36	4.30	3.05	0.54	0.22	0.25	0.43	1.84	0.63	0.42	0.19	0.83	2.43	3.64	3.65	1.90	0.63	1.29	0.46
pH	SU			6.87	6.97	7.72	7.23	7.93	7.46	7.38	7.5	7.35	7.37	7.45	7.38	7.23	7.23	7.51	8.00	7.73	7.41	7.39	7.27	7.37	7.83
Specific Conductance	µS/cm			1330	1047	524	633	496	548	560	514	830	883	723	612	599	609	895	979	785	696	1000	777	786	1097
Temperature	deg c			11.90	17.5	22.86	16.74	14.45	16.26	19.07	15.1	18.44	16.53	13.03	17.78	18.16	14.8	20.06	17.64	14.05	20.83	20.40	15.8	15.81	14.23
Turbidity	ntu			2.25	1.90	4.28	3.15	3.87	3.36	2.26	0.94	24.37	1.94	2.88	0.57	2.95	1.54	5.62	6.43	0.58	3.25	20.6	5.82	2.82	8.59
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 100	--	--	< 100	< 100	--	227	106
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	3610	3600	441	< 200	207	349	288	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 200	245	< 200	< 200	< 200	< 200	--	4970
Oil-Range Organics	µg/L	500	Method A	3160	2890	942	680	493	1100	783	491	< 250	480	< 250	< 250	262	< 250	< 250	424	261	492	268	279	--	3530
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	6770	6490	1380	780	700	1450	1070	591	< 100	580	< 100	< 100	362	< 100	< 100	669	361	592	368	379	--	8500
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	6770	6490	1380	680	700	1450	1070	491	ND	480	ND	ND	262	ND	ND	669	261	492	268	279	--	8500
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	--	--	< 200	< 200	--	< 200	< 200	--	--	--	--	--	--	--	--	--	--	--	--	--	2500	--
Oil-Range Organics	µg/L	500	Method A	--	--	< 250	< 250	--	< 250	< 250	--	--	--	--	--	--	--	--	--	--	--	--	--	825	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	--	< 100	< 100	--	< 100	< 100	--	--	--	--	--	--	--	--	--	--	--	--	--	3330	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	--	ND	ND	--	ND	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	3330	--
BTEX																									
Benzene	µg/L	5	Method A	< 1.00 J	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Ethylbenzene	µg/L	700	Method A	< 1.00 J	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Toluene	µg/L	1000	Method A	< 1.00 J	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1	< 1.00	< 1.00	< 1.00	7.11	< 1.00	< 1	< 1.00	< 1.00	< 1.00	< 5.00	< 1.00
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	--	< 0.500
Xylene, total	µg/L	1000	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 3.00	--
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	5.92	3.64
2-Methylnaphthalene	µg/L	32	B Non cancer	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	< 0.250
Anthracene	µg/L	4800	B Non cancer	0.0737	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500
Benzo(a)anthracene	µg/L			< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500
Benzo(a)pyrene	µg/L	0.1	Method A	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500
Benzo(b)Fluoranthene	µg/L			< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500
Benzo(k)Fluoranthene	µg/L			< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500
Chrysene	µg/L			< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500
Dibenz(a,h)Anthracene	µg/L			< 0.0500	--	0.0689	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500
Indeno(1,2,3-c,d)Pyrene	µg/L			< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	--	--	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500
Naphthalene	µg/L	160	Method A	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	< 0.250	--	--	< 0.250	< 0.250	--	0.416	0.433
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	< 0.125	--	< 0.125	--	--	< 0.125	< 0.125	--	< 0.125	--	--	< 0.125	< 0.125	--	< 0.125	--	--	< 0.125	< 0.125	--	6.46	4.20
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	6.34	4.07
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	< 0.0250	--	0.0421	--	--	< 0.0250	< 0.0250	--	< 0.0250	--	--	< 0.0250	< 0.0250	--	< 0.0250	--	--	< 0.0250	< 0.0250	--	< 0.0250	< 0.0250
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	< 0.00	--	0.00689	--	--	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	< 0.00
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	< 5.00 J	< 5.00	< 5.00	< 5.00	< 5	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5	< 5.00	< 5.00	< 5.00	--	--
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	160	194
Nitrogen, Nitrate-Nitrite	µg/L			281	< 100	527	365	2940	4210	3140	1820	3360	2860	2880	5680	4670	2210	14900	6710	15100	12700	15700	15600	< 100	< 100
Sulfate (as SO4)	µg/L			17200	18500	29600	22500	21200	22400	24000	28500	50300	46300	27900	14300	13000	17100	29100	49300	17100	19500	15200	17000	< 5000	8560
Sulfide	µg/L			< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0
Gases																									
Ethane	µg/L			< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0
Ethylene	µg/L			< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0
Methane	µg/L			< 10.0	< 10.0	< 10.0	< 10.0	< 10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10	< 10.0	< 10.0	< 10.0	< 10.0	79.6	< 10	< 10.0	< 10.0	< 10.0	2960	< 200
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	< 100	265	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	1470	2660
Manganese, Dissolved	µg/L	2240	B Non Cancer	4320	4580	497	1040	10.2	25.0	78.2	177	587	448	147	36.1	108	196	419	477	< 5	< 5.00	20.3	92.8	2380	2550
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	< 2.00	--	4.20	--	--	3.61	4.34	--	2.18	--	--	< 2.00	< 2.00	--	3.15	--	--	5.83	5.36	--	--	--
Arsenic, Total	µg/L	5	Method A	2.19	--	4.37	--	--	3.48	3.93	--	2.42	--	--	< 2.00	< 2.00	--	3.66	--	--	4.79	4.99	--	--	--
Barium, Dissolved	µg/L	3200	B Non Cancer	131	--	39.9	--	--	42.4	40.9	33.0	55.2	--	--	31.9	31.8	--	51.9	--	--	30.4	29.9	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	141	--	43.0	--	--	45.5	16500	35.7	54.9	--	--	33.6	32.3	--	48.6	--	--	31.4	31.5	--	--	--
Lead, Dissolved	µg/L	15	Method A	< 2.00	--	5.69	--	--	< 2.00	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	< 5.00	< 2.00
Lead, Total	µg/L	15	Method A	< 2.00	--	2.85	--	--	< 2.00	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	< 2.00	--	--	< 2.00	< 2.00	--	< 5.00	< 2.00

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	RMD-1	RMD-1	RMD-1	RMD-1	RMD-1	RMD-1	RMD-2	RMD-2	RMD-2	RMD-2	RMD-2	RMD-2	RMD-2	RMD-2	RMD-2	RMD-2	RMD-2	RMD-3	RMD-3	RMD-3	RMD-3	RMD-3
			Sample Date	9/19/2017	4/26/2018	4/30/2018	8/22/2018	5/7/2019	8/22/2019	11/16/2016	4/18/2017	4/18/2017	9/19/2017	9/19/2017	4/25/2018	4/25/2018	8/22/2018	8/22/2018	5/7/2019	8/21/2019	11/15/2016	4/17/2017	9/20/2017	4/25/2018	8/22/2018
			Sample Type	N	N	N	N	N	N	N	N	FD	N	FD	N	FD	N	FD	N	N	N	N	N	N	N
			Sample ID	RMD-1-20170919	RMD-1-20180426	RMD-1-20180430	RMD-1-20180822	RMD-1-20190507	RMD-1-20190822	RMD-2-20161116	RMD-2-20170418	D-2-20170418	RMD-2-20170919	D-2-20170919	RMD-2-20180425	D-2-20180425	RMD-2-20180822	D-1-20180822	RMD-2-20190507	RMD-2-20190821	RMD-3-20161115	RMD-3-20170417	RMD-3-20170920	RMD-3-20180425	RMD-3-20180822
			Parent Sample ID									RMD-2-20170418		RMD-2-20170919		RMD-2-20180425		RMD-2-20180822							
			Sample Delivery Group	L938609	L989723	L990329	L1020953	L1097209	L1132628	L873914	L903886	L903886	L938609	L938609	L989723	L989723	L1020953	L1020953	L1097209	L1131642	L873914	L903886	L938609	L989723	L1020953
			Screen Interval	29.6-44.6 ft	29.6-44.6 ft	29.6-44.6 ft	29.6-44.6 ft	29.6-44.6 ft	29.6-44.6 ft	30.0-50.0 ft	30.0-50.0 ft	30.0-50.0 ft	30.0-50.0 ft	30.0-50.0 ft	30.0-50.0 ft	30.0-50.0 ft	30.0-50.0 ft	30.0-50.0 ft	30.0-50.0 ft	30.0-50.0 ft	40.0-60.0 ft	40.0-60.0 ft	40.0-60.0 ft	40.0-60.0 ft	40.0-60.0 ft
Chemical	**Unit**	**MTCA A then Lowest B**																							
Field																									
Depth to Water	ft			14.93	14.58	14.24	14.70	14.15	14.17	14.65	14.28	--	14.60	--	14.85	--	14.33	--	13.98	13.85	15.06	14.55	14.71	15.13	14.63
Oxidation-Reduction Potential	mV			191.1	-124.4	-127.0	-117.6	-118.7	8.9	114.2	-122.0	--	90.2	--	-137.8	--	-110.9	--	-131.9	20.3	95.5	-130.0	114.9	-139.4	-135.1
Oxygen, dissolved	mg/L			0.35	0.28	0.42	0.41	0.18	0.94	0.22	0.65	--	0.24	--	0.30	--	0.29	--	0.23	0.89	0.42	0.50	0.39	0.34	0.41
pH	SU			7.21	7.27	7.17	6.90	7.10	7.29	7.35	7.70	--	7.39	--	7.13	--	7.11	--	7.14	7.19	7.62	8.29	7.42	7.48	7.42
Specific Conductance	µS/cm			958	959	955	1028	968	1083	917	1334	--	1168	--	1189	--	1178	--	1156	1284	490	706	579	613	617
Temperature	deg c			16.50	16.60	15.83	18.87	16.16	17.28	16.66	12.93	--	17.25	--	17.00	--	20.07	--	16.22	17.86	15.39	14.86	15.96	16.61	20.45
Turbidity	ntu			2.76	12.38	7.86	2.71	13.88	2.11	--	0.68	--	2.13	--	14.58	--	4.49	--	3.70	2.28	2.79	0.76	1.81	14.66	8.77
NWTPH-Gx																									
Gasoline-Range Organics	µg/L	800/1000	Method A	233	--	--	--	--	--	270	< 100	< 100	119	108	--	--	--	--	--	--	< 100	< 100	< 100	--	--
NWTPH-Dx - without silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	5030	4660	--	4540	5980	5210	--	4880	4830	5030	5310	4420	3850	4630	6980	8630	7020	--	229	< 200	< 200	< 200
Oil-Range Organics	µg/L	500	Method A	2180	2920	--	2460	3240	2100	--	4520	4720	3080	3170	2540	2200	2530	4110	4930	4170	--	302	315	< 250	< 250
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	7210	7580	--	7000	9220	7310	--	9400	9550	8110	8480	6960	6050	7160	11100	13600	11200	--	531	415	< 100	< 100
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	7210	7580	--	7000	9220	7310	--	9400	9550	8110	8480	6960	6050	7160	11100	13600	11200	--	531	315	ND	ND
NWTPH-Dx - with silica gel cleanup																									
Diesel-Range Organics	µg/L	500	Method A	--	3290	--	3230	456	321	2050	--	--	--	--	2260	2520	213	4640	206	< 200	< 250	--	--	--	--
Oil-Range Organics	µg/L	500	Method A	--	1050	--	894	< 250	< 250	776	--	--	--	--	596	763	< 250	2590	< 250	< 250	< 500	--	--	--	--
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	4340	--	4120	581	446	2830	--	--	--	--	2860	3280	338	7230	331	< 100	< 125	--	--	--	--
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	4340	--	4120	456	321	2830	--	--	--	--	2860	3280	213	7230	206	ND	ND	--	--	--	--
BTEX																									
Benzene	µg/L	5	Method A	< 1.00	--	--	--	--	--	< 1.00	< 1.00	< 1.00	< 5.00	< 1.00	--	--	--	--	--	--	< 1.00	< 1.00	< 1.00	--	--
Ethylbenzene	µg/L	700	Method A	< 1.00	--	--	--	--	--	< 1.00	< 1.00	< 1.00	< 5.00	< 1.00	--	--	--	--	--	--	< 1.00	< 1.00	< 1.00	--	--
Toluene	µg/L	1000	Method A	< 1.00	--	--	--	--	--	< 5.00	< 1.00	< 1.00	< 5.00	< 1.00	--	--	--	--	--	--	< 5.00	< 1.00	< 1.00	--	--
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	< 0.500	--	--	--	--	--	--	< 0.500	< 0.500	< 2.50	< 0.500	--	--	--	--	--	--	--	< 0.500	< 0.500	--	--
Xylene, total	µg/L	1000	Method A	--	--	--	--	--	--	< 3.00	--	--	--	--	--	--	--	--	--	--	< 3.00	--	--	--	--
Semi Volatile Organic Compounds																									
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																									
1-Methylnaphthalene	µg/L	1.5	B Non cancer	10.6	--	7.01	8.72	13.9	7.66	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
2-Methylnaphthalene	µg/L	32	B Non cancer	< 0.250	--	< 0.250	< 0.250	0.912	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
Anthracene	µg/L	4800	B Non cancer	0.126	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	0.0894	0.0813	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(a)anthracene	µg/L			< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(a)pyrene	µg/L	0.1	Method A	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(b)Fluoranthene	µg/L			< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(k)Fluoranthene	µg/L			< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Chrysene	µg/L			< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Dibenz(a,h)Anthracene	µg/L			< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Indeno(1,2,3-c,d)Pyrene	µg/L			< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Naphthalene	µg/L	160	Method A	1.17	--	0.886	< 0.250	1.25	0.520	0.271	< 0.250	< 0.250	0.280	0.274	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	11.9	--	8.02	8.97	16.1	8.31	0.521	< 0.125	< 0.125	0.530	0.524	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	11.8	--	7.90	8.72	16.1	8.18	0.271	< 0.00	< 0.00	0.280	0.274	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	< 0.0250	--	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	< 0.00	--	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Volatile Organic Compounds																									
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																									
Nitrogen, Ammonia (as NH3)	µg/L			290	146	--	330	306	316	107	177	--	186	191	< 100	< 100	165	166	178 J	190	< 100	100	< 100	< 100	< 100
Nitrogen, Nitrate-Nitrite	µg/L			< 100	1820	--	< 100	< 100	< 100	< 100	< 100	--	< 100	< 100	1840	1890	< 100	< 100	< 100	< 100	< 100	< 100	< 100	1740	< 100
Sulfate (as SO4)	µg/L			< 5000	< 5000	--	< 5000	< 5000	< 5000	< 5000	< 5000	--	< 5000	< 5000	< 5000	< 5000	< 5000	< 5000	< 5000	< 5000	5050	21900	20200	24500	32300
Sulfide	µg/L			< 50.0	< 50.0	--	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	--	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0
Gases																									
Ethane	µg/L			< 13.0	< 13.0	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	29.9	< 13.0	< 13.0	< 13.0	< 13.0
Ethylene	µg/L			< 13.0	< 13.0	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	16.2	< 13.0	< 13.0	< 13.0	< 13.0
Methane	µg/L			7450	13200	--	6440	6080	7620	2900	1840	--	1250	1190	6830 J	672 J	2550	2740	7130	5680	173	65.8	53.9	98.4	76.9
Metals																									
Iron, Dissolved	µg/L	11200	B Non Cancer	6050	3630	--	5430	3170	5700	6930	5150	--	5500	5500	5850	5800	6080	6070	5190	6370	1650	1640	1080	1260	2160
Manganese, Dissolved	µg/L	2240	B Non Cancer	2430	2310	--	2380	2290	2360	2820	2830	--	2890	2910	3080	3040	3320	3300	3010	3360	772	708	559	559	458
Metals																									
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead, Dissolved	µg/L	15	Method A	< 2.00	--	--	--	--	--	< 5.00	< 2.00	< 2.00	< 2.00	< 2.00	--	--	--	--	--	--	< 5.00	< 2.00	< 2.00	--	--
Lead, Total	µg/L	15	Method A	< 2.00	--	--	--	--	--	< 5.00	< 2.00	< 2.00	< 2.00	< 2.00	--	--	--	--	--	--	< 5.00	< 2.00	< 2.00	--	--

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

			Location	RMD-3	RMD-3	RMD-4	RMD-4	RMD-4	RMD-4	RMD-4	RMD-4	RMD-4	RMD-4	RMD-5	RMD-5	RMD-5	RMD-6	RMD-6	RMD-6
			Sample Date	5/7/2019	8/21/2019	11/15/2016	4/17/2017	9/20/2017	4/25/2018	4/30/2018	8/22/2018	5/8/2019	8/22/2019	8/30/2018	5/7/2019	8/22/2019	8/30/2018	5/8/2019	8/20/2019
			Sample Type	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
			Sample ID	RMD-3-20190507	RMD-3-20190821	RMD-4-20161115	RMD-4-20170417	RMD-4-20170920	RMD-4-20180425	RMD-4-20180430	RMD-4-20180822	RMD-4-20190508	RMD-4-20190822	RMD-5-20180830	RMD-5-20190507	RMD-5-20190822	RMD-6-20180830	RMD-6-20190508	RMD-6-20190820
			Parent Sample ID																
			Sample Delivery Group	L1097209	L1131642	L873914	L903886	L938609	L989723	L990329	L1020953	L1098098	L1132636	L1022689	L1097209	L1132628	L1022689	L1098098	L1131652
			Screen Interval	40.0-60.0 ft	40.0-60.0 ft	45.0-65.0 ft	45.0-65.0 ft	45.0-65.0 ft	45.0-65.0 ft	45.0-65.0 ft	45.0-65.0 ft	45.0-65.0 ft	45.0-65.0 ft						
Chemical	Unit	MTCA A then Lowest B																	
Field																			
Depth to Water	ft			14.22	14.18	14.91	14.42	14.60	14.92	13.94	14.62	13.95	14.03	14.70	13.80	13.80	14.61	13.76	13.90
Oxidation-Reduction Potential	mV			-87.5	38.3	263.6	60.3	110.2	40.8	51.9	79.9	99.1	120.6	149.2	139.4	165.1	113.7	63.4	195.1
Oxygen, dissolved	mg/L			0.25	0.69	1.12	3.06	0.55	0.44	1.24	0.34	0.85	0.96	1.67	0.10	0.63	2.28	0.18	0.51
pH	SU			7.37	7.25	7.50	7.93	7.36	7.32	7.25	7.35	7.31	7.38	7.32	7.43	7.56	7.5	7.35	7.31
Specific Conductance	µS/cm			589	663	663	527	790	853	835	850	861	985	802	828	848	889	890	986
Temperature	deg c			16.21	17.06	15.85	14.39	16.13	15.40	16.04	17.63	15.81	16.60	18.87	15.72	17.12	20.33	16.12	19.78
Turbidity	ntu			27.88	8.62	4.51	1.54	3.30	17.39	4.89	3.26	2.56	0.46	8.36	1.90	0.92	3.18	2.77	3.10
NWTPH-Gx																			
Gasoline-Range Organics	µg/L	800/1000	Method A	--	--	< 100	< 100	< 100	--	--	--	--	--	--	--	--	--	--	--
NWTPH-Dx - without silica gel cleanup																			
Diesel-Range Organics	µg/L	500	Method A	< 200	< 200	--	< 200	< 200	< 200	--	< 200	< 200	< 200	1000	1420	1000	< 200	< 200	< 200
Oil-Range Organics	µg/L	500	Method A	< 250	266	--	591	274	364	--	< 250	< 250	< 250	501	927	734	< 250	< 250	< 250
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	< 100	366	--	691	374	464	--	< 100	< 100	< 100	1500	2350	1730	< 100	< 100	< 100
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	ND	266	--	591	274	364	--	ND	ND	ND	1500	2350	1730	ND	ND	ND
NWTPH-Dx - with silica gel cleanup																			
Diesel-Range Organics	µg/L	500	Method A	--	--	< 250	--	--	< 200	--	< 200	< 200	< 200	737	< 200	< 200	< 200	< 200	< 200
Oil-Range Organics	µg/L	500	Method A	--	--	< 500	--	--	< 250	--	< 250	< 250	< 250	260	< 250	< 250	< 250	< 250	< 250
Total TPH-Dx (HalfDL_WA)	ug/L	500	Method A	--	--	< 125	--	--	< 100	--	< 100	< 100	< 100	997	< 100	< 100	< 100	< 100	< 100
Total TPH-Dx (HitsOnly)	ug/L	500	Method A	--	--	ND	--	--	ND	--	ND	ND	ND	997	ND	ND	ND	ND	ND
BTEX																			
Benzene	µg/L	5	Method A	--	--	< 1.00	< 1.00	< 1.00	--	--	--	--	--	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Ethylbenzene	µg/L	700	Method A	--	--	< 1.00	< 1.00	< 1.00	--	--	--	--	--	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Toluene	µg/L	1000	Method A	--	--	< 5.00	< 1.00	< 1.00	--	--	--	--	--	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Total Xylenes (HalfDL_WA)	µg/L	1000	Method A	--	--	--	< 0.500	< 0.500	--	--	--	--	--	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500
Xylene, total	µg/L	1000	Method A	--	--	< 3.00	--	--	--	--	--	--	--	--	--	--	--	--	--
Semi Volatile Organic Compounds																			
2-Methylphenol (o-Cresol)	µg/L	400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylphenol, 3 & 4	µg/L			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) using SIM																			
1-Methylnaphthalene	µg/L	1.5	B Non cancer	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	--	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
2-Methylnaphthalene	µg/L	32	B Non cancer	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	--	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
Anthracene	µg/L	4800	B Non cancer	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(a)anthracene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(a)pyrene	µg/L	0.1	Method A	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(b)Fluoranthene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Benzo(k)Fluoranthene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Chrysene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Dibenz(a,h)Anthracene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Indeno(1,2,3-c,d)Pyrene	µg/L			< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	--	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
Naphthalene	µg/L	160	Method A	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	--	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
Total Naphthalenes (HalfDL_WA)	µg/L	160	Method A	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	--	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125	< 0.125
Total Naphthalenes (HitsOnly)	µg/L	160	Method A	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	--	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Total cPAH TEQ (HalfDL_WA)	µg/L	0.1	Method A	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	--	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250	< 0.0250
Total cPAH TEQ (HitsOnly)	µg/L	0.1	Method A	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	--	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Volatile Organic Compounds																			
Naphthalene	µg/L	160	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anions																			
Nitrogen, Ammonia (as NH3)	µg/L			< 100	110	< 100	< 100	< 100	< 100	--	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Nitrogen, Nitrate-Nitrite	µg/L			< 100	< 100	5720	1160	7670	8140	--	5820	5530	5210	358	926	1760	1990	2350	3110
Sulfate (as SO4)	µg/L			21700	23200	55900	40200	60400	72400	--	76500	75000	77300	33700	40300	41200	78700	72200	68800
Sulfide	µg/L			< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	--	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0
Gases																			
Ethane	µg/L			< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0
Ethylene	µg/L			< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	--	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0	< 13.0
Methane	µg/L			< 10.0	84.2	< 10.0	< 10.0	< 10.0	< 10.0	--	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Metals																			
Iron, Dissolved	µg/L	11200	B Non Cancer	611	2130	< 100	< 100	< 100	< 100	--	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Manganese, Dissolved	µg/L	2240	B Non Cancer	683	543	158	114	22.2	16.2	--	22.1	16.7	23.9	481	630	443	204	90.5	108
Metals																			
Arsenic, Dissolved	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	9.95	11.9	14.8
Arsenic, Total	µg/L	5	Method A	--	--	--	--	--	--	--	--	--	--	--	--	--	10.6	13.3	14.5
Barium, Dissolved	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	32.6	27.7	28.7
Barium, Total	µg/L	3200	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	31.3	27.2	29.2
Lead, Dissolved	µg/L	15	Method A	--	--	< 5.00	< 2.00	< 2.00	--	--	--	--	--	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Lead, Total	µg/L	15	Method A	--	--	< 5.00	< 2.00	< 2.00	--	--	--	--	--	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS (2003 THROUGH 2019)
BNSF Wishram Railyard, Wishram, Washington

2.38	Detected concentrations above the cleanup level are shaded blue and bolded.
< 0.0100	Non-detect values above the cleanup level are shaded gray and italicized.
160	Detected concentrations at or above the method reporting limit are shown in bold.

Abbreviations and Symbols
" - -" denotes not measured, not available, or not applicable.
" < " denotes not detected at or above the indicated method reporting limit.
"B" denotes that the value has been qualified due to blank contamination by the laboratory.
"DUP" denotes a field duplicate sample. Primary sample ID is provided beneath the duplicate sample ID.
"J" indicates an estimated concentration based on either being less than the laboratory reporting limit or data validation findings.
"Y" denotes that 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
Total TPH-Dx = Total TPH-Dx concentrations were calculated by summing diesel-range organics (DRO) and oil-range organics (ORO) concentrations. Non-detects were included as noted.
Total cPAHs = Possible Total Carcinogenic Polycyclic Aromatic hydrocarbons (cPAHs) are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. Non-detects were included as noted.
Total Naphthalenes = Total Naphthalenes concentrations were calculated by summing 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene concentrations. Non-detects were included as noted
Total Xylenes = Total Xylenes concentrations were calculated by summing Xylene, m,p- and Xylene, o- concentrations. Non-detects were included as noted.
(HitsOnly) = If an individual chemical was not detected, it was not included in the calculation.
(HalfDL_WA) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration.
deg C = degrees Celsius
ft = feet
mg/L = milligrams per liter
ms/cm = millisiemens per centimeter
mV = millivolts
NTU = Nephelometric turbidity unit
SU = standard units
µg/L = micrograms per liter
µS/cm = microsiemens per centimeter

Cleanup Levels (CUL)
Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for groundwater (Method A) based on Washington State Administrative Code (WAC) 173-340-740 Table 720-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2020). See Table 2 for additional cleanup level information.

Methods
Samples analyzed for Anions as follows Nitrogen, Ammonia (as NH3) using method E350.1, Nitrogen, Nitrate-Nitrite using method E353.2, Sulfide using method SM4500-S-2 D or SM4500S2E, and Sulfate (as SO4) using method SW9056.
Samples analyzed for Gases using EPA Method RSK175.
Samples analyzed for metals using EPA Method 6020 unless noted by 6010.
Samples analyzed for gasoline-range organics (GRO) using Northwest Total Petroleum Hydrocarbon (NWTPH)-Gx and diesel- and oil-range organics (DRO and ORO) using NWTPH-Dx (with or without silica gel cleanup as indicated).
Samples analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 8260
Samples analyzed for Semivolatile Organic Compounds using EPA Method 8270.
Samples analyzed for Polycyclic Aromatic Hydrocarbons (PAHs) using EPA Method 8270 with or without selective ion monitoring (SIM) as indicated. In cases where SIM was not used, it is noted in the notes row.
Samples analyzed for Volatile Organic Compounds using EPA Method 8260.

Notes
Groundwater samples from wells WMW-07 and WMW-08 were frequently not collected due to sheen or NAPL in the well, as noted.
Hydrasleeve = HydraSleeve "No-Purge" groundwater samplers were used to collect comparison samples from selected wells in the September 2012, March and November 2013, and April and September 2014 sampling events.

SUMMARY OF METALS IN GROUNDWATER ANALYTICAL RESULTS
BNSF Wishram Railyard, Wishram, Washington

Analyte		Arsenic								Barium							
CAS_RN		7440-38-2								7440-39-3							
MTCA CUL		5								3200							
MTCA CUL Note		Method A								Method B Non cancer							
FRACTION		Dissolved				Total				Dissolved				Total			
Well ID	Site Area	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)
B-16-17	NML																
B-18-24	NML	1	1	0	4.41					1	1	0	135				
WMW-07	NML																
WMW-08	NML																
WMW-12	NML																
WMW-31	NML	3	1	0	2.18	3	1	0	2.42	3	3	0	55.2	3	3	0	54.9
WSB-04-34	SML	1	1	1	6.48					1	1	0	13.4				
WMW-01	SML																
WMW-02	SML					2	2	2	21.7					2	2	0	18.5
WMW-03	SML					2	2	2	8.54					2	2	0	59
WMW-04	SML																
WMW-05	SML					1	1	1	7.03					1	1	0	58
WMW-06	SML					2	2	0	4.3					2	2	0	122
WMW-09	SML																
WMW-10	SML																
WMW-11	SML																
WMW-13	SML																
WMW-14	SML																
WMW-15	SML																
WMW-16	SML																
WMW-17	SML	23	22	18	35.9	23	21	17	34.9								
WMW-18	SML	13	12	12	15.9	14	13	13	16.2								
WMW-19	SML																
RMD-1	SML																
RMD-2	SML																
RMD-3	SML																
RMD-4	SML																
RMD-5	SML																
B-16-10	FEH	1	0			1	1	1	151	1	1	0	63.4	1	1	1	8620
B-16-11	FEH	1	0			1	1	1	107	1	1	0	70.6	1	1	1	6150
B-16-12	FEH	1	0			1	0			1	1	0	43.4	1	1	0	495
B-16-18	FEH	1	0			1	1	1	10.1	1	1	0	36.6	1	1	0	228
B-16-19	FEH	1	0			1	1	1	15.2	1	1	0	63.3	1	1	0	367
B-16-20	FEH	1	0			1	1	1	15.7	1	1	0	28.8	1	1	0	167
B-16-21	FEH	1	0			1	0	0	10	1	1	0	39.9	1	1	0	120
B-16-22	FEH	1	0			1	0	0	10	1	1	0	43	1	1	0	146
B-16-23	FEH	1	0			1	1	1	26.4	1	1	0	74	1	1	0	1550
B-16-24	FEH	2	0			2	0			2	2	0	111	2	2	0	247
B-18-01	FEH	1	1	0	2.38					1	1	0	47.1				
B-18-02	FEH	1	1							1	1	0	51.9				
B-18-03	FEH	1	0							1	1	0	115				
B-18-04	FEH	1	1	0	3.06					1	1	0	77.5				
B-18-05	FEH	1	1	0	2.64					1	1	0	65.7				
B-18-06	FEH	1	1	0	3.24					1	1	0	41.1				
B-18-07	FEH	1	1	1	8.15					1	1	0	58.5				
B-18-08	FEH	1	1	0	4.02					1	1	0	39.4				
B-18-09	FEH	1	1	0	2.28					1	1	0	28.8				
B-18-10	FEH	1	1	0	2.63					1	1	0	31.7				
B-18-11	FEH	1	1	0	2.42					1	1	0	38.3				
B-18-12	FEH	2	2	2	5.34					2	2	0	32.4				
B-18-13	FEH	1	1	1	7.33					1	1	0	45.4				
B-18-22	FEH	1	1	0	3.88					1	1	0	70.6				
B-18-23	FEH	1	1	0	3.65					1	1	0	21.1				
WMW-24	FEH	3	3	3	37	3	3	3	35.5	3	3	0	37.3	3	3	0	36.6
WMW-26	FEH	3	3	0	2.42	3	3	0	2.33	3	3	0	73.2	3	3	0	68.5
WMW-27	FEH	3	3	0	4.96	3	3	0	4.62	3	3	0	26.5	3	3	0	25.5
WMW-28	FEH	6	6	6	8.15	6	6	6	7.39	6	6	0	27.5	6	6	0	28.4
WMW-29	FEH	3	1	0	3.42	3	3	0	3.7	3	3	0	152	3	3	0	160

Analyte		Cadmium								Chromium, total							
CAS_RN		7440-43-9								7440-47-3							
MTCA CUL		5								50							
MTCA CUL Note		Method A								Method A							
FRACTION		Dissolved				Total				Dissolved				Total			
Well ID	Site Area	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)
B-16-17	NML																
B-18-24	NML	1	0							1	0						
WMW-07	NML																
WMW-08	NML																
WMW-12	NML																
WMW-31	NML	3	0			3	0			3	0			3	0		
WSB-04-34	SML	1	0							1	1	0	10.4				
WMW-01	SML																
WMW-02	SML					1	0							2	2	0	4.39
WMW-03	SML					1	0							2	0		
WMW-04	SML																
WMW-05	SML					1	0							1	0		
WMW-06	SML					1	0							2	0		
WMW-09	SML																
WMW-10	SML																
WMW-11	SML																
WMW-13	SML																
WMW-14	SML																
WMW-15	SML																
WMW-16	SML																
WMW-17	SML																
WMW-18	SML																
WMW-19	SML																
RMD-1	SML																
RMD-2	SML																
RMD-3	SML																
RMD-4	SML																
RMD-5	SML																
B-16-10	FEH	1	0			1	1	1	19.3	1	0			1	1	1	854
B-16-11	FEH	1	0			1	1	1	14.1	1	0			1	1	1	647
B-16-12	FEH	1	0			1	0			1	0			1	1	1	57.5
B-16-18	FEH	1	0			1	0			1	0			1	1	0	26.5
B-16-19	FEH	1	0			1	0			1	0			1	1	0	36.4
B-16-20	FEH	1	0			1	0			1	0			1	1	0	43.2
B-16-21	FEH	1	0			1	0			1	0			1	1	0	14.1
B-16-22	FEH	1	0			1	0			1	0			1	1	0	18.9
B-16-23	FEH	1	0			1	1	1	8.76	1	0			1	1	1	198
B-16-24	FEH	2	0			2	0			2	0			2	1	0	14.4
B-18-01	FEH	1	0							1	0						
B-18-02	FEH	1	0							1	0						
B-18-03	FEH	1	0							1	0						
B-18-04	FEH	1	0							1	0						
B-18-05	FEH	1	0							1	1	0	2.19				
B-18-06	FEH	1	0							1	1	0	2.87				
B-18-07	FEH	1	0							1	0						
B-18-08	FEH	1	0							1	0						
B-18-09	FEH	1	0							1	0						
B-18-10	FEH	1	0							1	0						
B-18-11	FEH	1	0							1	0						
B-18-12	FEH	2	0							2	2	0	5.01				
B-18-13	FEH	1	0							1	0						
B-18-22	FEH	1	0							1	0						
B-18-23	FEH	1	0							1	0						
WMW-24	FEH	3	0			3	0			3	3	0	8.92	3	3	0	9.12
WMW-26	FEH	3	0			3	0			3	2	0	15	3	2	0	14
WMW-27	FEH	3	0			3	0			3	0			3	0		
WMW-28	FEH	6	0			6	0			6	6	0	4.35	6	6	0	4.28
WMW-29	FEH	3	0			3	0			3	0			3	0		

Analyte		Lead								Mercury							
CAS_RN		7439-92-1								7439-97-6							
MTCA CUL		15								2							
MTCA CUL Note		Method A								Method A							
FRACTION		Dissolved				Total				Dissolved				Total			
Well ID	Site Area	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)
B-16-17	NML	1	0			1	1	1	19.9								
B-18-24	NML	1	0							1	0						
WMW-07	NML	1	0			1	0										
WMW-08	NML																
WMW-12	NML	4	0			4	0										
WMW-31	NML	3	0			3	0			3	0			3	0		
WSB-04-34	SML	1	1	0	6.33					1	0						
WMW-01	SML	3	0			3	0										
WMW-02	SML					1	0							1	0		
WMW-03	SML	3	0			4	0							1	0		
WMW-04	SML																
WMW-05	SML	3	0			4	0							1	0		
WMW-06	SML					1	0							1	0		
WMW-09	SML	3	0			3	0										
WMW-10	SML	3	0			3	0										
WMW-11	SML	3	0			3	0										
WMW-13	SML	3	0			3	0										
WMW-14	SML	4	0			4	0										
WMW-15	SML	5	0			5	0										
WMW-16	SML	4	0			4	0										
WMW-17	SML	6	0			6	0										
WMW-18	SML	4	0			4	0										
WMW-19	SML	3	0			3	0										
RMD-1	SML	3	0			3	0										
RMD-2	SML	5	0			5	0										
RMD-3	SML	3	0			3	0										
RMD-4	SML	3	0			3	0										
RMD-5	SML	3	0			3	0										
B-16-10	FEH	1	0			1	1	1	1860	1	0			1	1	0	0.51
B-16-11	FEH	1	0			1	1	1	445	1	0			1	1	0	0.52
B-16-12	FEH	1	0			1	1	1	78.6	1	0			1	0		
B-16-18	FEH	1	0			1	1	1	68	1	0			1	0		
B-16-19	FEH	1	0			1	1	0	7.52	1	0			1	0		
B-16-20	FEH	1	0			1	1	1	46.2	1	0			1	0		
B-16-21	FEH	1	0			1	1	0	7.3	1	0			1	0		
B-16-22	FEH	1	0			1	1	1	222	1	0			1	0		
B-16-23	FEH	1	1	0	6.29	1	1	1	4530	1	0			1	1	0	0.3
B-16-24	FEH	2	0			2	2	1	30.5	2	0			2	0		
B-18-01	FEH	1	0							1	0						
B-18-02	FEH	1	0							1	0						
B-18-03	FEH	1	0							1	0						
B-18-04	FEH	1	0							1	0						
B-18-05	FEH	1	0							1	0						
B-18-06	FEH	1	0							1	0						
B-18-07	FEH	1	0							1	0						
B-18-08	FEH	1	0							1	0						
B-18-09	FEH	1	0							1	0						
B-18-10	FEH	1	0							1	0						
B-18-11	FEH	1	0							1	0						
B-18-12	FEH	2	0							2	0						
B-18-13	FEH	1	0							1	0						
B-18-22	FEH	1	0							1	0						
B-18-23	FEH	1	0							1	0						
WMW-24	FEH	3	0			3	0			3	0			3	0		
WMW-26	FEH	3	0			3	0			3	0			3	0		
WMW-27	FEH	3	0			3	0			3	0			3	0		
WMW-28	FEH	6	0			6	0			6	0			6	0		
WMW-29	FEH	3	0			3	0			3	0			3	0		

SUMMARY OF METALS IN GROUNDWATER ANALYTICAL RESULTS
BNSF Wishram Railyard, Wishram, Washington

Analyte		Arsenic								Barium							
CAS_RN		7440-38-2								7440-39-3							
MTCA CUL		5								3200							
MTCA CUL Note		Method A								Method B Non cancer							
FRACTION		Dissolved				Total				Dissolved				Total			
Well ID	Site Area	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)
B-16-09	BEH	1	0			1	1	1	31.8	1	1	0	44	1	1	0	1020
B-18-14	BEH	1	1	1	7.57					1	1	0	41.2				
B-18-15	BEH	1	1	1	7.12					1	1	0	43.6				
B-18-16	BEH	1	1	1	7.81					1	1	0	41.6				
B-18-17	BEH	1	1	1	15.5					1	1	0	34.3				
B-18-18	BEH	1	1	1	7.06					1	1	0	44.9				
B-18-19	BEH	1	1	0	4.8					1	1	0	32.9				
B-18-21	BEH	1	1	1	10.1					1	1	0	39.6				
RMD-6	BEH	3	3	3	14.8	3	3	3	14.5	3	3	0	32.6	3	3	0	31.3
WMW-20	BEH	3	3	1	7.59	3	3	1	7.58	3	3	0	46.2	3	3	0	47.9
WMW-21	BEH	3	3	3	6.76	3	3	3	6.43	3	3	0	22	3	3	0	23.3
WMW-22	BEH	3	3	2	5.9	3	3	2	5.38	3	3	0	32.6	3	3	0	32.3
WMW-23	BEH	3	3	3	17.6	3	3	3	17.8	3	3	0	22.6	3	3	0	29.8
B-16-13	FOH	1	0			1	0			1	1	0	27.6	1	1	0	192
B-16-14	FOH	1	0			1	0			1	1	0	68.1	1	1	0	352
WMW-30	FOH	3	3	0	4.34	3	3	0	4.37	4	4	0	42.4	4	4	1	16500
B-16-15	SFE	2	0			2	2	2	32.8	2	2	0	143	2	2	0	494
B-16-16	SFE	1	0			1	1	1	11.5	1	1	0	68.3	1	1	0	327
B-18-26	SFE	1	1	1	9.04					1	1	0	64.8				
B-18-27	SFE	1	1	1	11.8					1	1	0	49.7				
B-18-28	SFE	1	1	1	6.35					1	1	0	52.7				
B-18-29	SFE	1	1	1	10.5					1	1	0	63.1				
B-18-30	SFE	1	1	1	14.1					1	1	0	38.4				
WMW-32	SFE	3	3	2	5.83	3	3	0	4.99	3	3	0	51.9	3	3	0	48.6

Analyte		Cadmium								Chromium, total							
CAS_RN		7440-43-9								7440-47-3							
MTCA CUL		5								50							
MTCA CUL Note		Method A								Method A							
FRACTION		Dissolved				Total				Dissolved				Total			
Well ID	Site Area	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)
B-16-09	BEH	1	0			1	1	0	3.92	1	0			1	1	1	157
B-18-14	BEH	1	0							1	0						
B-18-15	BEH	1	0							1	1	0	3.78				
B-18-16	BEH	1	0							1	0						
B-18-17	BEH	1	0							1	0						
B-18-18	BEH	1	0							1	0						
B-18-19	BEH	1	0							1	0						
B-18-21	BEH	1	0							1	0						
RMD-6	BEH	3	0			3	0			3	0			3	0		
WMW-20	BEH	3	0			3	0			3	0			3	0		
WMW-21	BEH	3	0			3	0			3	0			3	0		
WMW-22	BEH	3	0			3	0			3	0			3	0		
WMW-23	BEH	3	0			3	0			3	0			3	0		
B-16-13	FOH	1	0			1	0			1	1	0	18.1	1	1	0	42.4
B-16-14	FOH	1	0			1	0			1	0			1	1	1	58.8
WMW-30	FOH	3	0			3	0			3	2	0	2.27	3	1	0	2.35
B-16-15	SFE	2	0			2	2	0	4.68	2	0			2	2	2	60.2
B-16-16	SFE	1	0			1	0			1	0			1	1	0	25.9
B-18-26	SFE	1	0							1	0						
B-18-27	SFE	1	0							1	0						
B-18-28	SFE	1	0							1	0						
B-18-29	SFE	1	0							1	0						
B-18-30	SFE	1	0							1	0						
WMW-32	SFE	3	0			3	0			3	2	0	9.76	3	2	0	9.04

Analyte		Lead								Mercury							
CAS_RN		7439-92-1								7439-97-6							
MTCA CUL		15								2							
MTCA CUL Note		Method A								Method A							
FRACTION		Dissolved				Total				Dissolved				Total			
Well ID	Site Area	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)
B-16-09	BEH	1	0			1	1	1	61.7	1	0			1	0		
B-18-14	BEH	1	0							1	0						
B-18-15	BEH	1	0							1	0						
B-18-16	BEH	1	0							1	0						
B-18-17	BEH	1	0							1	0						
B-18-18	BEH	1	1	0	4.52					1	0						
B-18-19	BEH	1	0							1	0						
B-18-21	BEH	1	0							1	0						
RMD-6	BEH	3	0			3	0			3	0			3	0		
WMW-20	BEH	3	0			3	0			3	0			3	0		
WMW-21	BEH	3	0			3	0			3	0			3	0		
WMW-22	BEH	3	0			3	0			3	0			3	0		
WMW-23	BEH	3	0			3	1	0	9.68	3	0			3	0		
B-16-13	FOH	1	0			1	1	1	59.5	1	0			1	0		
B-16-14	FOH	1	0			1	1	1	308	1	0			1	0		
WMW-30	FOH	3	1	0	5.69	3	1	0	2.85	3	0			3	0		
B-16-15	SFE	2	0			2	2	2	1420	2	0			2	2	0	1.45
B-16-16	SFE	1	0			1	1	1	115	1	0			1	0		
B-18-26	SFE	1	0							1	0						
B-18-27	SFE	1	0							1	0						
B-18-28	SFE	1	0							1	0						
B-18-29	SFE	1	1	0	2.52					1	0						
B-18-30	SFE	1	0							1	0						
WMW-32	SFE	3	0			3	0			3	0			3	0		

SUMMARY OF METALS IN GROUNDWATER ANALYTICAL RESULTS
BNSF Wishram Railyard, Wishram, Washington

	Analyte	Selenium								Silver								Iron				Manganese			
	CAS_RN	7782-49-2								7440-22-4								7439-89-6				7439-96-5			
	MTCA CUL	80								80								11000				750			
	MTCA CUL Note	Method B Non cancer								Method B Non cancer								Method B Non cancer				Method B Non cancer			
	FRACTION	Dissolved				Total				Dissolved				Total				Dissolved				Dissolved			
Well ID	Site Area	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)
B-16-17	NML																								
B-18-24	NML	1	0							1	0														
WMW-07	NML																	3	2	0	2790	1	1	1	1660
WMW-08	NML																	2	1	0	310				
WMW-12	NML																	8	0			8	3	0	225
WMW-31	NML	3	0			3	0			3	0			3	0			6	0			6	6	0	587
WSB-04-34	SML	1	1	0	1.46					1	0														
WMW-01	SML																	11	9	4	15500	7	7	6	2000
WMW-02	SML					2	2	0	6.5					1	0										
WMW-03	SML					2	1	0	2.65					1	0			11	10	1	11700	8	8	8	6750
WMW-04	SML																								
WMW-05	SML					1	0							1	0			11	1	0	183	7	4	0	22.5
WMW-06	SML					2	2	0	2.12					1	0										
WMW-09	SML																	11	1	0	100	7	7	2	1020
WMW-10	SML																	11	1	0	135	7	1	0	30.9
WMW-11	SML																	12	9	0	2900	7	7	7	2070
WMW-13	SML																	7	0			7	5	1	856
WMW-14	SML																	13	0			13	5	0	200
WMW-15	SML																	14	11	0	5630	14	14	10	1650
WMW-16	SML																	13	10	2	18400	13	13	7	3310
WMW-17	SML																	21	19	0	5090	21	21	16	2330
WMW-18	SML																	13	1	0	155	13	11	0	730
WMW-19	SML																	6	2	0	712	6	6	0	420
RMD-1	SML																	7	7	0	6050	7	7	7	2550
RMD-2	SML																	10	10	0	6930	10	10	10	3360
RMD-3	SML																	7	7	0	2160	7	7	1	772
RMD-4	SML																	7	0			7	7	0	158
RMD-5	SML																	3	0			3	3	0	630
B-16-10	FEH	1	0			1	0			1	0			1	0										
B-16-11	FEH	1	0			1	0			1	0			1	0										
B-16-12	FEH	1	0			1	0			1	0			1	0										
B-16-18	FEH	1	0			1	0			1	0			1	0										
B-16-19	FEH	1	0			1	0			1	0			1	0										
B-16-20	FEH	1	0			1	0			1	0			1	0										
B-16-21	FEH	1	0			1	0			1	0			1	0										
B-16-22	FEH	1	0			1	0			1	0			1	0										
B-16-23	FEH	1	0			1	0			1	0			1	0										
B-16-24	FEH	2	0			2	0			2	0			2	0										
B-18-01	FEH	1	0							1	0														
B-18-02	FEH	1	0							1	0														
B-18-03	FEH	1	0							1	0														
B-18-04	FEH	1	0							1	0														
B-18-05	FEH	1	0							1	0														
B-18-06	FEH	1	0							1	0														
B-18-07	FEH	1	0							1	0														
B-18-08	FEH	1	0							1	0														
B-18-09	FEH	1	0							1	0														
B-18-10	FEH	1	0							1	0														
B-18-11	FEH	1	0							1	0														
B-18-12	FEH	2	0							2	0														
B-18-13	FEH	1	0							1	0														
B-18-22	FEH	1	0							1	0														
B-18-23	FEH	1	0							1	0														
WMW-24	FEH	3	0			3	0			3	0			3	0			7	0			7	7	0	489
WMW-26	FEH	3	0			3	0			3	0			3	0			6	1	0	683	6	6	3	2550
WMW-27	FEH	3	0			3	0			3	0			3	0			6	1	0	298	6	5	0	361
WMW-28	FEH	6	0			6	0			6	0			6	0			9	0			9	5	0	163
WMW-29	FEH	3	0			3	0			3	0			3	0			6	3	0	600	6	6	6	5570

SUMMARY OF METALS IN GROUNDWATER ANALYTICAL RESULTS
BNSF Wishram Railyard, Wishram, Washington

	Analyte	Selenium								Silver								Iron				Manganese			
	CAS_RN	7782-49-2								7440-22-4								7439-89-6				7439-96-5			
	MTCA CUL	80								80								11000				750			
	MTCA CUL Note	Method B Non cancer								Method B Non cancer								Method B Non cancer				Method B Non cancer			
	FRACTION	Dissolved				Total				Dissolved				Total				Dissolved				Dissolved			
Well ID	Site Area	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)	Samples	Detections	Detections Above CUL	Detection Max (µg/L)
B-16-09	BEH	1	0			1	0			1	0			1	0										
B-18-14	BEH	1	0							1	0														
B-18-15	BEH	1	0							1	0														
B-18-16	BEH	1	0							1	0														
B-18-17	BEH	1	0							1	0														
B-18-18	BEH	1	0							1	0														
B-18-19	BEH	1	0							1	0														
B-18-21	BEH	1	0							1	0														
RMD-6	BEH	3	0			3	0			3	0			3	0			3	0			3	3	0	204
WMW-20	BEH	3	0			3	0			3	0			3	0			6	3	0	4210	6	6	4	2410
WMW-21	BEH	3	0			3	0			3	0			3	0			6	0			6	3	2	939
WMW-22	BEH	3	0			3	0			3	0			3	0			6	0			6	2	0	30.4
WMW-23	BEH	3	0			3	0			3	0			3	0			6	0			6	4	0	202
B-16-13	FOH	1	0			1	0			1	0			1	0										
B-16-14	FOH	1	0			1	0			1	0			1	0										
WMW-30	FOH	3	0			3	0			3	0			3	0			6	0			6	6	1	1040
B-16-15	SFE	2	0			2	0			2	0			2	0										
B-16-16	SFE	1	0			1	0			1	0			1	0										
B-18-26	SFE	1	0							1	0														
B-18-27	SFE	1	0							1	0														
B-18-28	SFE	1	0							1	0														
B-18-29	SFE	1	0							1	0														
B-18-30	SFE	1	0							1	0														
WMW-32	SFE	3	1	0	3.01	3	1	0	3.09	3	0			3	0			6	0			6	4	0	477

Site Areas:

NML = North of Mainline Tracks. SML = South of Mainline Tracks. FEH = Former Engine House/Machine Shop Area. BEH = Berm Area south of former Engine House/Machine Shop. FOH = Former Oil House Area. SFE = Former Septic Field and East Area. Refer to Figures 2 through 5.

Summary of total counts of the following for each monitoring well (WMW-# or RMD-#) and reconnaissance groundwater (RGW) sample (B-# or WSB-#) and laboratory constituent shown:

Samples - Groundwater samples collected in the period of record for each monitoring well or RGW location, including primary and duplicate samples. Sampling events span September 2003 through November 2019.

Detections - Groundwater samples (primary and duplicates) with detected concentration above laboratory reporting limits

Detections above CUL - Groundwater samples (primary and duplicates) with detected concentration above applicable MTCA Method A or B cleanup levels (CULs)

Maximum detected concentration in micrograms per liter (µg/L) above laboratory reporting limits.

3	Blue shading of "Detections Above CUL" indicates one or more sample result was above the applicable CUL.
9,500	Blue shading of "Detection Max" indicates result was above the applicable CUL.

Former Wells (shaded grey): WMW-2 was removed in 2005, WMW-4 was destroyed in 2006, and WMW-6 was removed in 2006.

TABLE 24

SUMMARY OF LNAPL PHYSICAL PROPERTIES
BNSF Wishram Railyard, Wishram, Washington

Well/ Location	Sample ID	Matrix	Date	Sample Location	Sample Depth (ft bgs)	Color	Temperature °F	ASTM D1481 Density g/cc	ASTM D1481 Specific Gravity unitless	ASTM D445 Dynamic Viscosity cP	DuNuoy Method - ASTM D971 Water-Oil Interfacial Tension dynes/cm	DuNuoy Method - ASTM D971 Water-Air Surface Tension dynes/cm	DuNuoy Method - ASTM D971 Oil-Air Surface Tension dynes/cm
TG-D4 (temp well)	NAPL (PURE)	NAPL	Jul 2013	LIF Location TG-D4	40	Black	50	0.9760	0.9762	7210	19.3 (74°F)	71.7 (74°F)	32.0 (74°F)
TG-D4 (temp well)	NAPL (PURE)	NAPL	Jul 2013	LIF Location TG-D4	40	Black	70	0.9672	0.9692	--			
TG-D4 (temp well)	NAPL (PURE)	NAPL	Jul 2013	LIF Location TG-D4	40	Black	100	0.9582	0.9649	438			
TG-D4 (temp well)	NAPL (PURE)	NAPL	Jul 2013	LIF Location TG-D4	40	Black	130	0.9444	0.9579	141			
TG-D4 (temp well)	Water	Groundwater	Jul 2013	LIF Location TG-D4	18	--	50	0.9996	0.9999	1.37	--	--	--
TG-D4 (temp well)	Water	Groundwater	Jul 2013	LIF Location TG-D4	18	--	70	0.9964	0.9985	--			
TG-D4 (temp well)	Water	Groundwater	Jul 2013	LIF Location TG-D4	18	--	100	0.9912	0.9981	0.69			
TG-D4 (temp well)	Water	Groundwater	Jul 2013	LIF Location TG-D4	18	--	130	0.9782	0.9922	0.52			
OHM-1	OHM-1 Fluid NAPL	NAPL	Nov 2016	OHM-1	12	Black	70	0.9537	0.9557	839	15.4 (71°F)	71.7 (71°F)	31.5 (73°F)
OHM-1	OHM-1 Fluid NAPL	NAPL	Nov 2016	OHM-1	12	Black	100	0.9429	0.9495	220			
OHM-1	OHM-1 Fluid NAPL	NAPL	Nov 2016	OHM-1	12	Black	130	0.9320	0.9452	78.5			
OHM-1	OHM-1-NAPL-20190722	NAPL	Jul 2019	OHM-1	10	Black	70	0.9494	0.9496	695.92	12.9 (80°F)	58.2 (79.5°F)	31.4 (81°F)
OHM-1	OHM-1-NAPL-20190722	NAPL	Jul 2019	OHM-1	10	Black	100	0.9397	0.9463	188.08			
OHM-1	OHM-1-NAPL-20190722	NAPL	Jul 2019	OHM-1	10	Black	130	0.9292	0.9424	70.28			
OHM-2	OHM-2 Fluid NAPL	NAPL	Feb 2017	OHM-2	12	Black	70	0.9619	0.9639	1580	16.7 (76°F)	71.7 (74°F)	31.8 (76°F)
OHM-2	OHM-2 Fluid NAPL	NAPL	Feb 2017	OHM-2	12	Black	100	0.9544	0.9611	396			
OHM-2	OHM-2 Fluid NAPL	NAPL	Feb 2017	OHM-2	12	Black	130	0.9408	0.9542	122			
OHM-2	OHM-2-WATER-20190722	Groundwater	Jul 2019	OHM-2	25	--	70	0.9981	0.9983	0.9906	--	--	--
OHM-2	OHM-2-WATER-20190722	Groundwater	Jul 2019	OHM-2	25	--	100	0.9930	0.9999	0.6890			
OHM-2	OHM-2-WATER-20190722	Groundwater	Jul 2019	OHM-2	25	--	130	0.9832	0.9900	0.4840			
OHM-3	OHM-3 Fluid NAPL	NAPL	Nov 2016	OHM-3	12	Black	70	0.9708	0.9728	2264	18.1 (71°F)	71.7 (71°F)	31.6 (73°F)
OHM-3	OHM-3 Fluid NAPL	NAPL	Nov 2016	OHM-3	12	Black	100	0.9601	0.9668	482			
OHM-3	OHM-3 Fluid NAPL	NAPL	Nov 2016	OHM-3	12	Black	130	0.9489	0.9624	154			
OHM-3	OHM-3-NAPL-20190722	NAPL	Jul 2019	OHM-3	12	Black	70	0.9600	0.9602	1989.18	14.5 (81.1°F)	59.2 (80°F)	32.0 (81°F)
OHM-3	OHM-3-NAPL-20190722	NAPL	Jul 2019	OHM-3	12	Black	100	0.9512	0.9578	421.29			
OHM-3	OHM-3-NAPL-20190722	NAPL	Jul 2019	OHM-3	12	Black	130	0.9406	0.9540	133.34			
OHM-3	OHM-3-WATER-20190722	Groundwater	Jul 2019	OHM-3	20	--	70	0.9982	0.9984	0.9935	--	--	--
OHM-3	OHM-3-WATER-20190722	Groundwater	Jul 2019	OHM-3	20	--	100	0.9930	0.9999	0.6900			
OHM-3	OHM-3-WATER-20190722	Groundwater	Jul 2019	OHM-3	20	--	130	0.9854	0.9994	0.4827			

Notes:
Analyses for fluid properties performed by PTS Laboratories, Inc. of Santa Fe Springs, California between 2013 and 2017, and PTS Laboratires, Inc. of Houston, Texas in 2019.
NAPL = non-aqueous phase liquid; dynes/cm = dynes per cenitmeter
g/cc = grams per cubic centimeter; °F = degrees Fahrenheit
cp = centipoise; ASTM = ASTM International
Interfacial and surface tensions measured at ambient laboratory temperature (values shown above).
(temp well) = Sample collected in July 2013 from temporary well adjacent to laser-induced fluorescence (LIF) boring TG-D4.
Well OHM-1 July 2019 interfacial tension tests for Water-Oil and Oil-Air performed using groundwater collected from well OHM-2.

TABLE 25

SUMMARY OF SOIL CORE AND LNAPL MOBILITY ANALYSES
BNSF Wishram Railyard, Wishram, Washington

2013 Soil Core Samples

				Physical Properties Data - Pore Fluid Saturations								Drainage (Effective) Porosity			Air/Water Capillary Pressure			
					API RP 40 / ASTM D2216	API RP 40							ASTM D425	ASTM D425	EPA 9100			EPA 9100
Well/ Location	Soil Core Depth (in feet bgs)	Lithology	Core Length	Sample Depth and Orientation	Moisture Content	Density Dry Bulk	Grain Density	Total Porosity	Air-Filled Porosity	Pore Fluid Saturation (water)	Pore Fluid Saturation (NAPL)	Sample Depth and Orientation	Total Porosity	Effective Porosity	Sample Depth and Orientation	Specific Permeability to Air	Effective Permeability to Water	Horizontal Hydraulic Conductivity
			feet	feet	% weight	g/cc	g/cc	% Vb	% Vb	% Pv	% Pv	feet	% Vb	% Vb	feet	millidarcy	millidarcy	cm/s
TG-D6	30' - 32'	Fine sand	2.00	30.9 (V)	27.4	1.30	2.70	51.7	15.5	38.2	31.9	31.7 (V)	44.3	21.7	31.5 (H)	1220	48.6	4.87E-05
TG-F2	34.3' - 36.3'	Fine sand	2.00	34.9 (V)	30.9	1.37	2.70	49.2	6.7	71.2	15.1	35.1 (V)	42.2	33.2	35.4 (H)	124	15.6	1.55E-05
TG-F6	28' - 30'	Fine sand	2.00	28.9 (V)	28.1	1.29	2.70	52.2	15.7	58.2	11.8	28.7 (V)	47.2	33.1	29.1 (H)	6850	4180	4.16E-03

				Free Product Mobility Centrifugal method ASTM D425M, Dean-Stark								Free Product Mobility Water Drive Test API RP 40, Dean-Stark						
Well/ Location	Soil Core Depth (in feet bgs)	Lithology	Core Length	Sample Depth and Orientation	Initial Saturation		After Centrifuge at 1000XG Saturation		Percent Difference Saturation	NAPL Produced During Centrifuge?	Residual NAPL Concentration $C_{res,soil}$	Sample Depth and Orientation	Initial Saturation		After Water Drive Test Saturation		Percent Difference Saturation	NAPL Produced During Water Drive?
					Water	NAPL	Water	NAPL	NAPL		NAPL		Water	NAPL	Water	NAPL	NAPL	
			feet	feet	% Pv	% Pv	% Pv	% Pv	%	Y/N	mg/kg	feet	% Pv	% Pv	% Pv	% Pv	%	Y/N
TG-D6	30' - 32'	Fine sand	2.00	31.3 (V)	36.6	31.2	9.0	17.6	56%	Y	57,600	31.9 (V)	47.1	50.4	51.6	33.6	40.0%	Y
				Dark brown LNAPL produced. Produced water clear.								Dark brown LNAPL produced; 42.1 pore volumes of water injected. Produced water clear, yellow tint with moderate hydrocarbon odor.						
TG-F2	34.3' - 36.3'	Fine sand	2.00	36.1 (V)	75.8	7.7	21.6	7.0	9.5%	Y	20,700	35.6 (V)	80.0	6.2	80.7	6.2	0.0%	N
				Dark brown LNAPL produced. Produced water clear.								No visible LNAPL produced; 9.1 pore volumes of water injected. Produced water clear with faint hydrocarbon odor.						
TG-F6	28' - 30'	Fine sand	2.00	28.5 (V)	68.6	14.5	19.3	13.9	4.2%	Y	48,800	28.3 (V)	68.3	12.9	68.3	12.9	0.0%	N
				Dark brown LNAPL produced. Produced water clear.								No visible LNAPL produced; 7.4 pore volumes of water injected. Produced water clear, yellow tint with faint hydrocarbon odor. Sample compressed slightly from confining pressure.						

Notes:
Analyses for fluid properties performed by PTS Laboratories, Inc. of Santa Fe Springs, California.
NAPL = non-aqueous phase liquid
-- = analysis not performed
g/cc = grams per cubic centimeter
cp = centipoise
dynes/cm = dynes per cenitmeter
° F = degrees Fahrenheit
ASTM = ASTM International
Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

(1) Sample Orientation: H = horizontal; V = vertical; R = remold
(2) Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids.
(3) Fluid density used to calculate pore fluid saturations: Water = 0.9996 g/cc, NAPL = 0.8600 g/cc.
(4) Specific = No pore fluids in place.
(5) Effective (Native) = With as-received pore fluids in place.
(6) Permeability to water and hydraulic conductivity measured at saturated conditions.
Air = Nitrogen gas, Water = filtered Laboratory Fresh (tap) or Site water.
Residual NAPL Concentration ($C_{res,soil}$) calculated according to Equation 3 of Brost et. al., 2000.
Water drives conducted at 25 psi confining pressure and 70°F. Laboratory fresh water (tap) used as injection fluid.

SUMMARY OF SOIL CORE AND LNAPL MOBILITY ANALYSES
BNSF Wishram Railyard, Wishram, Washington

2016 Soil Core Samples

				Physical Properties Data - Pore Fluid Saturations								Drainage (Effective) Porosity			Air/Water Capillary Pressure			
				API RP 40 / ASTM D2216		API RP 40							ASTM D425	ASTM D425	EPA 9100			EPA 9100
Well/ Location	Soil Core Depth (in feet bgs)	Lithology	Core Length	Sample Depth and Orientation	Moisture Content	Density Dry Bulk	Grain Density	Total Porosity	Air-Filled Porosity	Pore Fluid Saturation (water)	Pore Fluid Saturation (NAPL)	Sample Depth and Orientation	Total Porosity	Effective Porosity	Sample Depth and Orientation	Specific Permeability to Air	Effective Permeability to Water	Horizontal Hydraulic Conductivity
			feet	feet	% weight	g/cc	g/cc	% Vb	% Vb	% Pv	% Pv	feet	% Vb	% Vb	feet	millidarcy	millidarcy	cm/s
OHM-1	52.5' - 55'	Gravel with silt and sand	2.50	55.0 (H)	6.5	2.14	2.69	20.4	5.4	40.2	33.1	54.8 (H)	35.1	20.9	54.2 (H)	1,180	75.3	7.57E-05
OHM-2	38' - 40'	Fine Sand	2.00	38.8 (H)	23.2	1.37	2.68	48.8	14.6	36.6	33.4	39.6 (H)	44.8	35.2	39.2 (H)	13,100	1,340	1.35E-03
OHM-3	28.5' - 31'	Fine Sand	2.50	28.8 (H)	34.0	1.32	2.64	50.2	3.1	61.1	32.7	30.5 (H)	45.9	30.2	30.1 (H)	383	5.21	5.26E-06
OHM-4	23' - 25'	Fine Sand	2.00	24.1 (H)	21.3	1.62	2.66	39.2	3.6	70.7	20.2	23.9 (H)	43.2	20.9	24.5 (H)	675	38.8	3.93E-05

				Free Product Mobility Centrifugal method ASTM D425M, Dean-Stark								Free Product Mobility Water Drive Test API RP 40, Dean-Stark						
Well/ Location	Soil Core Depth (in feet bgs)	Lithology	Core Length	Sample Depth and Orientation	Initial Saturation		After Centrifuge at 1000XG Saturation		Percent Difference Saturation	NAPL Produced During Centrifuge?	Residual NAPL Concentration $C_{res,soil}$	Sample Depth and Orientation	Initial Saturation		After Water Drive Test Saturation		Percent Difference Saturation	NAPL Produced During Water Drive?
					Water	NAPL	Water	NAPL	NAPL		NAPL		Water	NAPL	Water	NAPL	NAPL	
			feet	feet	% Pv	% Pv	% Pv	% Pv	%	Y/N	mg/kg	feet	% Pv	% Pv	% Pv	% Pv	%	Y/N
OHM-1	52.5' - 55'	Gravel with silt and sand	2.50	54.8 (H)	40.1	31.6	13.8	19.1	49%	Y	30,100	54.75 (H)	51.8	29.5	54.0	27.8	5.9%	Y
				Dark brown LNAPL produced. Produced water clear.								Dark brown LNAPL produced; 12.1 pore volumes of water injected. Produced water clear with faint hydrocarbon odor.						
OHM-2	38' - 40'	Fine Sand	2.00	38.6 (H)	26.9	39.8	5.6	13.8	97%	Y	43,300	39.0 (H)	37.7	29.3	46.5	29.3	0.0%	N
				Dark brown LNAPL produced. Produced water clear.								No visible LNAPL produced; 7.4 pore volumes of water injected. Produced water clear with faint hydrocarbon odor.						
OHM-3	28.5' - 31'	Fine Sand	2.50	29 (H)	60.6	29.8	24.8	28.2	5.5%	Y	94,100	30.9 (H)	66.4	22.9	65.1	22.9	0.0%	N
				Dark brown LNAPL produced. Produced water clear.								No visible LNAPL produced; 7.3 pore volumes of water injected. Produced water clear with faint hydrocarbon odor						
OHM-4	23' - 25'	Fine Sand	2.00	24.9 (H)	71.0	15.6	21.0	15.5	0.6%	Y	39,700	24.7 (H)	69.2	19.1	72.4	19.1	0.0%	Y (trace)
				Dark brown LNAPL produced. Produced water clear.								Trace LNAPL produced; 8.4 pore volumes of water injected. Produced water clear with faint hydrocarbon odor						

Notes:
Analyses for fluid properties performed by PTS Laboratories, Inc. of Santa Fe Springs, California.
NAPL = non-aqueous phase liquid
-- = analysis not performed
g/cc = grams per cubic centimeter
cp = centipoise
dynes/cm = dynes per cenitmeter
° F = degrees Fahrenheit
ASTM = ASTM International
Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

(1) Sample Orientation: H = horizontal; V = vertical; R = remold
(2) Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids.
(3) Fluid density used to calculate pore fluid saturations: Water = 0.9996 g/cc, NAPL = 0.8600 g/cc.
(4) Specific = No pore fluids in place.
(5) Effective (Native) = With as-received pore fluids in place.
(6) Permeability to water and hydraulic conductivity measured at saturated conditions.
Air = Nitrogen gas, Water = filtered Laboratory Fresh (tap) or Site water.
Residual NAPL Concentration ($C_{res,soil}$) calculated according to Equation 3 of Brost et. al., 2000.
Water drives conducted at 25 psi confining pressure and 70°F. Laboratory fresh water (tap) used as injection fluid.

SUMMARY OF LNAPL ANALYTICAL RESULTS
BNSF Wishram Railyard, Wishram, Washington

	Location	OHM-1	OHM-3	OHM-1	OHM-2	OHM-3
	Sample Date	5/6/2019	5/6/2019	7/22/2019	7/22/2019	7/22/2019
	Sample ID	OHM-1-20190506	OHM-3-20190506	OHM-1-NAPL-20190722	OHM-2-NAPL-20190722	OHM-3-NAPL-20190722
	Sample Delivery Group	L1097316	L1097316	19G0330	19G0330	19G0330
	Notes					
Chemical	Unit					
Metals						
Arsenic	mg/kg	< 2.00	< 2.00	--	--	--
Barium	mg/kg	< 0.500	< 0.500	--	--	--
Cadmium	mg/kg	< 0.500	< 0.500	--	--	--
Chromium, total	mg/kg	< 1.00	< 1.00	--	--	--
Copper	mg/kg	**1.01**	< 2.00	--	--	--
Lead	mg/kg	< 0.500	< 0.500	--	--	--
Mercury	mg/kg	< 0.0200 U	< 0.0200 U	--	--	--
Nickel	mg/kg	**0.619**	**1.53**	--	--	--
Selenium	mg/kg	< 2.00	< 2.00	--	--	--
Silver	mg/kg	< 1.00	< 1.00	--	--	--
Zinc	mg/kg	< 5.00	< 5.00	--	--	--
Polychlorinated Biphenyls (PCBs)						
PCB-1016 (Aroclor 1016)	mg/kg	< 1.00	< 1.00	--	--	--
PCB-1221 (Aroclor 1221)	mg/kg	< 1.00	< 1.00	--	--	--
PCB-1232 (Aroclor 1232)	mg/kg	< 1.00	< 1.00	--	--	--
PCB-1242 (Aroclor 1242)	mg/kg	< 1.00	< 1.00	--	--	--
PCB-1248 (Aroclor 1248)	mg/kg	< 1.00	< 1.00	--	--	--
PCB-1254 (Aroclor 1254)	mg/kg	< 1.00	< 1.00	--	--	--
PCB-1260 (Aroclor 1260)	mg/kg	< 1.00	< 1.00	--	--	--
Total PCBs (HalfDL_WA)	mg/kg	< 0.50	< 0.50	--	--	--
Total PCBs (HitsOnly)	mg/kg	ND	ND	--	--	--
NWTPH-Dx without silica gel cleanup						
Diesel Range Organics (DRO)	mg/kg	**303,000**	**370,000**	**461,000 J**	**388,000 J**	**431,000 J**
Oil Range Organics (ORO)	mg/kg	**300,000**	**376,000**	**347,000 J**	**335,000 J**	**382,000 J**
Fuel Oil #6	mg/kg	--	--	**1,360,000 J**	**1,200,000 J**	**1,330,000 J**
NWTPH-EPH						
C8-C10 Aliphatics	mg/kg	--	--	**7,610 J**	**3,950 J**	**4,610 J**
C10-C12 Aliphatics	mg/kg	--	--	**19,200 J**	**14,600 J**	**16,500 J**
C12-C16 Aliphatics	mg/kg	--	--	**69,300 J**	**58,700 J**	**63,900 J**
C16-C21 Aliphatics	mg/kg	--	--	**86,700 J**	**76,300 J**	**79,200 J**
C21-C34 Aliphatics	mg/kg	--	--	**114,000 J**	**103,000 J**	**114,000 J**
C8-C10 Aromatics	mg/kg	--	--	< 2,000 J	< 2,000 J	< 2,000 J
C10-C12 Aromatics	mg/kg	--	--	< 2,000 J	< 2,000 J	< 2,000 J
C12-C16 Aromatics	mg/kg	--	--	**8,950 J**	**8,390 J**	**9,080 J**
C16-C21 Aromatics	mg/kg	--	--	**50,900 J**	**47,300 J**	**53,800 J**
C21-C34 Aromatics	mg/kg	--	--	**73,300 J**	**73,800 J**	**88,700 J**
Volatile Organic Compounds (VOCs)						
1,1,1,2-Tetrachloroethane	mg/kg	< 0.250	< 0.100	--	--	--
1,1,1-Trichloroethane	mg/kg	< 0.250	< 0.100	--	--	--
1,1,2,2-Tetrachloroethane	mg/kg	< 0.250	< 0.100	--	--	--
1,1,2-Trichloroethane	mg/kg	< 0.250	< 0.100	--	--	--
1,1-Dichloroethane	mg/kg	< 0.250	< 0.100	--	--	--
1,1-Dichloroethene	mg/kg	< 0.250	< 0.100	--	--	--
1,1-Dichloropropene	mg/kg	< 0.250	< 0.100	--	--	--
1,2,3-Trichlorobenzene	mg/kg	< 0.250	< 0.100	--	--	--
1,2,3-Trichloropropane	mg/kg	< 1.25	< 0.500	--	--	--
1,2,3-Trimethylbenzene	mg/kg	**4.53**	**30.9**	--	--	--
1,2,4-Trichlorobenzene	mg/kg	< 1.25	< 0.500	--	--	--
1,2,4-Trimethylbenzene	mg/kg	**22.5**	**17.5**	--	--	--
1,2-Dibromo-3-Chloropropane	mg/kg	< 2.50	< 1.00	--	--	--
1,2-Dibromoethane	mg/kg	< 0.250	< 0.100	--	--	--
1,2-Dichlorobenzene	mg/kg	< 0.500	< 0.200	--	--	--
1,2-Dichloroethane	mg/kg	< 0.250	< 0.100	--	--	--
1,2-Dichloropropane	mg/kg	< 0.500	< 0.200	--	--	--
1,3,5-Trimethylbenzene	mg/kg	< 0.500	< 0.200	--	--	--
1,3-Dichlorobenzene	mg/kg	< 0.500	< 0.200	--	--	--
1,3-Dichloropropane	mg/kg	< 0.500	< 0.200	--	--	--
1,4-Dichlorobenzene	mg/kg	< 0.500	< 0.200	--	--	--
2,2-Dichloropropane	mg/kg	< 0.250	< 0.100	--	--	--
2-Chlorotoluene	mg/kg	< 0.250	< 0.100	--	--	--
4-Chlorotoluene	mg/kg	< 0.500	< 0.200	--	--	--

SUMMARY OF LNAPL ANALYTICAL RESULTS
BNSF Wishram Railyard, Wishram, Washington

	Location	OHM-1	OHM-3	OHM-1	OHM-2	OHM-3
	Sample Date	5/6/2019	5/6/2019	7/22/2019	7/22/2019	7/22/2019
	Sample ID	OHM-1-20190506	OHM-3-20190506	OHM-1-NAPL-20190722	OHM-2-NAPL-20190722	OHM-3-NAPL-20190722
	Sample Delivery Group	L1097316	L1097316	19G0330	19G0330	19G0330
	Notes					
Chemical	Unit					
Volatile Organic Compounds (VOCs)						
Acetone	mg/kg	< 2.50	< 1.00	--	--	--
Acrylonitrile	mg/kg	< 1.25	< 0.500	--	--	--
Benzene	mg/kg	< 0.100	< 0.0400	--	--	--
Bromobenzene	mg/kg	< 1.25	< 0.500	--	--	--
Bromodichloromethane	mg/kg	< 0.250	< 0.100	--	--	--
Bromoform	mg/kg	< 2.50	< 1.00	--	--	--
Bromomethane	mg/kg	< 1.25	< 0.500	--	--	--
Carbon Tetrachloride	mg/kg	< 0.500	< 0.200	--	--	--
Chlorobenzene	mg/kg	< 0.250	< 0.100	--	--	--
Chloroethane	mg/kg	< 0.500	< 0.200	--	--	--
Chloroform	mg/kg	< 0.250	< 0.100	--	--	--
Chloromethane	mg/kg	< 1.25	< 0.500	--	--	--
cis-1,2-Dichloroethene	mg/kg	< 0.250	< 0.100	--	--	--
cis-1,3-Dichloropropene	mg/kg	< 0.250	< 0.100	--	--	--
Cymene (p-Isopropyltoluene)	mg/kg	**5.28**	**4.39**	--	--	--
Dibromochloromethane	mg/kg	< 0.250	< 0.100	--	--	--
Dibromomethane	mg/kg	< 0.500	< 0.200	--	--	--
Dichlorodifluoromethane	mg/kg	< 0.250	< 0.100	--	--	--
Di-Isopropyl ether (DIPE)	mg/kg	< 0.100	< 0.0400	--	--	--
Ethylbenzene	mg/kg	**0.0974**	**0.105**	--	--	--
Freon 113	mg/kg	< 0.250	< 0.100	--	--	--
Hexachlorobutadiene	mg/kg	< 2.50	< 1.00	--	--	--
Isopropylbenzene	mg/kg	**12.5**	**5.48**	--	--	--
Methyl ethyl ketone (2-Butanone)	mg/kg	< 2.50	< 1.00	--	--	--
Methyl Isobutyl Ketone (MIBK)	mg/kg	< 2.50	< 1.00	--	--	--
Methyl tert-Butyl ether	mg/kg	< 0.100	< 0.0400	--	--	--
Methylene Chloride	mg/kg	< 2.50	< 1.00	--	--	--
Naphthalene	mg/kg	**7.89**	**10.7**	--	--	--
n-Butylbenzene	mg/kg	**10.7**	**6.54**	--	--	--
n-Propylbenzene	mg/kg	**15.9**	**6.82**	--	--	--
Sec-Butylbenzene	mg/kg	**12.9**	**5.19**	--	--	--
Styrene	mg/kg	< 1.25	< 0.500	--	--	--
Tert-Butylbenzene	mg/kg	**1.65**	**0.772**	--	--	--
Tetrachloroethene (PCE)	mg/kg	< 0.250	< 0.100	--	--	--
Toluene	mg/kg	< 0.500	< 0.200	--	--	--
trans-1,2-Dichloroethene	mg/kg	< 0.500	< 0.200	--	--	--
trans-1,3-Dichloropropene	mg/kg	< 0.500	< 0.200	--	--	--
Trichloroethene (TCE)	mg/kg	< 0.100	< 0.0400	--	--	--
Trichlorofluoromethane	mg/kg	< 0.250	< 0.100	--	--	--
Vinyl Chloride	mg/kg	< 0.250	< 0.100	--	--	--
Xylene, m,p-	mg/kg	**1.44**	**2.04**	--	--	--
Xylene, o-	mg/kg	< 0.250	**0.675**	--	--	--

10 Detected concentrations at or above the method reporting limit are shown in bold

Abbreviations and Symbols

" - -" denotes not measured, not available, or not applicable.

" < " denotes not detected at or above the indicated method reporting limit.

"U" denotes that the value has been qualified as undetected (at the detected concentration if above the method reporting limit) due to blank contamination.

"J" indicates an estimated concentration based on either being less than the laboratory reporting limit or data validation findings.

"mg/kg" = milligrams per kilogram

Methods

Samples analyzed for metals using EPA Method 6010D and mercury by 7471B.

Samples analyzed for polychlorinated biphenyls (PCBs) using EPA Method 8082M.

Samples analyzed for diesel- and oil-range organics (DRO and ORO) and fuel oil #6 using NWTPH-Dx without silica gel cleanup.

Samples analyzed for Volatile Organic Compounds using EPA Method 8260.

Samples analyzed for extractable petroleum hydrocarbons (EPH) using Northwest Total Petroleum Hydrocarbon (NWTPH)-EPH.

Total PCBs = Total PCBs concentrations were calculated by summing indivdual PCB concentrations. Non-detects were included as noted.

(HalfDL_WA) = If an individual chemical was not detected, a value of one half the method reporting limit was used as the concentration in the calculation, except when all chemicals used in the calculation were not detected then one half the lowest method reporting limit was used as the total concentration.

TABLE 27

SUMMARY OF OIL SHEEN AND OIL DROPLET ANALYTICAL RESULTS (2016 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

	Location	River	River	River	River	River	River	River	River	River
	Sample ID	RIVER-NAPL	RIVER NODULE	RIVER NAPL 03	RIVER NAPL 04	RIVER SHEEN-080217	RIVER NAPL-080317	RIVERNAPL-20170920	RIVERSHEEN-20180807	RIVERSHEEN-20180808
	Sample Date	8/4/2016	8/12/2016	10/13/2016	10/14/2016	8/2/2017	8/3/2017	9/20/2017	8/7/2018	8/8/2018
	Parent Sample ID									
	Notes	(a)								(b)
Parameter	**Unit**									
NWEPH										
C8-C10 Aliphatics	µg/L	--	--	--	--	--	--	< 40	--	< 40
C10-C12 Aliphatics	µg/L	--	--	--	--	--	--	< 40	--	< 40
C12-C16 Aliphatics	µg/L	--	--	--	--	--	--	< 40	--	< 40
C16-C21 Aliphatics	µg/L	--	--	--	--	--	--	< 40	--	< 40
C21-C34 Aliphatics	µg/L	--	--	--	--	--	--	< 40	--	**99**
C8-C10 Aromatics	µg/L	--	--	--	--	--	--	< 40	--	< 40
C10-C12 Aromatics	µg/L	--	--	--	--	--	--	< 40	--	< 40
C12-C16 Aromatics	µg/L	--	--	--	--	--	--	< 40	--	< 40
C16-C21 Aromatics	µg/L	--	--	--	--	--	--	< 40	--	**42**
C21-C34 Aromatics	µg/L	--	--	--	--	--	--	< 40	--	**172**
PAHs - SIM										
1-Methylnaphthalene	µg/L	--	--	--	--	--	< 0.250 J	--	< 0.250	--
2-Chloronaphthalene	µg/L	--	--	--	--	--	< 0.250 J	--	< 0.250	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	< 0.250 J	--	< 0.250	--
Acenaphthene	µg/L	--	--	--	--	--	< 0.0500 J	--	< 0.0500	--
Acenaphthylene	µg/L	--	--	--	--	--	< 0.0500 J	--	< 0.0500	--
Anthracene	µg/L	--	--	--	--	--	**0.122 J**	--	< 0.0500	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	< 0.0500 J	--	< 0.0500	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	< 0.0500 J	--	< 0.0500	--
Benzo(b)Fluoranthene	µg/L	--	--	--	--	--	< 0.0500 J	--	< 0.0500	--
Benzo(g,h,i)Perylene	µg/L	--	--	--	--	--	< 0.0500 J	--	< 0.0500	--
Benzo(k)Fluoranthene	µg/L	--	--	--	--	--	< 0.0500 J	--	< 0.0500	--
Chrysene	µg/L	--	--	--	--	--	< 0.0500 J	--	< 0.0500	--
Dibenz(a,h)Anthracene	µg/L	--	--	--	--	--	< 0.0500 J	--	< 0.0500	--
Fluoranthene	µg/L	--	--	--	--	--	**0.0666 J**	--	< 0.0500	--
Fluorene	µg/L	--	--	--	--	--	**0.102 J**	--	< 0.0500	--
Indeno(1,2,3-c,d)Pyrene	µg/L	--	--	--	--	--	< 0.0500 J	--	< 0.0500	--
Naphthalene	µg/L	--	--	--	--	--	**0.353 J**	--	< 0.250	--
Phenanthrene	µg/L	--	--	--	--	--	< 0.0500 J	--	< 0.0500	--
Pyrene	µg/L	--	--	--	--	--	**0.527 J**	--	< 0.0500	--
NWTPH-Dx - Without Silica Gel Cleanup										
Diesel-Range Organics	µg/L	--	--	**61,000**	**60,900**	< 200	**1,190 J**	--	< 200	**7,440**
Oil-Range Organics	µg/L	--	--	**88,700**	**84,700**	< 250	**441 J**	--	< 250	**49,820**
Motor Oil Range Organics	µg/L	--	--	--	--	--	--	--	--	**8,620**
Bunker C Range Organics	µg/L	--	--	--	--	--	--	--	--	**41,200**
NWTPH-Dx - With Silica Gel Cleanup										
Diesel-Range Organics	mg/kg	--	**80,000**	--	--	--	--	--	--	--
Oil-Range Organics	mg/kg	--	**223,000**	--	--	--	--	--	--	--

SUMMARY OF OIL SHEEN AND OIL DROPLET ANALYTICAL RESULTS (2016 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

	Location	River	River	River	River	River	River	River	River	River
	Sample ID	RIVER-NAPL	RIVER NODULE	RIVER NAPL 03	RIVER NAPL 04	RIVER SHEEN-080217	RIVER NAPL-080317	RIVERNAPL-20170920	RIVERSHEEN-20180807	RIVERSHEEN-20180808
	Sample Date	8/4/2016	8/12/2016	10/13/2016	10/14/2016	8/2/2017	8/3/2017	9/20/2017	8/7/2018	8/8/2018
	Parent Sample ID									
	Notes	(a)								(b)
Parameter	Unit									
VOCs										
1,1,1,2-Tetrachloroethane	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,1,1-Trichloroethane	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,1,2,2-Tetrachloroethane	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,1,2-Trichloroethane	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,1-Dichloroethane	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,1-Dichloroethene	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,1-Dichloropropene	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,2,3-Trichlorobenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,2,3-Trichloropropane	µg/L	--	--	--	--	--	--	--	< 2.50	--
1,2,3-Trimethylbenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,2,4-Trichlorobenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,2,4-Trimethylbenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,2-Dibromo-3-Chloropropane	µg/L	--	--	--	--	--	--	--	< 5.00	--
1,2-Dibromoethane	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,2-Dichlorobenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,2-Dichloroethane	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,2-Dichloropropane	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,3,5-Trimethylbenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,3-Dichlorobenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,3-Dichloropropane	µg/L	--	--	--	--	--	--	--	< 1.00	--
1,4-Dichlorobenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
2,2-Dichloropropane	µg/L	--	--	--	--	--	--	--	< 1.00	--
2-Chlorotoluene	µg/L	--	--	--	--	--	--	--	< 1.00	--
4-Chlorotoluene	µg/L	--	--	--	--	--	--	--	< 1.00	--
Acetone	µg/L	--	--	--	--	--	--	--	< 50.0	--
Acrolein	µg/L	--	--	--	--	--	--	--	< 50.0	--
Acrylonitrile	µg/L	--	--	--	--	--	--	--	< 10.0	--
Benzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
Bromobenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
Bromodichloromethane	µg/L	--	--	--	--	--	--	--	< 1.00	--
Bromoform	µg/L	--	--	--	--	--	--	--	< 1.00	--
Bromomethane	µg/L	--	--	--	--	--	--	--	< 5.00	--
Carbon Tetrachloride	µg/L	--	--	--	--	--	--	--	< 1.00	--
Chlorobenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
Chloroethane	µg/L	--	--	--	--	--	--	--	< 5.00	--
Chloroform	µg/L	--	--	--	--	--	--	--	< 5.00	--
Chloromethane	µg/L	--	--	--	--	--	--	--	< 2.50	--
cis-1,2-Dichloroethene	µg/L	--	--	--	--	--	--	--	< 1.00	--
cis-1,3-Dichloropropene	µg/L	--	--	--	--	--	--	--	< 1.00	--

SUMMARY OF OIL SHEEN AND OIL DROPLET ANALYTICAL RESULTS (2016 THROUGH 2018)
BNSF Wishram Railyard, Wishram, Washington

	Location	River	River	River	River	River	River	River	River	River
	Sample ID	RIVER-NAPL	RIVER NODULE	RIVER NAPL 03	RIVER NAPL 04	RIVER SHEEN-080217	RIVER NAPL-080317	RIVERNAPL-20170920	RIVERSHEEN-20180807	RIVERSHEEN-20180808
	Sample Date	8/4/2016	8/12/2016	10/13/2016	10/14/2016	8/2/2017	8/3/2017	9/20/2017	8/7/2018	8/8/2018
	Parent Sample ID									
	Notes	(a)								(b)
Parameter	**Unit**									
Cymene (p-Isopropyltoluene)	µg/L	--	--	--	--	--	--	--	< 1.00	--
Dibromochloromethane	µg/L	--	--	--	--	--	--	--	< 1.00	--
Dibromomethane	µg/L	--	--	--	--	--	--	--	< 1.00	--
Dichlorodifluoromethane	µg/L	--	--	--	--	--	--	--	< 5.00	--
Di-Isopropyl ether (DIPE)	µg/L	--	--	--	--	--	--	--	< 1.00	--
Ethylbenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
Freon 113	µg/L	--	--	--	--	--	--	--	< 1.00	--
Hexachlorobutadiene	µg/L	--	--	--	--	--	--	--	< 1.00	--
Isopropylbenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
Methyl ethyl ketone (2-Butanone)	µg/L	--	--	--	--	--	--	--	< 10.0	--
Methyl Isobutyl Ketone (MIBK)	µg/L	--	--	--	--	--	--	--	< 10.0	--
Methyl tert-Butyl ether	µg/L	--	--	--	--	--	--	--	< 1.00	--
Methylene Chloride	µg/L	--	--	--	--	--	--	--	< 5.00	--
Naphthalene	µg/L	--	--	--	--	--	--	--	< 5.00	--
n-Butylbenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
n-Propylbenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
Sec-Butylbenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
Styrene	µg/L	--	--	--	--	--	--	--	< 1.00	--
Tert-Butylbenzene	µg/L	--	--	--	--	--	--	--	< 1.00	--
Tetrachloroethene (PCE)	µg/L	--	--	--	--	--	--	--	< 1.00	--
Toluene	µg/L	--	--	--	--	--	--	--	< 1.00	--
trans-1,2-Dichloroethene	µg/L	--	--	--	--	--	--	--	< 1.00	--
trans-1,3-Dichloropropene	µg/L	--	--	--	--	--	--	--	< 1.00	--
Trichloroethene (TCE)	µg/L	--	--	--	--	--	--	--	< 1.00	--
Trichlorofluoromethane	µg/L	--	--	--	--	--	--	--	< 5.00	--
Vinyl Chloride	µg/L	--	--	--	--	--	--	--	< 1.00	--
Xylene, m,p-	µg/L	--	--	--	--	--	--	--	< 2.00	--
Xylene, o-	µg/L	--	--	--	--	--	--	--	< 1.00	--
Xylene, total	µg/L	--	--	--	--	--	--	--	< 0.50	--
1,1,1,2-Tetrachloroethane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,1-Dichloroethane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,1-Dichloroethene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,1-Dichloropropene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	mg/kg	< 0.122	--	--	--	--	--	--	--	--
1,2,3-Trimethylbenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--

SUMMARY OF OIL SHEEN AND OIL DROPLET ANALYTICAL RESULTS (2016 THROUGH 2018)
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	Location	River	River	River	River	River	River	River	River	River
	Sample ID	RIVER-NAPL	RIVER NODULE	RIVER NAPL 03	RIVER NAPL 04	RIVER SHEEN-080217	RIVER NAPL-080317	RIVERNAPL-20170920	RIVERSHEEN-20180807	RIVERSHEEN-20180808
	Sample Date	8/4/2016	8/12/2016	10/13/2016	10/14/2016	8/2/2017	8/3/2017	9/20/2017	8/7/2018	8/8/2018
	Parent Sample ID									
	Notes	(a)								(b)
Parameter	Unit									
1,2,4-Trimethylbenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,2-Dibromo-3-Chloropropane	mg/kg	< 0.244	--	--	--	--	--	--	--	--
1,2-Dibromoethane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,2-Dichloroethane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,2-Dichloropropane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,3-Dichloropropane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
2,2-Dichloropropane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
2-Chloroethyl Vinyl ether	mg/kg	< 2.44	--	--	--	--	--	--	--	--
2-Chlorotoluene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
4-Chlorotoluene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Acetone	mg/kg	< 2.44	--	--	--	--	--	--	--	--
Acrylonitrile	mg/kg	< 0.488	--	--	--	--	--	--	--	--
Benzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Bromobenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Bromodichloromethane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Bromoform	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Bromomethane	mg/kg	< 0.244	--	--	--	--	--	--	--	--
Carbon Tetrachloride	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Chlorobenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Chloroethane	mg/kg	< 0.244	--	--	--	--	--	--	--	--
Chloroform	mg/kg	< 0.244	--	--	--	--	--	--	--	--
Chloromethane	mg/kg	< 0.122	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Cymene (p-Isopropyltoluene)	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Dibromochloromethane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Dibromomethane	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Dichlorodifluoromethane	mg/kg	< 0.244	--	--	--	--	--	--	--	--
Di-Isopropyl ether (DIPE)	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Ethylbenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Freon 113	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Hexachlorobutadiene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Isopropylbenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Methyl ethyl ketone (2-Butanone)	mg/kg	< 0.488	--	--	--	--	--	--	--	--
Methyl Isobutyl Ketone (MIBK)	mg/kg	< 0.488	--	--	--	--	--	--	--	--
Methyl tert-Butyl ether	mg/kg	< 0.0488	--	--	--	--	--	--	--	--

SUMMARY OF OIL SHEEN AND OIL DROPLET ANALYTICAL RESULTS (2016 THROUGH 2018)
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	Location	River	River	River	River	River	River	River	River	River
	Sample ID	RIVER-NAPL	RIVER NODULE	RIVER NAPL 03	RIVER NAPL 04	RIVER SHEEN-080217	RIVER NAPL-080317	RIVERNAPL-20170920	RIVERSHEEN-20180807	RIVERSHEEN-20180808
	Sample Date	8/4/2016	8/12/2016	10/13/2016	10/14/2016	8/2/2017	8/3/2017	9/20/2017	8/7/2018	8/8/2018
	Parent Sample ID									
	Notes	(a)								(b)
Parameter	**Unit**									
Methylene Chloride	mg/kg	< 0.244	--	--	--	--	--	--	--	--
Naphthalene	mg/kg	< 0.244	--	--	--	--	--	--	--	--
n-Butylbenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
n-Propylbenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Sec-Butylbenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Styrene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Tert-Butylbenzene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Tetrachloroethene (PCE)	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Toluene	mg/kg	< 0.244	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Trichloroethene (TCE)	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Trichlorofluoromethane	mg/kg	< 0.244	--	--	--	--	--	--	--	--
Vinyl Chloride	mg/kg	< 0.0488	--	--	--	--	--	--	--	--
Xylene, total	mg/kg	< 0.146	--	--	--	--	--	--	--	--

0.122 J Detected concentrations at or above the method reporting limit are shown in bold.

Abbreviations and Symbols

" - -" denotes not measured, not available, or not applicable.
" < " denotes not detected at or above the indicated method reporting limit.
"J" indicates an estimated concentration based on either being less than the laboratory reporting limit or data validation findings.
mg/kg = milligrams per kilogram
µg/L = micrograms per liter

Cleanup Levels (CUL)

Not applicable

Methods

Samples analyzed for gasoline-range organics (GRO) using Northwest Total Petroleum Hydrocarbon (NWTPH)-Gx and diesel- and oil-range organics (DRO and ORO) using NWTPH-Dx (with or without silica gel cleanup as indicated).
Samples analyzed for Volatile Organic Compounds (VOCs) using EPA Method 8260.
Samples analyzed for Extractable Petroleum Hydrocarbons (EPH) using NWTPH-EPH.
Samples analyzed for Polycyclic Aromatic Hydrocarbons (PAHs) using EPA Method 8270 with selective ion monitoring (SIM).

Notes

(a) RIVER-NAPL (08/04/16) sample of oily material was direct-injected into laboratory instrument by weight and reported by the laboratory on a mass basis (mg/kg) similar to solid samples. All other samples above consisted of water containing oil sheen and/or oil droplet(s) and were prepared as water samples.
(b) Laboratory reported NWTPH-Dx as DRO, Motor Oil Range Organics and Bunker C Range Organics. Result for ORO in above table is the sum of Motor Oil Range Organics and Bunker C Range Organics.