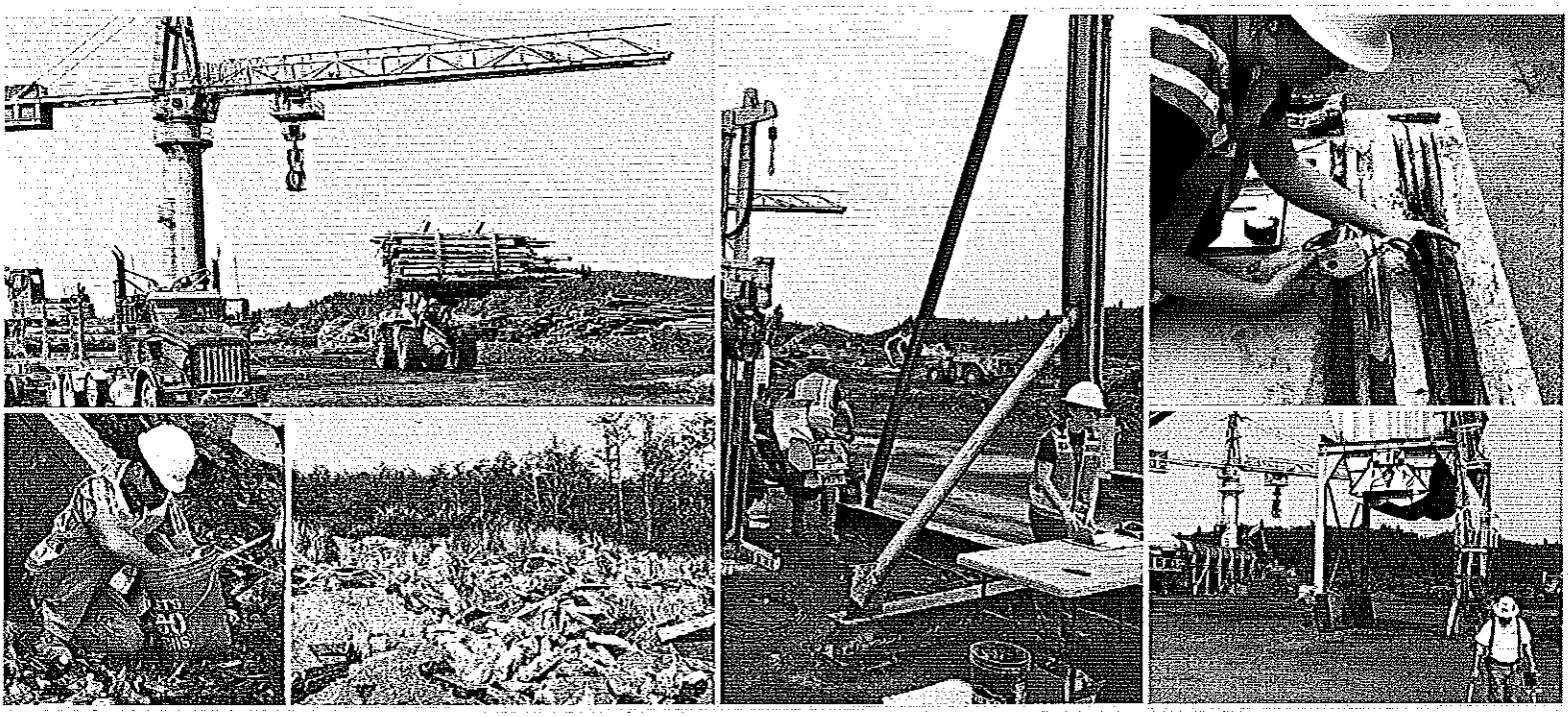
BergerABAM



BHP

Phase II Environmental Site Assessment

Proposed Grays Harbor Potash Export Facility

40600-HS-RPT-55046 | Revision A

Prepared for:
Ms. Valerie Bond | BHP Billiton Canada Inc.

Prepared by:
BergerABAM | November 2017

BergerABAM

210 East 13th Street, Suite 300, Vancouver, Washington 98660-3231
360/823-6100 • 360/823-6101 Fax • www.abam.com

7 November 2017

Ms. Valerie Bond
BHP Billiton Canada Inc.
130 Third Avenue South
Saskatoon, SK S7K 1L3
Canada

Dear Ms. Bond:

BergerABAM is pleased to submit our DRAFT "Proposed Grays Harbor Potash Export Facility – Phase II Environmental Site Assessment Summary Report" for the property located at the Port of Grays Harbor Terminal 3 and adjacent parcels in Hoquiam, Washington. Our services were completed in general accordance with our proposal, dated 27 June 2017.

We appreciate the opportunity to assist BHP Billiton Canada Inc. on this project. Please contact us if you have questions regarding this report.

Sincerely,

Victoria R. England, LG
Senior Environmental Scientist

VRE:AJR:nb
Attachment

Site Investigation Summary

Phase II Environmental Site Assessment
Proposed Grays Harbor Potash Export Facility
Hoquiam, Washington
BHP Document No. 40600-HS-RPT-55046, Revision A

Submitted to

BHP Billiton Canada Inc.
130 Third Avenue South
Saskatoon, SK S7K 1L3
Canada

DECLARATIONS

- "I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in Sec. 312.10 of 40 CFR Part 312."
- "I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I performed and/or developed all the appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312."[1]

Submitted by

Amber J. Roesler
Senior Environmental Scientist

BHP - Endorsed by

BHP – Approved by

Victoria R. England, LG
Project Manager/Senior Environmental Scientist

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

7 November 2017
A17.0202.00

---

[1] A person who does not qualify as an Environmental Professional may assist in the conduct of all appropriate inquiries in accordance with ASTM E 1527-13, if such person is under the supervision or responsible charge of a person meeting the definition of an environmental professional when conducting such activities.

BHP BILLITON CANADA INC.
PHASE II ENVIRONMENTAL SITE ASSESSMENT
PROPOSED GRAYS HARBOR POTASH EXPORT FACILITY
HOQUIAM, WASHINGTON

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

DRAFT PHASE II ENVIRONMENTAL SITE ASSESSMENT
PROPOSED GRAYS HARBOR POTASH EXPORT FACILITY
HOQUIAM, WASHINGTON

1.0 INTRODUCTION

This report summarizes the results of our Phase II Environmental Site Assessment (ESA) of the proposed Grays Harbor potash export site to be located at Port of Grays Harbor (Port) Terminal 3 and surrounding parcels in Hoquiam, Washington (herein referred to as "the site," see Figure 1). The upland portion of the site is 212 acres and comprises tax parcels that are owned by the City of Hoquiam (City), Emerson Street Hoquiam LLC, Adams Street Hoquiam LLC, and the Port. The site tax parcels and existing conditions are shown on Figures 2 and 3.

The southeast upland portion of the site is occupied by a wood chipping facility (Willis Enterprises; Tax Parcel 056401000801), the northeastern portion of the site is occupied by a distillery and an "inert waste" landfill (Tax Parcel 056401000600), and two warehouses (Tax Parcel 517101011001). The west and central portions of the subject site were historically used as a lumber facility (Grays Harbor Lumber/Rayonier; Tax Parcels 517101012001, 056401000400, and 056401000801), and the northeast portion of the subject site was previously used to support a foundry on the adjacent parcel to the north.[2] The southwest portion of the site consists of a former City of Hoquiam wastewater treatment pond that has been decommissioned and partially filled (Tax Parcels 056401000201 and 056401100100).

The aquatic portion of the site is located in the waters of Grays Harbor that bound the site on the south (Tax Parcels 056401000302, 056401100100, and 056401100203), and adjacent waters of the state managed by the Washington State Department of Natural Resources. The proposed in-water facilities will be located adjacent to the Port's existing Terminal 3 pier as shown on Figure 3.

BHP Billiton Canada Inc. (BHP) is considering a long-term lease and redevelopment of the site. The purpose of this Phase II ESA is to evaluate soil and groundwater conditions at the site based on historical site uses, conditions described below, and current site use as a wood chip facility and solid waste landfill on portions of the site.

2.0 BACKGROUND

BergerABAM recently completed a Phase I ESA (included as Appendix A) at the site and identified the following recognized environmental conditions (shown on Figure 3).

---

[2] A factory that produces metal castings.

2.1 Tax Parcel 056401000801 - Rayonier/Willis Enterprises

Soil contaminated with oil-range petroleum hydrocarbons was identified in this area and a cleanup action was conducted in 2000. The cleanup action report by GeoEngineers, Inc. indicates that diesel-range petroleum hydrocarbons remains in soil beneath a concrete debarker pad. The report also indicates that diesel-range petroleum hydrocarbons were detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A cleanup level in a groundwater sample collected near the debarker pad.

Petroleum hydrocarbon staining was observed on the concrete floor throughout the maintenance building at Willis Enterprises during the 2017 Phase I ESA site reconnaissance (see Appendix A).

2.2 Tax Parcels 056401000600 and 517101011001 – Lamb Grays Harbor Company/Foundry and the Inert Waste Landfill

2.2.1 Lamb Grays Harbor Company/Foundry

The northeast portion of Tax Parcel 056401000600 was used to support a former foundry operated by the Lamb Grays Harbor Company. A subsurface investigation[3] was conducted in this area in 2015 by SLR International Corporation (SLR). A brief summary of the data collected during SLR's 2015 investigation is discussed below.

- **Foundry Building (Off Site):** The former foundry building is located adjacent (upgradient) to the north of the subject site.[4] The foundry consisted of a machine shop; an assembly shop; a pattern shop; a maintenance, repair, and operation shop (including a cyanide quenching tank); a diesel underground storage tank (UST), a gasoline UST; and a partially buried diesel aboveground storage tank.

  Analysis was performed for diesel-, gasoline-, and oil-range petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), BTEX (benzene, toluene, ethylbenzene, and xylenes), volatile organic compounds (VOCs), and metals (arsenic, barium, cadmium, chromium, cyanide, lead, mercury, selenium, and silver).

  The following contaminants of concern (COCs) were detected in surface soil samples (0.5 to 1 foot below the ground surface [bgs]) at concentrations greater than their respective MTCA cleanup levels.

  - Diesel- and oil-range petroleum hydrocarbons concentrations from 2,300 to 35,000 milligrams per kilogram (mg/kg) (MTCA Method A soil cleanup level of 2,000 mg/kg)

[3] SLR International Corporation, February 2015. "Subsurface Investigation Report Former Lamb-Grays Harbor Company Facility, Blaine Street and Firman Avenue, Hoquiam, Washington." 2017.

[4] Currently occupied by Ovalstrapping – a plastic strapping manufacturer.

- Carcinogenic polycyclic aromatic hydrocarbons concentrations from 0.15 to 3.27 mg/kg (cPAHs) (MTCA cleanup level of 0.1 mg/kg)
- Lead concentration of 290 mg/kg(MTCA cleanup level for lead in soil is 250 mg/kg)

Gasoline-range petroleum hydrocarbons, BTEX, VOCs, and metals (other than lead) were either not detected or were detected at concentrations less than the applicable MTCA cleanup levels in the soil samples.

The following COCs were detected in groundwater at concentrations greater than their respective MTCA Method A cleanup levels.

- Diesel- and oil-range petroleum hydrocarbons concentrations from 1,700 to 6,000 micrograms per liter (µg/l) (MTCA Method A cleanup level of 500 µg/l)
- Gasoline-range petroleum hydrocarbons concentrations from 930 to 1,700 µg/l (MTCA Method A cleanup level of 800 µg/l)
- cPAHs concentration of 0.18 µg/l (MTCA cleanup level of 0.1 µg/l)
- Benzene concentration of 6.6 µg/l (MTCA Method A cleanup level of 5.0 µg/l)

VOCs and metals were either not detected or were detected at concentrations less than the applicable MTCA cleanup levels in the groundwater samples.

- **On Site:** Buildings associated with the foundry that are located on the subject site include the following: former chemical storage shed, former paint shed, former paint shop, former sandblast shop, and former fabrication shop. A former bunker C heating oil tank was also noted on the subject site (see Figure 3).[5]

  SLR completed one boring adjacent to the former bunker C heating oil UST. Analysis was completed for diesel- and oil-range petroleum hydrocarbons, PAHs, and BTEX. cPAHs were detected at a concentration (3.27 mg/kg) greater than the MTCA Method A cleanup level of 0.1 mg/kg in a soil sample collected from the boring. Oil- and diesel-range petroleum hydrocarbons and BTEX were either not detected or detected at concentrations less than the MTCA Method A cleanup level. Groundwater sampling was not conducted at this location.

2.2.2 Inert Waste Landfill

Approximately 3 acres of Tax Parcel 056401000600 is leased to the City for use as an "inert waste" landfill. The City disposes of grass, rock, soil, concrete, and asphalt from City projects on the parcel. The material is not tested prior to disposal at the site.

[5] According to the SLR report, the tank was 5,000 gallons and it was removed.

3.0 2017 BergerABAM PHASE II SITE INVESTIGATION

BergerABAM completed investigational borings at the site for the Phase II ESA on 29 and 30 August 2017 and 26 September 2017[6]. BergerABAM observed the completion of 28 direct-push borings (DP-1 through DP-4, DP-5/5a, DP-6, DP-7, DP-8/8a through DP-11/11a, DP-12, DP-13, DP-14/14a through DP-17/17a, and DP-18 through DP-20) to collect samples for chemical analysis to assess soil and groundwater conditions at the site. Figure 4 shows the location of the direct-push borings.

The presence or absence of petroleum-related soil contamination was evaluated by field screening soil samples collected from the borings and submitting select soil samples for chemical analysis. The soil and groundwater samples were submitted to the laboratory for analysis of one or more of the following COCs.

- Gasoline- and diesel-range petroleum hydrocarbons by Ecology method NWTPH-Gx and -Dx,
- VOCs by EPA 8260C/5035, PAHs by EPA 8270,
- Polychlorinated biphenyls (PCBs) by EPA 8082A/3510C, cyanide by Standard Method 4500-CN, and
- Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) by EPA 6020 series.

Sampling procedures and field screening methods are described in Appendix B. A description of soil conditions encountered and the results of field screening are provided in the boring logs in Appendix B.

4.0 RESULTS

The analytical data from soil and groundwater samples collected at the site for the Phase II ESA are summarized with respect to industrial MTCA Methods A and C cleanup levels in Tables 1 through 4 (MTCA Method A cleanup levels for unrestricted land use are the basis for evaluation of results where industrial criteria are not established). The laboratory reports are presented as Appendix C.

The following summarizes the results from the soil and groundwater samples collected from the site and submitted for chemical analysis.

Soil

- Diesel- and gasoline-range petroleum hydrocarbons, PCBs, VOCs, PAHs, metals (arsenic, barium, cadmium, lead, mercury, selenium, and silver) and cyanide were either not detected or were detected at concentrations less than the applicable MTCA cleanup levels.

---

[6] Additional groundwater sampling was conducted to confirm the first round of data. Field-filtered groundwater samples were collected (DP-5a, -8a, -9a, -10a, -11a, -14a, -15a, -16a, and -17 through -20).

- Chromium (reported as the total of chromium III plus chromium VI) was detected in soil at concentrations ranging from 7.7 mg/kg (DP-2 [2-3]) to 20 mg/kg (DP-15 [5-6]). The MTCA Method A cleanup level for total chromium as VI is 19 mg/kg and for chromium III is 2,000 mg/kg. Sample DP-15 (5-6) had a concentration of total chromium of 20 mg/kg so follow-up analysis to quantify chromium VI was conducted. Chromium VI was not detected in that sample, therefore, the total chromium detection is assumed to be chromium III, and the chromium concentration is less than the applicable MTCA Method A criteria.

Groundwater

- Diesel- and gasoline-range petroleum hydrocarbons, VOCs, PAHs, PCBs, metals (barium, cadmium, mercury, selenium, and silver) cyanide were either not detected or detected at concentrations less than the ap licable MTCA cleanup levels.
- Arsenic was detected in 27 groundwater samples collected from the site at concentrations ranging from 2.3 µg/l (DP-18) to 140 µg/l (DP-17). The concentrations of arsenic in 19 of the groundwater samples (DP-5, -5a, -8 through -11a, -14 through -16a, DP-17, DP-19, and DP-20) were greater than the MTCA Method C cleanup level for arsenic (10.5 µg/l).
- Lead was detected in 10 of the 28 groundwater samples at concentrations ranging from 2.1 µg/l (DP-6) to 57 µg/l (DP-9). The sample collected from DP-9 was the only groundwater sample with a total lead exceedance of the MTCA Method A cleanup level (15 µg/l).[7]
- Chromium was detected in 20 groundwater samples at concentrations ranging from 9.4 µg/l (DP-12) to 130 µg/l (DP-9). Four of the groundwater samples (DP-9, DP-9a, DP-14, and DP-17) had concentrations of chromium greater than the MTCA Method A cleanup level for that COC (50 µg/l).[8]

5.0 SUMMARY AND RECOMMENDATIONS

BergerABAM collected 16 soil and 28 groundwater samples at the site in August and September 2017 using direct-push methods from the locations shown on Figure 4.

COCs in soil were either not detected or were detected at concentrations less than the applicable MTCA cleanup levels.

With the exception of metals, COCs in groundwater samples collected from the site were either not detected or were detected at concentrations less than the MTCA cleanup levels (see Tables 1 through 4 and Figure 4). Arsenic, chromium, and lead were detected in groundwater samples collected from the site at concentrations that exceed MTCA cleanup levels

[7] The MTCA Method C cleanup level for lead in groundwater has not been established.
[8] The MTCA Method C cleanup level for chromium in groundwater is not established.

We recommend installing groundwater wells and conducting 4 quarters of groundwater monitoring to (1) establish a baseline and (2) evaluate dissolved metals concentrations over time (e.g., seasonal fluctuations) to evaluate potential issues during construction dewatering.

6.0 LIMITATIONS

This report has been prepared for BHP for evaluating and documenting the soil and groundwater conditions at the proposed Grays Harbor potash export facility. Environmental conditions may vary between the locations sampled or with time. The conditions described in this evaluation represent the areas sampled at the time of the investigation.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with the generally accepted environmental science practices for soil characterization at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

7.0 LIST OF ACRONYMS AND ABBREVIATIONS

µg/l	micrograms per liter
bgs	below the ground surface
BHP	BHP Billiton Canada Inc.
BTEX	benzene, toluene, ethylbenzene, and xylenes
City	City of Hoquiam
COC	contaminant of concern
cPAHs	carcinogenic polycyclic aromatic hydrocarbons
ESA	Environmental Site Assessment
IDW	investigation-derived waste
mg/kg	milligrams per kilogram
MTCA	Model Toxics Control Act
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PID	photo-ionization detector
Port	Port of Grays Harbor
ppm	parts per million
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
SLR	SLR International Corporation
UST	underground storage tank
VOC	volatile organic compound

Phase II Environmental Site Assessment
Proposed Grays Harbor Potash Export Facility
Hoquiam, Washington

Tables

TABLE 1. METALS IN GROUNDWATER[1]

PROPOSED GRAYS HARBOR POTASH EXPORT FACILITY

HOQUIAM, WASHINGTON

Sample Identification	Date	Metals (µg/l)							
		Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
DP-1	8/30/2017	**5.7**	<20	<1	<10	**2.4**	<0.5	<10	<20
DP-2	8/30/2017	**4.5**	**59**	<1	**16**	**3**	<0.5	<10	<20
DP-3	8/30/2017	<2	<20	<1	<10	<2	<0.5	<10	<20
DP-4	8/30/2017	**5**	**94**	<1	**19**	<2	<0.5	<10	<20
DP-5	8/30/2017	**13**	**35**	<1	**23**	<2	<0.5	<10	<20
DP-5a[2]	9/26/2017	**55**	--	--	--	--	--	--	--
DP-6	8/30/2017	**2.7**	**23**	<1	**8.8**	**2.1**	<0.5	<10	<20
DP-7	8/29/2017	**7.1**	**58**	<1	**16**	**4.4**	<0.5	<10	<20
DP-8	8/29/2017	**14**	**80**	<1	**46**	**11**	<0.5	<10	<20
DP-8a[2]	9/26/2017	**65**	--	--	--	--	--	--	--
DP-9	8/29/2017	**52**	**210**	<1	**130**	**57**	<0.5	<10	<20
DP-9a[2]	9/26/2017	**52**	--	--	**100**	**3.4**	--	--	--
DP-10	8/30/2017	**30**	**38**	<1	**25**	**3**	<0.5	<10	<20
DP-10a[2]	9/26/2017	**30**	--	--	--	--	--	--	--
DP-11	8/30/2017	**46**	**27**	<1	**34**	<2	<0.5	<10	<20
DP-11a[2]	9/26/2017	**12**	--	--	--	--	--	--	--
DP-12	8/29/2017	**4.2**	<20	<1	**9.4**	<2	<0.5	<10	<20
DP-13	8/29/2017	**5.7**	**63**	<1	**29**	**4.2**	<0.5	<10	<20
DP-14	8/29/2017	**37**	**87**	<1	**66**	**4.6**	<0.5	**37**	<20
DP-14a[2]	9/26/2017	**51**	--	--	**43**	--	--	--	--
DP-15	8/29/2017	**26**	**20**	<1	**48**	<2	<0.5	**19**	<20
DP-15a[2]	9/26/2017	**44**	--	--	--	--	--	--	--
DP-16	8/29/2017	**59**	<20	<1	**10**	<2	<0.5	**160**	<20
DP-16a[2]	9/26/2017	**49**	--	--	--	--	--	--	--
DP-17[2]	9/26/2017	**140**	--	--	**69**	<2	--	--	--
DP-18[2]	9/26/2017	**2.3**	--	--	**18**	<2	--	--	--
DP-19[2]	9/26/2017	**34**	--	--	**23**	<2	--	--	--
DP-20[2]	9/26/2017	**24**	--	--	**37**	<2	--	--	--
MTCA Method C (Industrial) Cleanup Level[3]		10.5	7,000	17.5	50*	15*	2*	175	175

Notes:

[1]Chemical Analysis was performed by Environmental Services Network Northwest; The laboratory report is included as Appendix C.

[2] = samples were filtered in the field.

[3]Washington State Department of Ecology Model Toxics Control Act (MTCA) Cleanup Levels. Non cancer values are used unless otherwise noted. https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx

* MTCA Method A clean up level for unrestricted site use is listed because the MTCA Method C industrial clean up level is not established.

µg/l = microgram per liter

Bold indicates the analyte was detected at a concentration greater than the laboratory method reporting limits

NE = Not established

<2 = The The analyte was not detected. The associated numerical value is the sample quantitation limit.

-- = not analyzed

Highlight indicates the detected concentration is greater than the applicable MTCA cleanup level.

TABLE 2. METALS IN SOIL[1]

PROPOSED GRAYS HARBOR POTASH EXPORT FACILITY

HOQUIAM, WASHINGTON

Sample Identification	Depth (feet below the ground surface)	Date	Total Metals (mg/kg)							
			Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
DP-1 (7-8)	7 to 8	8/30/2017	<5	<50	<1	**18**	**7.9**	<0.5	<20	<20
DP-2 (2-3)	2 to 3	8/30/2017	<5	<50	<1	**7.7**	<5	<0.5	<20	<20
DP-3 (9-10)	9 to 10	8/30/2017	<5	<50	<1	**10**	<5	<0.5	<20	<20
DP-4 (9-10)	9 to 10	8/30/2017	<5	<50	<1	**9.3**	<5	<0.5	<20	<20
DP-5 (4-5)	4 to 5	8/30/2017	<5	<50	<1	**12**	<5	<0.5	<20	<20
DP-6 (4-5)	4 to 5	8/30/2017	<5	<50	<1	**10**	<5	<0.5	<20	<20
DP-7 (3-4)	3 to 4	8/29/2017	<5	<50	<1	**10**	<5	<0.5	<20	<20
DP-8 (3-4)	3 to 4	8/29/2017	<5	<50	<1	**11**	<5	<0.5	<20	<20
DP-9 (3-4)	3 to 4	8/29/2017	<5	<50	<1	**10**	<5	<0.5	<20	<20
DP-10 (9-10)	9 to 10	8/30/2017	<5	<50	<1	**14**	**6.4**	<0.5	<20	<20
DP-11 (7-9)	7 to 9	8/30/2017	<5	<50	<1	**12**	<5	<0.5	<20	<20
DP-12 (6-7)	6 to 7	8/29/2017	<5	<50	<1	**17**	<5	<0.5	<20	<20
DP-13 (12-13)	12 to 13	8/29/2017	<5	<50	<1	**12**	<5	<0.5	<20	<20
DP-14 (6-7)	6 to 7	8/29/2017	<5	<50	<1	**10**	<5	<0.5	<20	<20
DP-15 (5-6)	5 to 6	8/29/2017	<5	<50	<1	**20**[3]	**13**	<0.5	<20	<20
DP-16 (7-8)	7 to 8	8/29/2017	<5	<50	<1	**16**	**8.7**	<0.5	<20	<20
MTCA Method A Industrial Soil Cleanup Level[2]			20	700,000*	2	19/2,000[4]	1,000	2	17,500*	17,500*

Notes:

[1]Chemical Analysis was performed by Environmental Services Network Northwest; The laboratory report is included as Appendix C.

[2]Washington State Department of Ecology Model Toxics Control Act (MTCA) Cleanup Levels. Non cancer values are used unless otherwise noted. https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx

[3] This sample was analyzed for chromium VI which was not detected; Therefore the reported value represents total chromium as chromium III

[4] There is no industrial MTCA Method A or Method C clean up level for total chromium. The MTCA Method A clean up level for unrestricted use (19 mg/kg) is specific to chromium VI. The MTCA Method C clean up level for industrial sites (2,000 mg/kg) is specific to chromium III.

* The MTCA Method C industrial clean up level is listed because the MTCA Method A industrial clean up level is not established.

Bold indicates the analyte was detected at a concentration greater than the laboratory method reporting limits

ND = The analyte was not detected

NE = Not established

<5 = The analyte was not detected. The associated numerical value is the sample quantitation limit.

mg/kg = milligram per kilogram

TABLE 3. PAHs IN SOIL[1]
PROPOSED GRAYS HARBOR POTASH EXPORT FACILITY
HOQUIAM, WASHINGTON

Sample Identification	DP-1 (7-8)	DP-2 (2-3)	DP-3 (9-10)	DP-4 (9-10)	DP-5 (4-5)	DP-6 (4-5)	DP-7 (3-4)	DP-8 (3-4)	DP-9 (3-4)	DP-10 (9-10)	DP-11 (7-9)	DP-12 (6-7)	DP-13 (12-13)	DP-14 (6-7)	DP-15 (5-6)	DP-16 (7-8)	MTCA Method C (Industrial) Soil Cleanup Level[2]
Sample Depth (feet below the ground surface)	7 to 8	2 to 3	9 to 10	9 to 10	4 to 5	4 to 5	3 to 4	3 to 4	3 to 4	9 to 10	7 to 9	6 to 7	12 to 13	6 to 7	5 to 6	7 to 8	
PAHs (mg/kg)																	
Acenaphthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	210,000
Acenaphthylene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NE
Anthracene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	1,050,000
Benzo (ghi) perylene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NE
Dibenzofuran	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	3,500
Fluoranthene	<0.02	<0.02	1.4	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	140,000
Fluorene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	140,000
1-Methylnaphthalene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	245,000
2-Methylnaphthalene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	14,000
Naphthalene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	70,000
Phenanthrene	<0.02	<0.02	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NE
Pyrene	<0.02	<0.02	1.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	105,000
cPAHs (mg/kg)																	
Benzo (a) anthracene (TEF 0.1)	<0.02	<0.02	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	MTCA Method A cPAH cleanup level for the TEQ sum
Benzo (a) pyrene (TEF 1.0)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Benzo (b+k) fluoranthene (TEF 0.1)	<0.02	<0.02	0.4	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Chrysene (TEF 0.01)	<0.02	<0.02	0.4	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Dibenz (a,h) anthracene (TEF 0.1)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Indeno (1,2,3-cd) pyrene (TEF 0.1)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Total TEQ of cPAHs	N/A	N/A	0.0640	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.1

Notes:

[1]Chemical Analysis was performed by Environmental Services Network Northwest; The laboratory report is included as Appendix C.

[2]Washington State Department of Ecology Model Toxics Control Act (MTCA) Cleanup Levels. https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx

PAHs = polycyclic aromatic hydrocarbons

cPAHs = carcinogenic polycyclic aromatic hydrocarbons.

NE = not established

TEF = toxic equivalency factor

Toxic Equivalency Quotient or TEQ = the sum of the TEF-modified cPAH constituents concentrations

Bold indicates the analyte was detected at a concentration greater than the laboratory method reporting limits.

<0.02 = The analyte was not detected. The associated numerical value is the sample quantitation limit.

TABLE 4. SELECT VOLATILE ORGANIC COMPOUNDS IN SOIL[1,2]

PROPOSED GRAYS HARBOR POTASH EXPORT FACILITY

HOQUIAM, WASHINGTON

Sample Identification	Depth (feet below the ground surface)	Date	Sheen	PID (ppm)	VOCs (mg/kg)		
					n-Propylbenzene	1,3,5-Trimethylbenzene	1,3-Dichlorobenzene
DP-1 (7-8)	7 to 8	8/30/2017	NS	0	<0.05	<0.05	<0.05
DP-2 (2-3)	2 to 3	8/30/2017	NS	0	<0.05	<0.05	<0.05
DP-3 (9-10)	9 to 10	8/30/2017	NS	0	<0.05	<0.05	<0.05
DP-4 (9-10)	9 to 10	8/30/2017	NS	0	**0.061**	**0.061**	**0.059**
DP-5 (4-5)	4 to 5	8/30/2017	NS	0	<0.05	<0.05	<0.05
DP-6 (4-5)	4 to 5	8/30/2017	NS	0.2	<0.05	<0.05	<0.05
DP-7 (3-4)	3 to 4	8/29/2017	NS	0	<0.05	<0.05	<0.05
DP-8 (3-4)	3 to 4	8/29/2017	NS	0	<0.05	<0.05	<0.05
DP-9 (3-4)	3 to 4	8/29/2017	NS	0	<0.05	<0.05	<0.05
DP-10 (9-10)	9 to 10	8/30/2017	NS	0	<0.05	<0.05	<0.05
DP-11 (7-9)	7 to 9	8/30/2017	NS	0	<0.05	<0.05	<0.05
DP-12 (6-7)	6 to 7	8/29/2017	NS	0	<0.05	<0.05	<0.05
DP-13 (12-13)	12 to 13	8/29/2017	NS	0	<0.05	<0.05	<0.05
DP-14 (6-7)	6 to 7	8/29/2017	NS	0	<0.05	<0.05	<0.05
DP-15 (5-6)	5 to 6	8/29/2017	NS	0	<0.05	<0.05	<0.05
DP-16 (7-8)	7 to 8	8/29/2017	NS	0	<0.05	<0.05	<0.05
MTCA Method C (Industrial) Soil Cleanup Level[3]					350,000	35,000	NE

Notes:

[1]Chemical analysis was performed by Environmental Services Network Northwest; The laboratory report is included as Appendix C.

[2]Volatile organic compounds (VOCs) were analyzed by EPA Method 5035/8260B. The full list of VOCs were analyzed but only the detected VOCs are listed.

[3]Washington State Department of Ecology Model Toxics Control Act (MTCA) Cleanup Levels. https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx

ppm = parts per million

NE = not established

mg/kg = milligrams per kilogram

Bold indicates the analyte was detected at a concentration greater than the laboratory method reporting limits.

NS = No sheen

<0.05 = The analyte was not detected. The associated numerical value is the sample quantitation limit.

Phase II Environmental Site Assessment
Proposed Grays Harbor Potash Export Facility
Hoquiam, Washington

Figures

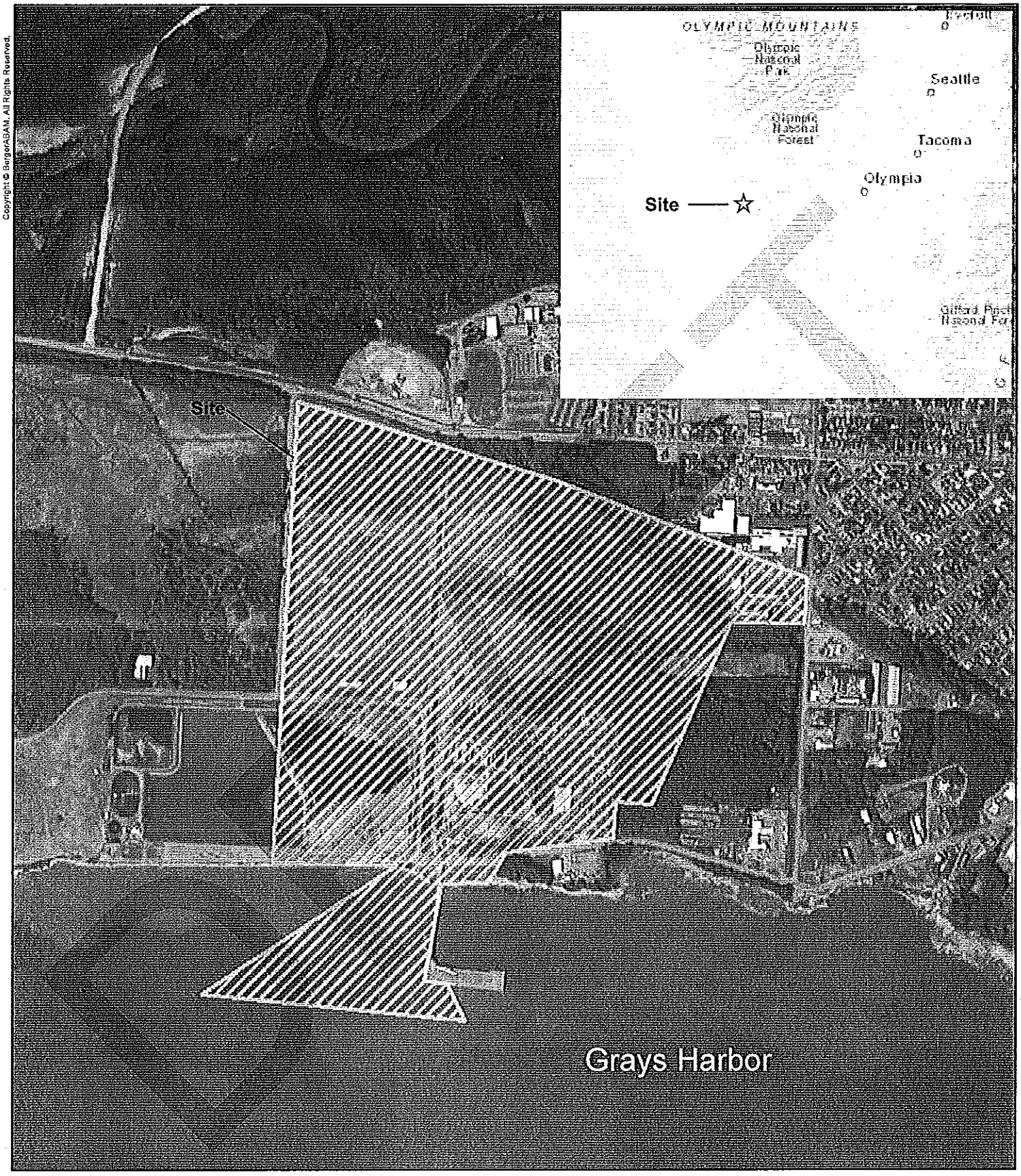


Figure 1- Vicinity Map
Proposed Grays Harbor Potash Export Facility
Phase II Environmental Site Assessment
Hoquiam, WA

BergerABAM

0 250 500 1,000 1,500 2,000
Feet

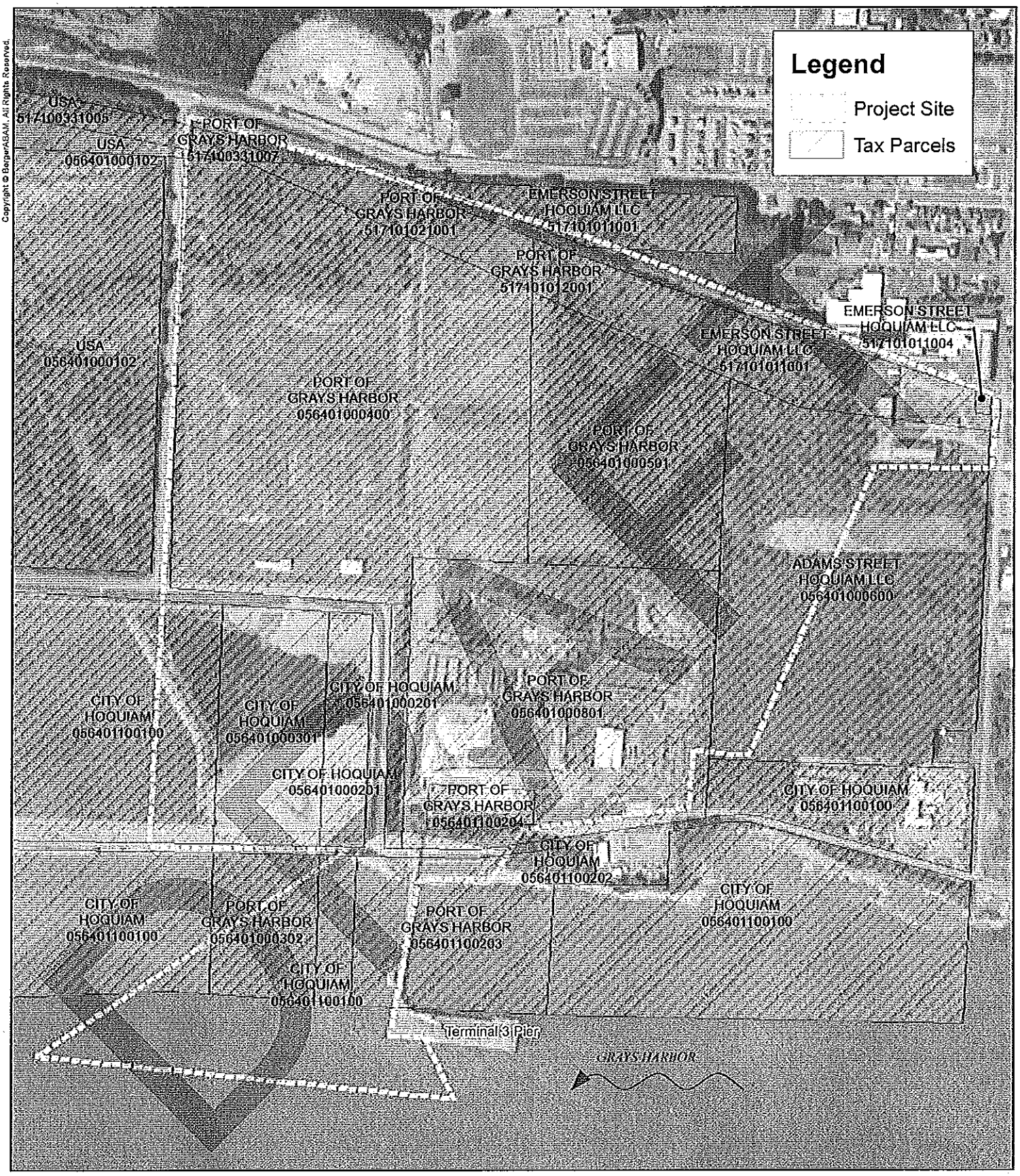


Figure 2- Tax Lot Map
Proposed Grays Harbor Potash Export Facility
Phase II Environmental Site Assessment
Hoquiam, WA

BergerABAM

0 150 300 600 900 1,200
Feet

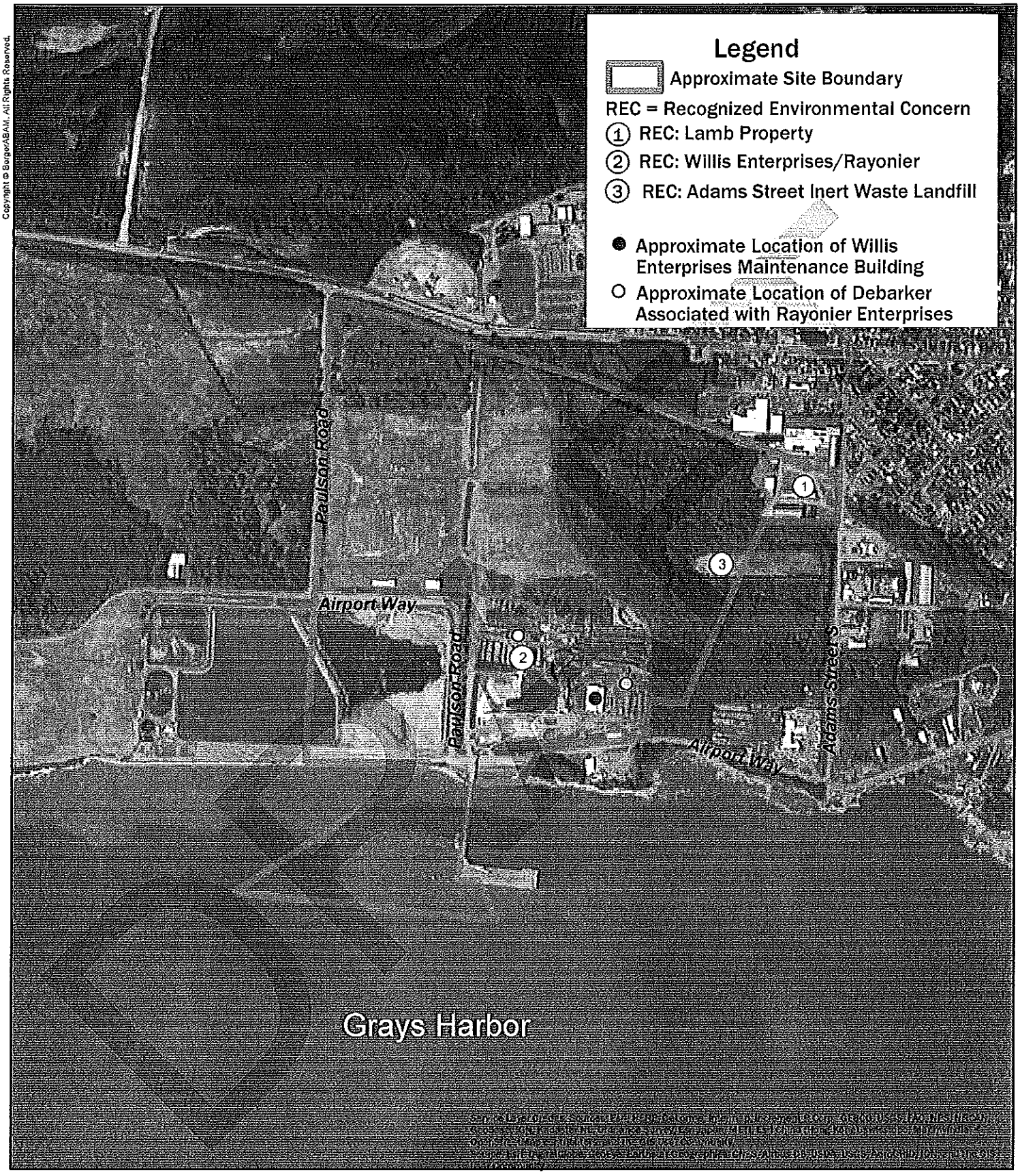


Figure 3- Subject Site Map
Proposed Grays Harbor Potash Export Facility
Phase II Environmental Site Assessment
Hoquiam, WA

BergerABAM

0 250 500 1,000 1,500 2,000
Feet

Path: O:\Vancouver\2017\A17.002600\GIS\02_MXD\Phase II\Fig3_Subject Site Map_POGH Phase II.mxd

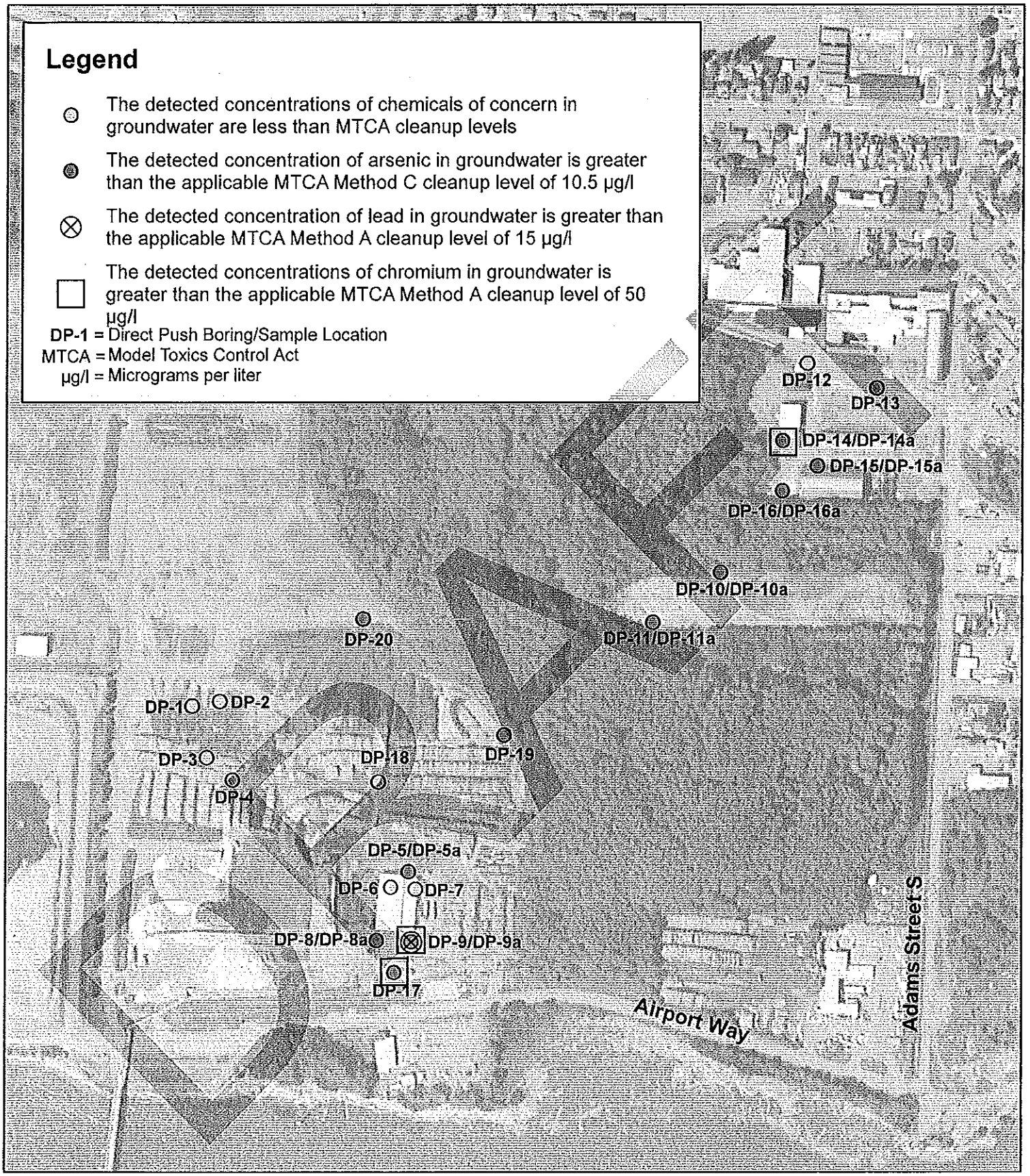


Figure 4-Sample Locations and Metals in Groundwater
Proposed Grays Harbor Potash Export Facility
Phase II Environmental Site Assessment
Hoquiam, WA

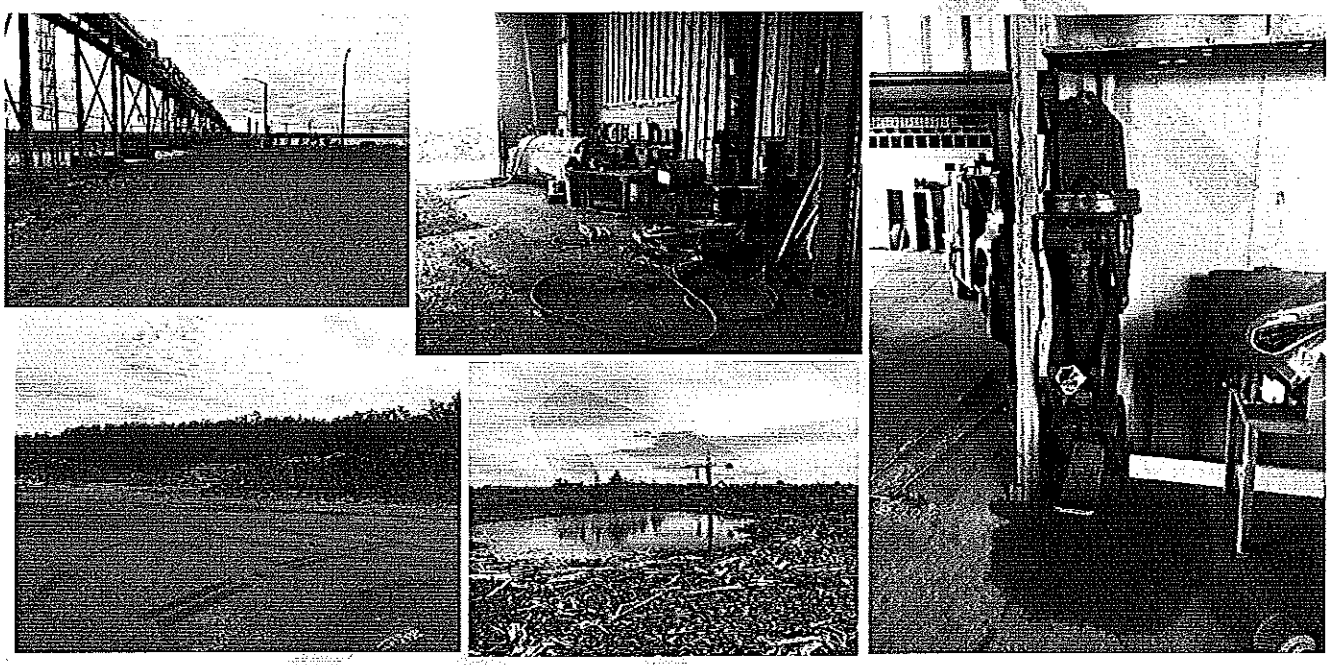
BergerABAM

0 112.5225 450 675 900
Feet

Path: Q:\Vancouver\2017\A17.020200\GIS\02_MXD\Phase II\Phase II SET 10.17.17\Fig_4 Boring Locations.mxd

Appendix A
Phase I ESA
(appendices not included)

BergerABAM



40600-HS-RPT-55034
Revision 0
Phase I Environmental Site Assessment
BHP Billiton Canada Inc.

Submitted to
Ms. Valerie Bond
BHP Billiton Canada Inc.
130 Third Avenue South
Saskatoon, SK S7H 1L3
Canada

Submitted by
BergerABAM
1301 Fifth Avenue, Suite 1200
Seattle, WA 98101

A17.0202.00

21 July 2017

BergerABAM

210 East 13th Street, Suite 300, Vancouver, Washington 98660-3231
360/823-6100 • 360/823-6101 Fax • www.abam.com

21 July 2017

Ms. Valerie Bond
BHP Billiton Canada Inc.
130 Third Avenue South
Saskatoon, SK S7K 1L3
Canada

Dear Ms. Bond:

BergerABAM is pleased to submit our final "Proposed Grays Harbor Potash Export Facility – Phase I Environmental Site Assessment Summary Report" for the property located at the Port of Grays Harbor Terminal 3 and adjacent parcels in Hoquiam, Washington. Our services were completed in general accordance with our proposal dated 13 February 2017.

We appreciate the op ortunity to assist the BHP Billiton Canada Inc. on this project. Please contact us if you have questions regarding this report.

Sincerely,

Victoria R. England, LG
Senior Environmental Scientist

VRE:wp
Attachment

Summary Report

Phase I Environmental Site Assessment
Proposed Grays Harbor Potash Export Facility
Port of Grays Harbor, Hoquiam, Washington
BHP Document No. 40600-HS-RPT-55034

Submitted to

BHP Billiton Canada Inc.
130 Third Avenue South
Saskatoon, SK S7K 1L3
Canada

DECLARATIONS

- "I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in Sec. 312.10 of 40 CFR Part 312."
- "I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I performed and/or developed all the appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312."[1]

Submitted by

April Ryckman
Environmental Scientist

BHP - Endorsed by

BHP – Approved by

Victoria R. England, LG
Project Manager/Environmental Scientist

BergerABAM
210 East 13th Street, Suite 300
Vancouver, Washington 98660

21 July 2017
A17.0202.00

[1] A person who does not qualify as an Environmental Professional may assist in the conduct of all appropriate inquiries in accordance with ASTM E 1527-13, if such person is under the supervision or responsible charge of a person meeting the definition of an environmental professional when conducting such activities.

BHP BILLITON CANADA INC.
PHASE I ENVIRONMENTAL SITE ASSESSMENT
PROPOSED GRAYS HARBOR POTASH EXPORT FACILITY
PORT OF GRAYS HARBOR, HOQUIAM, WASHINGTON

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

GLOSSARY

Abbreviation	Definition
AAI	All Appropriate Inquiry
AIRS	Aerometric Information Retrieval System
ALLSITES	Site of Interest to Washington State Department of Ecology
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
BHP	BHP Billiton Canada Inc.
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
CSCSL	Confirmed and Suspected Contaminated Sites List
DOD	Department of Defense
ECHO	Enforcement and Compliance History Online
Ecology	Washington State Department of Ecology
EDR	Environmental Data Resources, Inc.
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
FINDS	Facility Index System
FUDS	Formerly Used Defense Site
HSL	Hazardous Site List
MTCA	Model Toxics Control Act
NFA	No Further Action
NLR	No Longer Regulated
NonGen	Non Generator
Port	Port of Grays Harbor
RCRA	Resource Conservation and Recovery Act
REC	recognized environmental condition
SR	State Route
SWF/LF	Solid Waste Facilities/Landfill Sites
UST	underground storage tank

PHASE I
ENVIRONMENTAL SITE ASSESSMENT
PROPOSED GRAYS HARBOR POTASH EXPORT FACILITY
PORT OF GRAYS HARBOR, HOQUIAM, WASHINGTON

1.0 INTRODUCTION

This report summarizes the results of our Phase I Environmental Site Assessment (ESA) of the Port of Grays Harbor (Port) Terminal 3 and adjacent parcels in Hoquiam, Washington, as shown on Figure 1, Vicinity Map. The study area is approximately 240 acres and is referred to herein as the "subject site." The subject site consists of all or part of 13 tax parcels of waterfront and industrial land with multiple owners. The subject site is shown relative to surrounding physical features in Figure 1, and a site map showing the tax parcels is provided as Figure 2.

We understand that BHP Billiton Canada Inc. (BHP) is considering a long-term lease and redevelopment of the subject site. We further understand that the results of this Phase I ESA will be used as part of BHP's evaluation of potential recognized environmental conditions (RECs)[2] associated the site.

1.1 Purpose and Scope of Services – Phase I ESA

The purpose of this Phase I ESA is to identify RECs in connection with the properties. Our services were completed in general accordance with our proposal, dated 13 February 2017, and authorized by BHP on 20 March 2017. Our scope of services was developed in eneral accordance with American Society for Testing and Materials (ASTM) Standard E 1527-13 for Phase I ESAs and the Environmental Protection Agency's (EPA) Federal Standard 40 Code of Federal Regulations (CFR) Part 312 "Standards and Practices for All Appropriate Inquiries (AAI)." The scope of services described below was completed by an environmental professional as described in Federal Standard 40 CFR. Our scope of services for the Phase I ESA included the following.

1. Reviewing historical aerial photographs, topographic maps, and tax assessor records as available and appropriate to identify past development history on, and adjacent to, the subject site relative to the possible use, generation, storage, release, or disposal of hazardous substances.
2. Conducting a visual reconnaissance of the subject site and adjacent properties to identify visible evidence of potential RECs.

[2] Recognized environmental conditions are defined in ASTM E1527-13 as "the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. *De minimis* conditions are not recognized environmental conditions."

3. Attempting to identify uses of the site from the present to the time that records show no apparent structures on the site, back to the time the property was first used for residential, agricultural, commercial, industrial, or governmental purposes or back to 1942, whichever is earlier.
4. Identifying data gaps relative to site historical use.
5. Reviewing the results of a federal, state, local, and tribal environmental database search provided by an outside environmental data service for listings of sites with known or suspected environmental conditions on or near the subject site and within a 1-mile search distance from the boundaries of the subject property.
6. Reviewing online and hard copy regulatory agency files regarding listed sites of potential environmental concern relative to the subject site.
7. Providing this summary report with a matrix and figure summarizing the results of the records review and identified recognized environmental conditions along with our opinion and recommendations regarding the potential for contamination by hazardous substances at the site and the significance of any data gaps identified.

1.2 Special Considerations

The EPA standard for AAI requires that the end user of this report disclose whether there is a significant difference between the purchase price of the subject property and the fair market value. This comparison is intended to assess whether the property value is reduced as a result of real or perceived contamination. Valerie Bond with BHP provided this information by completing our Phase I ESA User Questionnaire (Appendix A).

2.0 SUBJECT SITE DESCRIPTION

2.1 Involved Parties

BHP is considering a long-term lease and redevelopment of the subject site. Involved parties primarily include BHP and the Port. Other property owners may be involved as the Port consolidates the proposed site via leases or property acquisition.

Information provided by Grays Harbor County Geographical Information Systems indicates the subject site parcels are currently owned by the Port of Grays Harbor; Emerson Street Hoquiam, LLC; City of Hoquiam; and Adam Street Hoquiam, LLC.

2.2 Location, Legal Description, and Setting

General site information, property use(s), and environmental setting of the subject site area are summarized in Table 1 below. Refer to Figures 1 and 2 for vicinity and site maps. Photographs of the subject site are included in Appendix B.

Table 1. Subject Site Information

Topographic Map	USGS, 7.5 minute, Hoquiam, Washington, topographic map, 2014
Section, Township, and Range	S10, T17N, R10W of the Willamette Baseline and Meridian
Subject Site Address(es)	100 Airport Way, 400 Airport Way, and 615 Airport Way, Hoquiam, WA 98550
Subject Site General Location	On the shoreline of Grays Harbor west of the Hoquiam River and adjacent upland
Tax Parcel Numbers	056401100203 (Port of Grays Harbor), 056401000400 (Port of Grays Harbor), 056401000501 (Port of Grays Harbor), 517101021001 (Port of Grays Harbor), 517101012001 (Port of Grays Harbor), 056401100204 (Port of Grays Harbor), 056401000801 (Port of Grays Harbor), 056401000301 (City of Hoquiam), 056401000201 (City of Hoquiam), 056401100100 (City of Hoquiam), 056401100202 (City of Hoquiam), 056401000600 (Adam Street Hoquiam, LLC), 517101011001 (Emerson Street Hoquiam, LLC)
Abbreviated Subject Site Legal Description	HOQ TDLDS TAX R3 (OUT OF TRS 10-11); HOQ TDLDS LOT 6 & LOT 7 LS 176' OF E 176' TR 10; HOQ AC LOT 1 LS RY RW LS PT OF TAX 2 LS TAX 3 & 4; LOT 2 S OF RY RW LS TAX 1
Subject Site Approximate Area	240 Acres
Subject Site Existing Use	A 25-acre portion of the site is used as a log storage and wood chipping/processing facility (Willis Enterprises). A 3-acre portion of the site is used as a landfill. A 4-acre portion of the site in the northeast corner is used as a distillery. A 20-acre portion of the site is used as the City of Hoquiam's wastewater pond.

Geologic Setting	Puget-Willamette Lowland - Chehalis River Basin
Nearest Surface Water Bodies	Grays Harbor lies south and west of the site.
Approximate Surface Elevation	Approximately 20 feet above mean sea level
Soil and Geologic Conditions	Site soil generally consists of very loose to very dense fill over estuarine and alluvial deposits
Depth to Groundwater	Depth to groundwater is approximately 2 to 15 feet below the ground surface
Inferred Direction of Shallow Groundwater Flow	To the west/southwest towards Grays Harbor, based on local surface drainage features, topography, and surface water features

Our knowledge of the general physiographic setting and geology and groundwater occurrence in the subject site vicinity is based on our review of the topographic map listed above, public agency records, and reviewing information from investigations conducted by others at the subject site and site vicinity.

2.3 Subject Site Reconnaissance

2.3.1 Summary of Observations

A representative of BergerABAM performed a visual reconnaissance of the subject site on 10 May 2017. The subject site is generally flat, ranging from Elevations +7 to +23 feet mean lower low water (MLLW). The approximately 240-acre site (including an existing berth and intertidal area) is occupied by approximately 4.3 acres of wetland near the northwest corner, 1.6 acres of wetlands on the west and southwest portions of the site, and 77 acres of wetland on the east portion of the property. These wetland areas are approximated from previous studies[3]. The subject site and surrounding properties are shown on Figures 2 and 3.

The central portion of the subject site is occupied by a lumber yard and wood chip facility (owned by the Port; leased to Willis Enterprises). The wood chip warehouse sits on a paved yard, but the remainder of the wood chip facility property (e.g., log storage area) is not paved. A warehouse-type property is on the northeast corner of the site (Lamb Property). The southwest corner of the site (City parcel) is occupied by a stormwater treatment pond that has been partially filled.

Airport Way crosses the south portion of the site near the shoreline, Bowerman Airfield and Grays Harbor National Wildlife Refuge are to the west, and commercial and residential properties border the subject site on the north. Undeveloped and/or cleared land is located east of the site and extends east to Paulson Road.

[3] HDR Engineering, Inc., March 2014. "Grays Harbor Rail Terminal LLC, Wetland Technical Report." March 2014.

The subject site has a rail spur that extends south from the main line to approximately the center of the site area. The main line is located near West Emerson Avenue adjacent to the north portion of the site.

Table 2 below summarizes conditions observed during our subject site reconnaissance.

Table 2. Summary of Subject Site Reconnaissance Observations

Feature	Observed		Comment, Location, and/or Description
	Yes	No	
Structures (existing)	X		Willis Enterprises: 1 maintenance shed, 1 weigh station office, and 1 guardhouse (not in use) Tax Parcels 056401000600 and 517101011001: 3 warehouses (one of which was labeled "Bellweather Yard Rack and Bottle") and a storage area for wooden barrels. Tax Parcel 056401000400: 3 abandoned and dilapidated warehouses, 1 abandoned weigh station, and associated office building
Structures (evidence of former)	X		A footprint of a former building was observed on the northeast portion of the subject site (Tax Parcel 056401000600)
Heating/Cooling System		X	
Floor Drains, Sumps, or Drywells		X	
Aboveground Storage Tanks (ASTs)	X		2 diesel ASTs diked for secondary containment were observed inside the maintenance building at Willis Enterprises
Underground Storage Tanks (USTs) or Evidence of USTs		X	
Drums or Other Containers	X		Approximately thirty 55-gallon drums and other containers on concrete floor inside warehouse at Willis Enterprises. No secondary containment was observed around the drums and containers.
Chemicals or Hazardous Materials (other than *de minimis* quantities of cleaning products)		X	
Evidence of Leaks, Spills, or Releases Surrounding ASTs, USTs, and/or Chemical Storage Areas	X		Oil staining on concrete floor around ASTs and 55-gallon drums inside maintenance building at Willis Enterprises (Tax Parcel 056401000801)
Stained or Corroded Floors, Walls, or Drains (other than apparent water stains or minor oil stains on pavement from parked vehicles)	X		Oil staining on the concrete floor of the maintenance building was observed at Willis Enterprises (Tax Parcel 056401000801). According to one of the workers at the site, small or "de minimus" spills of hydraulic fluid from their equipment do occur on the property. He stated that they clean up the spills by digging them up and disposing of the soil. The employee did not indicate how or where the spill-impacted soil was disposed.

Feature	Observed		Comment, Location, and/or Description
	Yes	No	
Pipes of Unknown Origin or Use		X	
On-site Septic System		X	
Sewage Disposal System		X	
Potable Water Supply		X	
Solid Waste Refuse Dumpsters	X		
Hydraulic Hoists		X	
Oil/Water Separators		X	
Discolored or Stained Soil or Vegetation Potentially from Hazardous Substances		X	
Hazardous Waste Disposal Areas		X	
Uncontained Debris, Refuse, or Unidentified Waste Materials	X		A debris pile was observed on the eastern portion of Willis Enterprises property (see Figure 3)
Standing Water or Other Liquids	X		Standing water on land west/northwest of Willis Enterprises
Catch Basins and Stormwater Drainage		X	
Pits/Ponds/Lagoons	X		City of Hoquiam wastewater pond located on west side of property
Waste or Wastewater Discharges		X	
Unusual Odors		X	
Stressed Vegetation		X	
Fill Material		X	
Water Wells (agricultural, domestic, monitoring)	X		One monitoring well was observed on the southern portion of Tax Parcel 056401000600 associated with Lamb Grays Harbor Company property
Pad-Mounted Transformers	X		One pad-mounted transformer with a visible "No PCB" sticker was observed on the southeast portion of Tax Parcel 056401000801
Pole-Mounted Transformers	X		Two pole-mounted transformers were observed on Tax Parcel 056401000801 and one pole-mounted transformer was observed on Tax Parcel 056401000600
Other Conditions of Environmental Concern		X	

2.4 Adjacent Property and Vicinity Observations

We observed properties located adjacent to and surrounding the subject site on 10 May 2017. We observed the adjacent properties from accessible public rights-of-way and from the subject site. Table 3 below outlines adjacent land uses and pertinent observations with respect to conditions that could pose as RECs on the subject site.

Table 3. Adjacent Land Uses

Direction	Position Relative to Site[a]	Adjoining Street	Adjacent Property and Use(s)
North	Upgradient	West Emerson Avenue/State Route 109 (SR 109)	A railroad track traverses the northern boundary of the site. Farther north, there is forested land, private residences, and commercial businesses (Ovalstrapping, a credit union, and Lamb Grays Harbor Company).
East	Up to Crossgradient	South Adams Street	Commercial properties (Root Paint & Glass Company, Apex Environmental) lumber yard, mini storage, and private residences.
South	Downgradient	Airport Way	Grays Harbor and the Port's Terminal 3 pier.
West	Down to Crossgradient	Paulson Road and Airport Way	The property immediately adjacent to the west is a wastewater pond and the wastewater treatment facility. Bowerman Airport is located west of the wastewater facility. The Grays Harbor National Wildlife Refuge is located north of the airport and west of the subject site.

Note[a]: The inferred shallow groundwater flow direction in the subject site vicinity is generally toward the west/southwest (see Section 2.2).

3.0 ENVIRONMENTAL RECORDS REVIEW

3.1 Database Search

BergerABAM reviewed the results of a search of pertinent environmental regulatory lists and databases for current or previous facilities listed at the subject sites and addresses located within ASTM-specified distances from the subject sites. The database search was provided by a subcontracted regulatory list search service, Environmental Data Resources, Inc. (EDR). The EDR report is presented in Appendix C. The report includes details regarding the listed facilities identified and maps showing the approximate locations of the listed facilities relative to the subject site.

The subject site and off-site facilities that are located within 1 mile of the subject site are listed in various databases (e.g., ALLSITES[4], FINDS[5], CSCSL[6], ECHO[7], UST[8]) in the EDR report. Table 4 below summarizes the database listings of the subject site and the listed facilities in that area that, in our opinion could pose a REC to the subject site. Additional sites identified in the EDR report that are not included in Table 4 were located in a downgradient position, were at a distance to not likely affect the subject site, and/or did not have RECs at the site.

[4] ALLSITES are listed in the EDR report as 'sites of interest' to the Washington State Department of Ecology (Ecology).

[5] The Facility Index System (FINDS) contains both facility information and "pointers" to other sources of information that contain more detail.

[6] The State Hazardous Waste Sites records are the states' equivalent to CERCLIS (Comprehensive Environmental Response, Compensation, and Liability Information System). These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data come from the Ecology's Confirmed and Suspected Contaminated Sites List (CSCSL).

[7] ECHO, Enforcement and Compliance History Online, is a web tool developed and maintained by EPA's Office of Enforcement and Compliance Assurance for public use. The ECHO website provides environmental regulatory compliance and enforcement information.

[8] The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Ecology's Statewide UST Site/Tank Report.

Table 4. Summary of Regulatory Database Search Listings of Potential Environmental Concern

EDR Map ID	Location[a]	Listed Business and Address	Regulatory Database	Description	Additional Information
A1, A2, A3	Subject Site	Dahlstrom Lumber Co., 100 Airport Way	ALLSITES, NPDES, FINDS, ECHO	This site is listed for an industrial stormwater general permit and is a "site of interest" to Ecology. It is also listed as "Willis Enterprises" in the EDR report.	The Dahlstrom Lumber Co. site is the lumberyard and wood chipping facility that currently operates as Willis Enterprises on the subject site.
		Rayonier Grays Harbor Dock, 615 Airport Way	ALLSITES, CSCSL No Further Action (NFA), NPDES	This site is a former lumberyard that operated on the west-central portion of the subject site and was listed on Ecology's CSCSL. The Ecology Toxics Cleanup Program online database indicates a NFA was issued in 2002.	The Rayonier Grays Harbor Dock site is located on the subject site where Willis Enterprises currently operates (see Figure 3). This site is considered a REC because (1) petroleum hydrocarbon impacted soil was left in place beneath a concrete pad associated with the former debarker and (2) a groundwater sample collected west of the debarker had detected concentrations of diesel-range petroleum hydrocarbons that exceeds Model Toxics Control Act (MTCA) Method A cleanup levels. See Section 3.2.1 for additional information.
F20	Subject Site	Lamb Grays Harbor Company, Blaine Street and Firman Street	Hazardous Site List (HSL), CSCSL, UST, ALLSITES, RCRA Non Generator/No Longer Regulated (NonGen/NLR), Aerometric Information Retrieval System (AIRS)	This site is a former machinery manufacturing facility for pulp and paper equipment. Multiple USTs and ASTs (fuel oil, diesel, leaded gasoline, and Bunker C oil) were decommissioned with no environmental assessment completed before closure. Widespread oil staining and no secondary containment for storage drums were documented on site during Ecology's site visit in 2005.	The Lamb Grays Harbor Company site (see Figure 3) is considered to be a REC because Ecology's Toxic Cleanup Program database states that the site has confirmed soil (metals priority pollutants, other reactive wastes, and petroleum products). SLR International Corporation's (SLR) Subsurface Investigation Report stated that the site has confirmed soil (diesel-range organic [DRO], HO, total cPAH, and lead) contamination and confirmed groundwater (DRO, HO, total cPAH, gasoline-range organic [GRO]) contamination above cleanup levels in 2015. Site is awaiting cleanup. Please see Sections 3.2.5 and 3.3.1 for additional information.

EDR Map ID	Location[a]	Listed Business and Address	Regulatory Database	Description	Additional Information
4, B6	Subject Site	Adams Street Inert Waste Disposal Site, 400 block - south Adams Street	ALLSITES, FINDS, Solid Waste Facilities/Landfill Sites (SWF/LF)	This site was used for construction debris/concrete disposal. According to Ecology's Toxic Cleanup Program database, no violations or hazardous material releases have been reported for this site.	The Adams Street Inert Waste Disposal Site is a REC because it is on the subject site (see figure 3) and there was no record of testing of the materials placed in the landfill in the information reviewed. See Section 3.2.2 for additional information.
23	Upgradient – Approximately 800 feet north of the subject site	Fuds Hoquiam High School Munitions, HIWAY 109	CSCSL, ALLSITES	This site was used as U.S. Department of Defense site for small arms ammunition manufacturing.	The Hoquiam High School Munitions Site is not considered a REC because the 2012 site investigation results indicated there are no munitions on site and lead was not detected in soil at a concentration greater than the MTCA Method A cleanup level. See Section 3.2.3 for additional information.
B8, C12	Crossgradient - Approximately 500 feet east of the subject site boundary	Apex Environmental, 414 S Adams Street and 418 S Adams Street	HSL, CSCSL, ALLSITES, RCRA NonGen/NLR, FINDS, MANIFEST, NPDES, ECHO, SWF/LF	According to Ecology's Toxic Cleanup Program database, the site has confirmed soil (petroleum products) and suspected groundwater and surface water contamination above cleanup levels. The site is awaiting cleanup.	The Apex Environmental site is not considered a REC because it is not on the subject site and is a "low priority" site to Ecology. See Section 3.2.4 for additional information.

Note[a]: Shallow groundwater flow direction in the subject sites vicinity flows to the west/southwest as noted in Section 2.2.

3.2 Ecology File Review

BergerABAM reviewed Ecology site regulatory files for sites that are suspected RECs or facilities with data gaps. The information was reviewed at Ecology's headquarters in Lacey, Washington. A brief summary of the information reviewed is provided below.

3.2.1 Rayonier Grays Harbor Dock/Willis Enterprises

The Rayonier Grays Harbor Dock/Willis Enterprises facility has been variously operated as a lumber mill and wood chip export facility for more than 30 years. The "Environmental Investigation and Site Cleanup Actions Report" (GeoEngineers, 2000) included in the file indicated that approximately 340 cubic yards of petroleum-contaminated soil were removed from the site as part of a site cleanup. Petroleum-impacted soil that exceeded site-specific MTCA Method B cleanup levels was left in place beneath a concrete pad (former debarker) at the site due to its location beneath an operating structure. Diesel-range petroleum hydrocarbons that exceed MTCA Method A

cleanup levels were detected in one groundwater sample collected adjacent to the debarker. The site received an NFA determination under Ecology's Voluntary Cleanup Program after the 2000 cleanup was completed.

This site is a REC due to its location on the project site and the residual contamination left on site beneath the former debarker pad after the 2000 cleanup.

3.2.2 Adams Street Inert Waste Disposal Site

The Adams Street Inert Waste Disposal site has been a permitted landfill for more than 10 years. The files reviewed for the Adams Street Inert Waste Disposal site included solid waste disposal permits and permit renewals. There are no records of a hazardous material release at the site.

The site is considered a REC as it is located on the project site and no material characterization is completed prior to disposal at the site.

3.2.3 Fuds Hoquiam High School Munitions

Fuds Hoquiam High School Munitions is a formerly used defense site. According to the U.S. Army Corps of Engineers website, the Department of Defense (DOD) has used land throughout the United States to both train soldiers, airmen, sailors, and marines, and test new weapons to ensure the nation's military readiness. As training and testing needs changed, DOD obtained property or returned it to private or public uses. Ecology's files stated that a soil investigation conducted in 2012 concluded that there are no Munitions and Explosives of Concern at the site. Lead was detected in soil at concentrations less than the MTCA Method A cleanup level (250 mg/kg). The site received an NFA determination from Ecology in 2012.

This site is not considered a REC due to the findings of the 2012 investigation and subsequent NFA determination.

3.2.4 Apex Environmental Inc.

Apex Environmental is an industrial facility that is classified as an RCRA non-generator located 500 feet east of the subject site. The facility was inspected by Ecology in 2007 and was documented to have poor housekeeping and suspected soil contamination (petroleum hydrocarbons). The Ecology file indicates that a sub-pad shallow excavation (less than 1 foot) occurred in 2008 to accommodate construction of a concrete slab. The site is "awaiting cleanup" and it has a hazard ranking of 5[9] according to Ecology's online cleanup site database.

[9] Ecology ranks a site after a Site Hazard Assessment is completed to confirm the presence of hazardous substances and to determine the relative risk the site poses to human health and the environment. The results of the Site Hazard Assessment are used in the Washington Ranking Method to be given a number between 1 and 5. Where "1" represents the highest level of risk and "5" represents the lowest risk.

The site is not considered a REC because it is not on the subject site and is a "low priority" site to Ecology.

3.2.5 Lamb Grays Harbor Company

The Lamb Grays Harbor site, which ceased operations in 2001, had been a machinery manufacturing facility for pulp and paper equipment since the early 1900s. The site is currently occupied by a whiskey distillery. Lamb Grays Harbor Company is the parent company of Emerson Street Hoquiam, LLC, Adams Street Hoquiam, LLC, and Firman Street Hoquiam, LLC. The three companies occupy the parcels adjacent to the northeast corner of the subject site (517101011001, 056401000600, and 052000100001, respectively).

Ecology conducted a Site Hazard Assessment at the property in 2005 based on a complaint registered with Ecology's Emergency Response Tracking System. During this assessment, along with documentation of current site conditions, three soil samples and two samples from the collecting pits were collected and analyzed for petroleum hydrocarbons (including gas-, diesel- and heavy oil- range petroleum hydrocarbons). The results indicated concentrations of petroleum below MTCA Method A cleanup levels in the samples collected. The site was given a hazard ranking of 1 (which represents the highest risk level to the site) based on the results of this sampling and analysis. The Site Hazard Assessment indicated that groundwater contamination was suspected at the site and that contaminated groundwater would have the potential to impact any well within a 2-mile radius. The Ecology site file indicated that the status of the site is "awaiting cleanup."

3.3 Additional File Review

3.3.1 Lamb Grays Harbor Company

An additional file review of documents concerning the Lamb Grays Harbor Company property provided by BHP was conducted by BergerABAM. In 2015, a Subsurface Investigation Report[10] completed by SLR was completed (Appendix I). The report indicated the following.

Soil sample results showed:

- Diesel-range organics (DRO) and HO concentrations greater than the MTCA Method A cleanup level are present in the shallow soil near the former diesel AST, the diesel UST, and beneath the dirt floor area in the maintenance, repair, and operation (MRO) shop.

[10] SLR International Corporation, February 2015. "Subsurface Investigation Report Former Lamb-Grays Harbor Company Facility, Blaine Street and Firman Avenue, Hoquiam, Washington." 12 April 2017.

- Total cPAH concentrations greater than the MTCA Method A cleanup levels are present in the shallow soil near the former diesel AST, near the former heating oil UST, and beneath the dirt floor area in the MRO shop.

- A lead concentration greater than the MTCA Method A cleanup level is present in the shallow soil beneath the dirt floor area in the MRO shop.

Groundwater sample results showed:

- DRO, HO, and total cPAH concentrations greater than the MTCA Method A cleanup levels are present near the former diesel AST and beneath the dirt floor area in the MRO shop

- Gasoline-range organics (GRO) concentrations greater than the MTCA Method A cleanup level are present near the former leaded gasoline UST

The site is a REC due to its location on the project site and because the site has confirmed soil (DRO, HO, Total cPAH, and lead) contamination and confirmed groundwater (DRO, HO, total cPAH, GRO) contamination above cleanup levels in 2015.

4.0 SUBJECT SITE HISTORY

4.1 Historical Resources

Our understanding of the history of the subject site is based on a review of the information from the historical resources listed in Table 5 and interviews with the individuals listed.

Table 5. Historical Resources Reviewed

Description	Provider or Interviewee	Dates of Coverage or Dates of Site Knowledge	Date Reviewed or Contacted	Comment
Historical Aerial Photographs[a]	EDR	1953, 1971, 1974, 1981, 1983, 1990, 1992, 1994, 2005, 2006, 2009, 2011	17 April 2017	See Section 4.2 for findings
Historical Fire Insurance Maps	Not available			
Historical Topographic Maps	EDR	1942, 1957, 1973, 1983, 1994, 2014	12 April 2017	See Section 4.2.1
Historical City Directories	EDR	1984, 1988, 1995, 1999	12 April 2017	See Section 4.2.2
Title/Deed of Trust Reports	The Port of Grays Harbor	1999 to present	24 April 2017	No environmental liens were noted in the Title or Deed of Trust reports.
	Adams Street Hoquiam, LLC	2013 to present	24 April 2017	No environmental liens were noted in the Title or Deed of Trust reports.
	Emerson Street Hoquiam, LLC	2013 to present	24 April 2017	No environmental liens were noted in the Title or Deed of Trust reports.
Building Records	Not available			
Interviewee	Leonard Barnes, Port of Grays Harbor	1999 to present	31 May 2017	See Section 4.2.3
Interviewee	Brian Shay, City of Hoquiam Administrator		1 June 2017	See Section 4.2.4

Note[a]: The scale of the photographs reviewed allowed for an interpretation of general site development/configuration, such as identifying most structures, roadways, and clearings. However, the scale of the photographs did not allow for identification of specific site features, such as fuel pumps, wells, or chemical storage areas of the site, if any.

4.2 Historical Subject Site Ownership and Use Summary

The Grays Harbor County Tax Assessor's records indicate that the parcels comprising the subject site are currently owned by the Port of Grays Harbor, Emerson Street Hoquiam, LLC, City of Hoquiam, and Adam Street Hoquiam, LLC.

Grays Harbor County building records are not available as of 12 April 2017.

Historical aerial photographs of the subject site were reviewed and are included in Appendix D. The historical conditions shown in the aerial photographs are summarized below.

- The 1953 aerial photographs show the subject site appearing to be undeveloped tide flats. The City of Hoquiam wastewater lagoon is present to the southwest. Adjacent land to the northeast is developed with structures (based on the SLR report summarized in Section 3.3.1, structures were used for industrial purposes i.e., machine shop, assembly shop, pattern shop, foundry, MRO shop) associated with the Lamb Grays Harbor Company site.

- The 1971 aerial photographs show the site t have been filled in with what appears to be dredge material. The 1971 aerial photographs also show large warehouse on the northeast corner of the subject site associated with the Lamb Grays Harbor Company property.

- The 1974 aerial photographs show a pile of debris adjacent to the structure in the northeast corner of the site seen in 1971, as well as continued development of commercial warehouses and residencies in the surrounding areas of the subject site.

- The 1981 aerial photograph shows the existing dock and development of the subject site with log yard known to be Rayonier Grays Harbor Dock, constructed between 1974 and 1981.

- The 1983 aerial photographs show operations at the log yard, including log storage, several buildings, and processing facilities on the subject site. Multiple piles of logs, haul roads, a scale house, and two buildings were located along the southern property boundary of the project site, near the City wastewater lagoon. A cleared area is present in the northwest portion of the subject site.

- The 1990 aerial photographs show a large warehouse had been added to the southern portion of the subject site, adjacent to Airport Way and the wastewater pond. The cleared area in the northwest portion of the site had generally been revegetated.

- The 1992 aerial photograph does not show significant changes in the conditions of the subject site from that shown in the 1990 photograph.

- The 1994 aerial photograph does not show significant changes in the conditions of the subject site from that shown in the 1992 photograph.

- The 2005 aerial photographs show the log yard as not being used with several of the buildings gone; four buildings remain. The 2005 aerial photographs also show a large clearing in vegetation on the eastern side of the subject site.

- The 2006 aerial photographs do not show significant changes in the conditions of the subject site from that shown in the2005 photographs.

- The 2009 aerial photographs show a portion of the subject site, Willis Enterprises' leased land, being used again as an apparent log yard.

- The 2011 aerial photographs do not show significant changes in the conditions of the subject site from that shown in the 2009 photogra hs. The east side of the City wastewater lagoon located on the southwest portion of the subject site has been filled in with what appears to be soil.

4.2.1 Historical Topographic Maps

The EDR Topographic Map Report was reviewed for the subject site and surrounding properties. The maps reviewed were dated 1942, 1957, 1973, 1983, 1994, and 2014, which are provided in Appendix F. These maps revealed that the subject site and surrounding properties are located in an undeveloped area until 1973. The subject site is developed by landmark buildings in the 1973, 1983, and 1994 maps. Surrounding properties are developed by landmark buildings in the 1957, 1973, 1983, and 1994 maps. According to these topographic maps, the surface topogra hy in the area of the subject site slopes downwardly to the west/southwest. Features of concern on or adjoining the subject site were not identified.

4.2.2 City Directory Information

A search of available city directories was conducted by EDR for Paulson Road and Airport Way. The following is a summary of the review of coverage years 1984, 1988, 1995, 1999, and 2013, which are provided in Appendix G.

Rayonier (dock facility) was identified at 615 Airport Way and appears to be associated with the site, as well as Dahlstrom Lumber at 100 Airport Way. A review of nearby addresses identified the following locations that could have hazardous waste used or stored on site.

- Rayonier (Dock Facility) – 615 Airport Way (associated with the subject site)
- Dahlstrom Lumber – 100 Airport Way (associated with the subject site)
- Grays Harbor Sorting Yard – 616 Airport Way (associated with the subject site)
- Independent Distributors – 1131 Airport Way (0.38 mile southwest)
- Flying Fat Boy – 1450 Airport Way (0.37 mile west/southwest)
- Grays Harbor Airport – Airport Way (0.37 mile west/southwest)

The information reviewed from City directories do not indicate any new evidence of RECs that were not previously identified from other sources.

4.2.3 Interview with Leonard Barnes, Port of Grays

Mr. Barnes has been associated with the site since 1999 when the Port of Grays Harbor took ownership of the Rayonier Grays Harbor property. He stated that when the Port of Grays Harbor acquired the land it had a "clean bill of health." His level of familiarity with the site dates back to 1981 when Rayonier Dock Grays Harbor had a log yard operation onsite. Mr. Barnes indicated the following during the interview.

- The site was filled using dredged material from the Chehalis River.
- He is unaware of any USTs or ASTs onsite, but he did indicate that their tenant (Willis Enterprises) could have them.
- He is not aware of any known or suspected leaks, spills, or releases from UST systems on the subject site.
- He did not know of any sumps, floor drains, dry wells, or oil/water separators on the site.
- He is not aware of past use, storage, disposal, or releases of hazardous substances at the site.
- There has never been a landfill located at the site and dumping has not been allowed at the Port of Grays Harbor portion of the site.

4.2.4 Interview with Brian Shay, City of Hoquiam Administrator

Mr. Shay indicated the following during the interview.

- The decommissioned (filled) portion of the City's wastewater lagoon is permitted to accept native fill material (see Appendix H for permits). He indicated that approximately 100,000 cubic feet of material came from the Department of Transportation's pontoon project in Aberdeen, and the rest came from two local area landslides and local construction sites. Chemical testing is not completed on the material before placement, but he stated that "they clarify that there is no risk to the material" by asking the material source where it is coming from, i.e., an industrial site or not.
- The City operates an inert landfill on the Lamb Grays Harbor Company property on the northeast corner of the subject site (see Appendix H for permit). The landfill accepts soil, grass, rock, concrete, and asphalt from the surrounding area for disposal. Mr. Shay indicated that no excavation is done; the concrete and asphalt are just covered over with the other material that is brought in.

4.3 Adjacent Properties

Our review and discussion of adjacent properties are focused on the properties immediately surrounding the subject site.

Nearby surrounding properties consisted of a mix of residential, commercial, and public properties. Commercial properties are located to the south and east, and a wastewater lagoon is located to the south between the subject site and Grays Harbor. Bowerman Airport is located west/southwest of the subject site. Hoquiam High School and residential properties are located north of the site beyond West Emerson Avenue/SR 109.

Historical aerial photographs dated 1953 to 2011 were reviewed. The photographs show the following historical conditions on the adjacent properties.

- SR 109 north of the subject site and Airport Way south of the subject site were developed prior to 1953.
- The properties north and east were developed between 1953 and 1971, along with one building south of the subject site. The Hoquiam wastewater lagoon appears to be in use.
- In the 1974 aerial photograph, there is commercial and residential development.
- In the 1981 aerial photograph, additional development, including athletic fields, was constructed on the adjacent Hoquiam High School property north of SR 109. In the 1981 aerial photograph, a large clearing adjacent to the north of the subject site is shown west of the Lamb Grays Harbor Company property.
- In the 1983 aerial photograph, the large clearing north of the subject site appears to be used for debris dumping. Property southeast of subject site was developed between 1981 and 1983 with what appears to be a log yard.

4.4 Environmental Liens or Property Use Restrictions

Our research indicates that environmental liens have not been filed against the subject site, based on our review of the title reports, deeds of trust, and other researched documents. The title reports and deeds of trust are included as Appendix E.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

BergerABAM has completed a Phase I ESA of the Proposed Grays Harbor Potash Export Facility and adjacent properties in Hoquiam, Washington (shown on Figures 1 through 3). This Phase I ESA was conducted in general accordance with the sco e and limitations of ASTM E 1527-13 and EPA's Federal Standard 40 CFR Part 312 "Standards and Practices for All Appropriate Inquiries (AAI)." Based on the results of our study, it is our opinion that the following known or suspect environmental conditions identified by our study represent RECs for the site.

Rayonier Grays Harbor Dock/Willis Enterprises

Petroleum-contaminated soil has been documented as remaining beneath a concrete pad at the former Rayonier Grays Harbor Dock site (currently Willis Enterprises). A groundwater sample collected near the concrete pad was also contaminated with petroleum hydrocarbons at concentrations greater than MTCA Method A cleanup levels in 1999. The site received an NFA determination from Ecology in 2002.

Petroleum staining was observed on the concrete floor of the maintenance building during the site reconnaissance. One of the workers on site stated that small or "de minimus" spills of petroleum hydrocarbons occur on the property. The worker stated that the spills are usually hydraulic fluid from their equipment and that they get "cleaned up" by digging up the soil and disposing of it.

The site is considered a potential REC due to the residual contamination remaining on site and the potential for soil and/or groundwater impacts from the spills that have been noted at the property during the site visit.

Lamb Grays Harbor Company

Metals, priority pollutants and other reactive wastes, and petroleum-product contaminated soil was encountered on the north portion of the Lamb Grays Harbor Company site in 2015 by SLR (located on the northeast corner of the project site). This portion of the site formerly operated as a foundry. Ecology files indicate that groundwater contamination is suspected at the site; SLR Subsurface Investigation Report confirms this through ground water sampling collected in 2015. The site has a hazard ranking of 1 (which represents the highest risk level to the site) from Ecology and is still awaiting cleanup.

An approximately 3-acre portion of the parcel (Parcel 056401000600, also owned by Lamb) to the south of the former foundry parcel is leased to the City of Hoquiam as a permitted landfill (Brian Shay, City Administrator). Grass, rock, soil, concrete, and asphalt from the surrounding areas are disposed there. This material is not characterized prior to disposal at the site.

The Lamb parcels represent a potential REC due to the known contamination at the former foundry facility, lack of characterization of material disposed at the City-leased landfill, and the parcel locations on and adjacent to the subject property.

5.2 Recommendations

The following recommendations are provided to address the potential environmental concerns that may impact the proposed project at the subject site.

- Soil and groundwater samples should be collected at (1) the area of the concrete pad where petroleum-impacted soil was left in place at the Rayonier site; and (2) the footprint of the existing Willis Enterprises maintenance building. The samples should be analyzed for total petroleum hydrocarbons, VOCs, PCBs, PAHs, and RCRA Metals.

- Soil and groundwater sampling should be completed at or adjacent to the Lamb property (Tax Parcels 056401000600 and 517101011001) including the areas surrounding the closed USTs and ASTs, land surrounding the former paint and welding shops, and the permitted landfill. The samples should be analyzed for total petroleum hydrocarbons, VOCs, PCBs, PAHs, and RCRA Metals.

6.0 LIMITATIONS

BergerABAM has completed this Phase I ESA of an approximately 240-acre site located in Hoquiam, Washington, in general accordance with the scope and limitations of our proposals, dated 13 February 2017, and ASTM E 1527-13, Standard Practice for Phase I ESAs. This Phase I ESA has been prepared for use by BHP for evaluating the subject site as defined in the report relative to proposed redevelopment. This report is not intended or authorized for use by third parties with which BergerABAM does not have a contractual relationship. BergerABAM and BHP are not liable or responsible for any conclusions or activities resulting from unauthorized third-party use of the information provided herein.

Environmental conditions described in this summar are based on site observations, historical research pertaining to the subject site, and soil sampling. Site conditions can change over time. This report represents a summary of site conditions at the time the site visit, interview(s), and environmental file review were completed.

Within the limitations of scope, schedule, and budget, this report has been prepared in accordance with generally accepted engineering and environmental practices in effect at the time the work was performed.

7.0 BIBLIOGRAPHY

Barnes, Leonard. "Phase 1 ESA Interview." Telephone interview. 31 May 2017.

Environmental Data Resources Inc. The EDR Radius Map Report with Geocheck, 100 Airport Way. 12 April 2017.

GeoEngineers, Inc. 2000. Environmental Investigation and Site Cleanup Actions Report.

HDR Engineering, Inc., February 2013. "Phase I Environmental Site Assessment Proposed Terminal 3 Facility, Port of Grays Harbor, Hoquiam, Washington." 28 February 2013.

HDR Engineering, Inc., March 2014. "Grays Harbor Rail Terminal LLC, Wetland Technical Report." March 2014.

Shay, Brian. "Phase 1 ESA Interview." Telephone interview. 1 June 2017.

SLR International Corporation, February 2015. "Subsurface Investigation Report Former Lamb-Grays Harbor Company Facility, Blaine Street and Firman Avenue, Hoquiam, Washington." 12 April 2017.

Figures

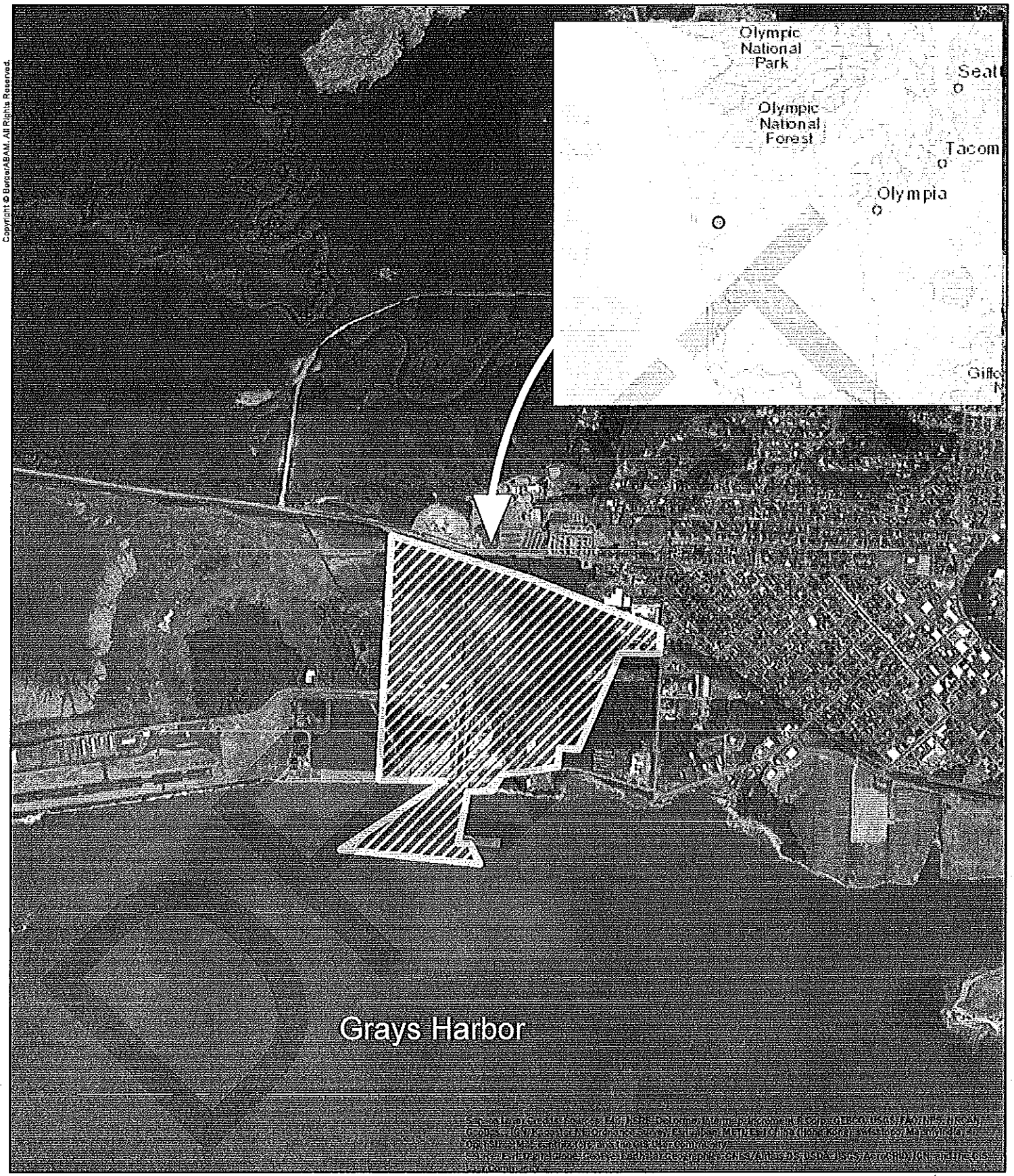


Figure 1-Site Vicinity Map
Proposed Terminal 3 Facility
Phase I Environmental Site Assessment
Port of Grays Harbor
Hoquiam, WA

BergerABAM

Path: Q:\Vancouver\2017\A17.020200\GIS\02_MXD\Preliminary\POGH Phase I.mxd

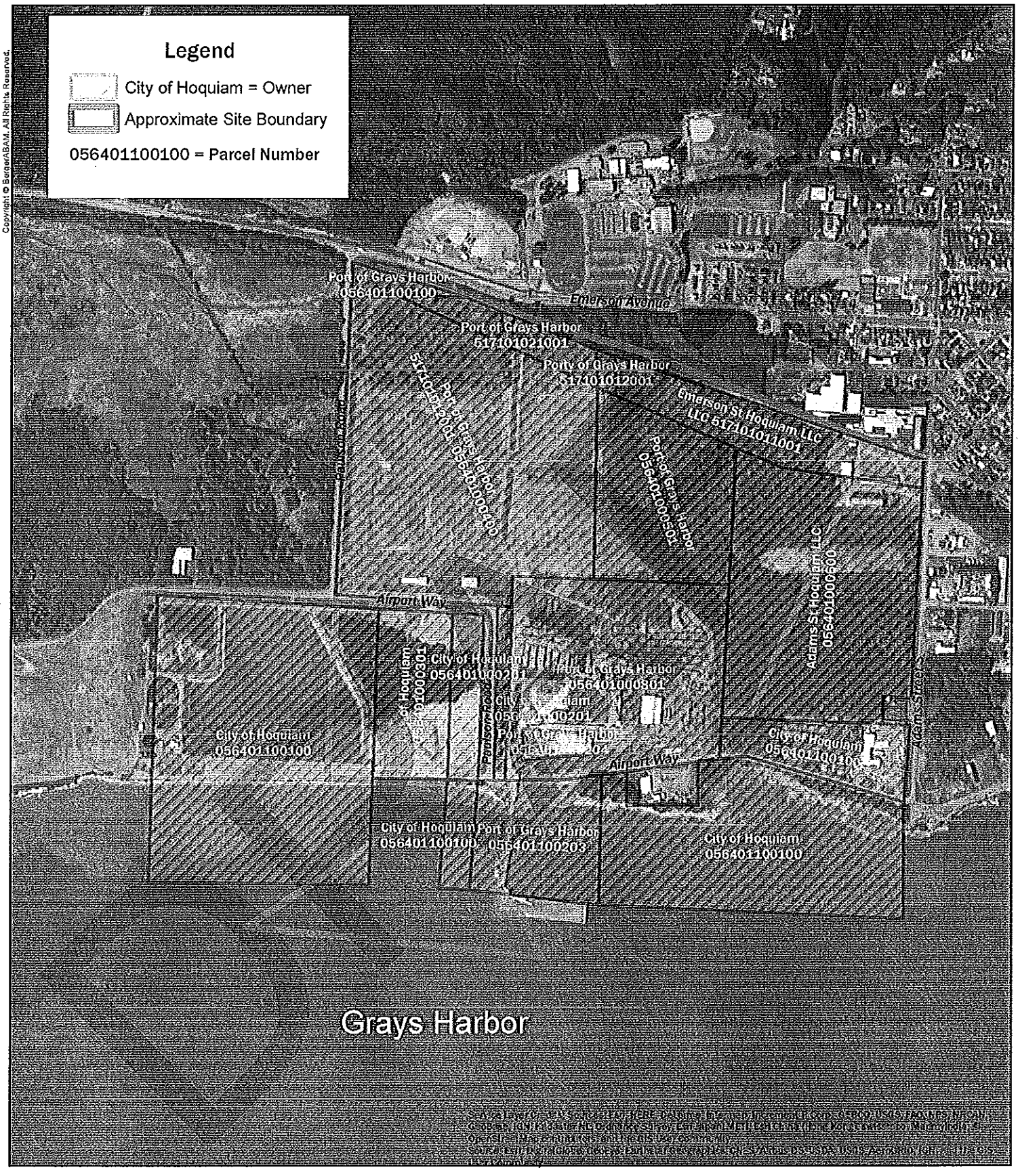


Figure 2-Parcel Map
Proposed Terminal 3 Facility
Phase I Environmental Site Assessment
Port of Grays Harbor
Hoquiam, WA

BergerABAM

0 250 500 1,000 1,500 2,000
Feet

Path: O:\Vancouver\2017\A17.020260\GIS\02_MXD\Preliminary\POGH Phase I.mxd

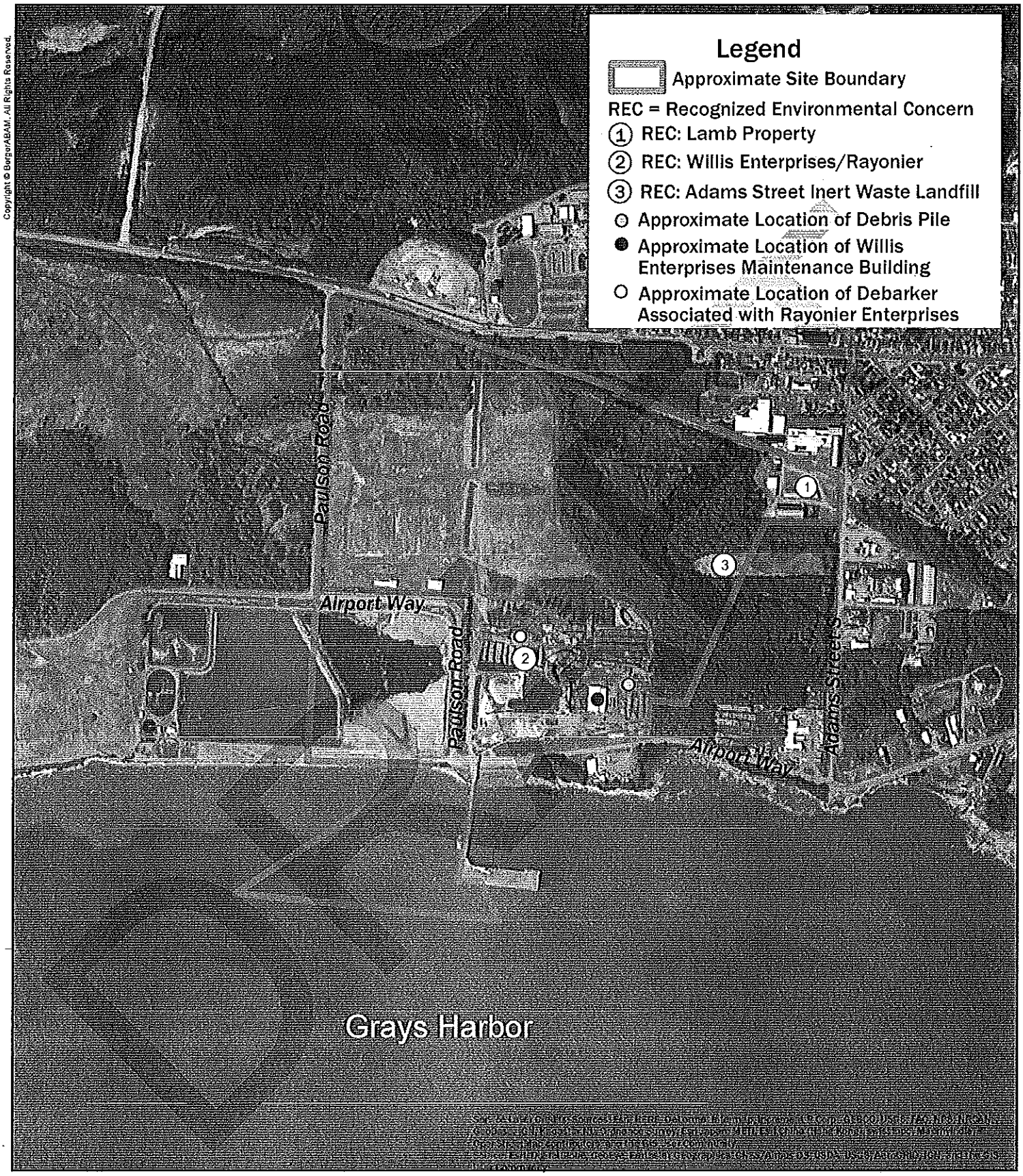


Figure 3-Subject Site Map
Proposed Terminal 3 Facility
Phase I Environmental Site Assessment
Port of Grays Harbor
Hoquiam, WA

BergerABAM

0 250 500 1,000 1,500 2,000
Feet

Path: Q:\Vancouver\2017\A17.020207\GIS\02_MXD\Preliminary\POGH Phase I.mxd

Appendix B
Field Procedures and Soil Boring Logs

APPENDIX B
FIELD PROCEDURES AND SOIL BORING LOGS

INTRODUCTION

General

This appendix describes the field procedures, field quality assurance/quality control (QA/QC) protocol, and the chemical testing program implemented during the environmental site assessment (ESA) activities. Additionally, field boring logs are included in this appendix. Field exploration methods described in this appendix include the following.

- Collecting soil samples from direct-push borings
- Field screening of soil samples
- Groundwater sampling from direct-push explorations
- Location control
- Decontamination procedures
- Handling of investigation-derived waste
- Chain-of-custody procedures

Collecting Soil Samples from Direct-push Borings

The soil borings were advanced using truck-mounted, direct-push equipment owned and operated by Environmental Services Network Northwest of Olympia, Washington. Soil sampling was conducted on a continuous basis from each direct-push exploration using a 5-foot-long, 2-inch-inside-diameter piston sampler lined with acrylic sleeves. The sealed piston sampler allows the collection of soil samples from discrete depth intervals without interference from overlying soil. Sampling equipment was decontaminated between each sampling attempt. Used acrylic sleeves were discarded between each sampling event.

Soil samples collected from the direct-push explorations were field-screened for the presence of VOCs using a photo-ionization detector (PID) and for gasoline-, diesel-, and oil-range hydrocarbons using a sheen test. Field screening methods are discussed later in this appendix.

Soil samples were transferred to jars equipped with Teflon lids (supplied by the laboratory), then placed in an ice chest containing water ice for storage prior to delivery to the laboratory. Standard chain-of-custody procedures were observed during transport of the samples to the laboratory.

Field logs were prepared for each boring in general accordance with ASTM D 2488-90, documenting soil type, field screening, and sampling information.

Field Screening of Soil Samples

BergerABAM performed field screening tests on selected soil samples obtained from the soil borings. Field screening results were used to aid in the selection of soil samples for chemical

analysis. Screening methods included (1) visual examination, (2) water sheen screening, and (3) headspace vapor screening using a MiniRAE PID.

Visual screening consisted of inspecting the soil for discoloration indicative of the presence of petroleum material in the sample. Water sheen screening involved placing soil in water and observing the water surface for signs of sheen. Sheen classifications are as follows:

No Sheen (NS)	No visible sheen on the water surface
Slight Sheen (SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly; natural organic matter in the soil may produce a slight sheen
Moderate Sheen (MS)	Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on water surface
Heavy Sheen (HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen

Headspace vapor screening involved placing a soil sample in a plastic bag. Air was captured in the bag, and the bag was shaken to expose the soil to the air trapped in the bag. The probe of a PID was inserted into the bag, and the PID measured VOC vapor concentrations in parts per million (ppm). The MiniRAE PID was calibrated to 100 ppm isobutylene. The PID was capable of quantifying VOC vapor concentrations in the range between 1 ppm and 2,000 ppm with an accuracy of 10 percent of the reading and between 2,000 ppm and 10,000 ppm with an accuracy of 20 percent of the reading.

Field screening results are site- and sample-specific, and can vary with temperature, soil moisture content, soil type, and type of contaminant.

Groundwater Sampling from Directpush Explorations

Groundwater samples were collected from select direct-push explorations during field activities using a sealed-screen sampler. The sealed-screen sampler contains a well screen nested inside a watertight sealed body. Retracting the probe rods once the desired depth has been reached exposes the screen. Groundwater samples were collected from inside the sealed-screen sampler and direct-push rods using polyethylene tubing and a peristaltic pump. The sealed-screen sampler was decontaminated between each sampling attempt. Used polyethylene tubing was discarded after each sampling attempt. The sealed-screen sampler was purged of approximately 1 to 2 gallons of groundwater before sampling. Groundwater samples were transferred into laboratory-prepared containers after purging was complete. Immediately after the groundwater samples were collected, they were placed in a cooler with frozen water ice pending delivery to the laboratory. Chain-of-custody procedures were followed during transport of the samples to the analytical laboratory.

Location Control

The sample locations were identified using handheld global positioning system technology.

Decontamination Procedures

The objective of the decontamination procedure was to minimize the potential for cross-contamination between sample locations. All samplings or exploration equipment were decontaminated in accordance with the following procedures before each sampling attempt or measurement.

1. Brushed equipment with a nylon brush to remove large particulate matter.
2. Rinsed with potable tap water.
3. Washed with non-phosphate detergent solution (Liquinox and potable tap water).
4. Rinsed with potable tap water.
5. Rinsed with distilled water.

Handling of Investigation-derived Waste

Investigation-derived waste (IDW), mainly drill cuttings and decontamination water, was placed in U.S. Department of Transportation-approved 55-gallon drums. Each drum was labeled with the project name, exploration number, general contents, and date. The drummed IDW will be stored on site pending analysis and disposal. Two 55-gallon drums of IDW were left on site.

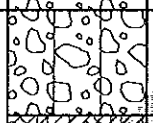
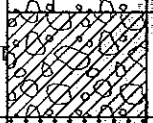
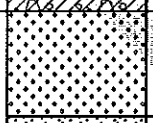
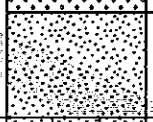
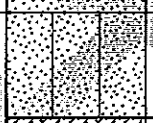
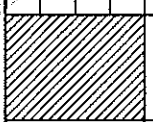
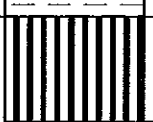
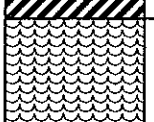
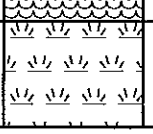
Disposable items, such as disposable bailers, bailer line, gloves, and paper towels, etc., were placed in plastic bags after use and deposited in trash receptacles for disposal.

Chain-of-Custody Procedures

All samples obtained for chemical analysis were transferred into clean sample containers supplied by the project analytical laboratory. Sufficient sample volume was obtained for the laboratory to complete the method-specific QC analyses. Soil samples collected from the borings were labeled using the boring designation followed by the depth interval (for example, DP-1 [0-1]). Possession of the samples was documented by the chain-of-custody forms, and the forms were signed and dated in the appropriate places by parties involved with a transfer of custody.

Upon receipt of the samples at the laboratory, the following procedures were followed. The custody seals were broken, the chain-of-custody form was signed by the laboratory personnel, and the conditions of the samples were recorded on the form. The original chain-of-custody form remained with the laboratory and copies were returned to the relinquishing party.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Appendix C
ESN Laboratory
Laboratory Reports

ESN NORTHWEST, INC. | Environmental Services Network

CHAIN-OF-CUSTODY RECORD

CLIENT: Bridge TABAM

ADDRESS:

PHONE: FAX:

CLIENT PROJECT #: A17.0202.00 PROJECT MANAGER:

DATE: 8-30-17 PAGE 1 OF 3

PROJECT NAME: BHP

LOCATION: HDQUARTERS

COLLECTOR: DAJ DATE OF COLLECTION: 8/29-8/30

Sample Number	Depth	Time	Sample Type	Container Type	TPH - HCID	TPH - Diesel & Oil	TPH - Gasoline	BTEX	VOC 8260CL	VOC 8260 (SO_3)	SemiVol 8270	PAH's 8270	PCB's 8082	CL Pesticides 8081	RCRA 8 Metals	MTCA 5 Metals	Pb	Asbestos - PLM	GRO Suite	DRO Suite	WO Suite	Cyanide	NOTES	Total Number of Containers	Laboratory Note Number
1. DP-1		11:28	WATER		X				X		X			X									8/29/17		
2. DP-2		12:10	↓		X				X		X			X											
3. DP-3		10:04			X				X		X			X											
4. DP-4		10:38			X				X		X			X											
5. DP-5		0820			X				X		X			X											
6. DP-6		09:10			X				X		X			X											
7. DP-7		1457			X				X		X			X											
8. DP-8		14:22			X				X		X			X											
9. DP-9		13:50			X				X		X			X											
10. DP-10		15:59			X	X			X		X	X		X									8/30/17 NO AMBIENT-PROUND		
11. DP-11		13:20			X	X			X		X	X		X											
12. DP-12		11:10			X	X			X		X	X		X							X				
13. DP-13		12:05			X	X			X		X	X		X											
14. DP-14		10:05			X	X			X		X	X		X											
15. DP-15		09:16			X	X			X		X	X		X											
16. DP-16		09:15			X	X			X		X	X		X											
17.																									
18.																									

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
[signature]	4:50	[signature]	8-30-17 1650
RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

Turn Around Time: 24 HR 48 HR 5 DAY

1210 Eastside Street SE, Suite 200
Olympia, Washington 98501
Phone: 360-459-4670
Fax: 360-459-3432
Website: www.esnnw.com
E-Mail: info@esnnw.com

ESN NORTHWEST, INC. | Environmental Services Network

CHAIN-OF-CUSTODY RECORD

CLIENT: BURGERBAM

ADDRESS:

PHONE: FAX:

CLIENT PROJECT #: A17.0202.00 PROJECT MANAGER:

DATE: 8-30-17 PAGE 2 OF 3

PROJECT NAME: BHP

LOCATION: HOQUIAM

COLLECTOR: DAN DATE OF COLLECTION: 8/29/17

Sample Number	Depth	Time	Sample Type	Container Type	TPH - HCID	TPH - Diesel & Oil	TPH - Gasoline	BTEX	VOC 8260CL	VOC 8260	SemiVol 8270	PAH's 8270	PCB's 8082	CL Pesticides 8081	RCRA 8 Metals	MTCA 5 Metals	Pb	Asbestos - PLM	GRO Suite	DRO Suite	WO Suite	NOTES	Total Number of Containers	Laboratory Note Number
1. DP-1(5-6)	5'	11:28	Soil		X				X		X			X								Hold		
2. DP-1(7-8)	7'	11:28	Soil		X				X		X			X										
3. DP-2(2-3)	2'	12:10	Soil		X				X		X			X										
4. DP-3(6-7)	6'	10:04	Soil		X				X		X			X								Hold		
5. DP-3(9-10)	9'	10:04	Soil		X				X		X			X										
6. DP-4(7-8)	7'	10:38	Soil																			Hold		
7. DP-4(9-10)	9'	10:38	Soil		X				X		X			X										
8. DP-5(2-3)	2'	08:20	Soil																			Hold		
9. DP-5(4-5)	4'	0820	Soil		X				X		X			X										
10. DP-6(2-3)	2'	09:10	Soil																			Hold		
11. DP-6(4-5)	4'	09:10	Soil		X				X		X			X										
12. DP-7(1-2)	1'	14:57	Soil																			Hold		
13. DP-7(3-4)	3'	14:57	Soil		X				X		X			X										
14. DP-8(1-2)	1'	14:22	Soil																			Hold		
15. DP-8(3-4)	3'	14:22	Soil		X				X		X			X										
16. DP-9(1-2)	1'	13:50	Soil																			Hold		
17. DP-9(3-4)	3'	13:50	Soil		X				X		X			X										
18.																								

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
			8-30-17 1650
RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

Turn Around Time: 24 HR 48 HR 5 DAY

1210 Eastside Street SE, Suite 200
Olympia, Washington 98501
Phone: 360-459-4670
Fax: 360-459-3432
Website: www.esnnw.com
E-Mail: info@esnnw.com

ESN NORTHWEST, INC. | Environmental Services Network

BHP

CHAIN-OF-CUSTODY RECORD

CLIENT: BERGERABAM

ADDRESS:

PHONE: FAX:

CLIENT PROJECT #: A17.0202.00 PROJECT MANAGER:

DATE: 8-30-17 PAGE 3 OF 3

PROJECT NAME: BHP

LOCATION: HOQUIAM

COLLECTOR: DAJ DATE OF COLLECTION: 8/30/17

Sample Number	Depth	Time	Sample Type	Container Type	TPH - HCID	TPH - Diesel & Oil	TPH - Gasoline	BTEX	VOC 8250CL	VOC 8260	SemiVol 8270	PAH's 8270	PCB's 8082	CL Pesticides 8081	RCRA 8 Metals	MTCA 5 Metals	Pb	Asbestos - PLM	GRO Suite	DRO Suite	WO Suite	(4 WTB)	NOTES	Total Number of Containers	Laboratory Note Number
1. DP-10(7-8)	7'	13:59	Soil		X	X			X		X	X											Hold		
2. DP-10(9-10)	9'	13:59	Soil		X	X			X		X	X		X											
3. DP-11(7-9)	7'	13:20	Soil		X	X			X		X	X		X											
4. DP-12(3-4)	3'	11:10	Soil																				Hold		
5. DP-12(6-7)	6'	11:10	Soil		X	X			X		X	X		X							X				
6. DP-13(3-4)	3'	12:05	Soil																				Hold		
7. DP-13(12-13)	12'	12:25	Soil		X	X			X		X	X		X											
8. DP-14(2-3)	2'	10:05	Soil																				Hold		
9. DP-14(6-7)	6'	10:05	Soil		X	X			X		X	X		X											
10. DP-15(4-5)	4'	09:16	Soil																				Hold		
11. DP-15(5-6)	5'	09:16	Soil		X	X			X		X	X		X											
12. DP-16(3-4)	3'	08:15	Soil																				Hold		
13. DP-16(7-8)	7'	08:15	Soil		X	X			X		X	X		X											
14.																									
15.																									
16.																									
17.																									
18.																									

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
			8-30-17 1650
RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

Turn Around Time: 24 HR 48 HR 5 DAY

1210 Eastside Street SE, Suite 200
Olympia, Washington 98501
Phone: 360-459-4670
Fax: 360-459-3432
Website: www.esnnw.com
E-Mail: info@esnnw.com

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Diesel Range Organics & Lube Oil Range Organics in Soil by Method NWTPH-Dx Extended

Sample Number	Date Prepared	Date Analyzed	Surrogate Recovery (%)	Diesel Range Organics (mg/kg)	Lube Oil Range Organics (mg/kg)
Method Blank	9/5/2017	9/6/2017	104	nd	nd
LCS	9/5/2017	9/6/2017	121	107%	---
DP-1 (7-8)	9/5/2017	9/6/2017	94	nd	nd
DP-2 (2-3)	9/5/2017	9/6/2017	109	nd	nd
DP-3 (9-10)	9/5/2017	9/6/2017	106	nd	nd
DP-4 (9-10)	9/5/2017	9/6/2017	102	nd	nd
DP-5 (4-5)	9/5/2017	9/6/2017	106	nd	nd
DP-6 (4-5)	9/5/2017	9/6/2017	105	nd	nd
DP-7 (3-4)	9/5/2017	9/6/2017	102	nd	nd
DP-8 (3-4)	9/5/2017	9/6/2017	98	nd	nd
DP-9 (3-4)	9/5/2017	9/6/2017	104	nd	nd
DP-10 (9-10)	9/5/2017	9/6/2017	99	nd	nd
DP-10 (9-10) Duplicate	9/5/2017	9/6/2017	100	nd	nd
DP-11 (7-9)	9/5/2017	9/6/2017	108	nd	nd
DP-12 (6-7)	9/5/2017	9/6/2017	100	nd	nd
DP-13 (12-13)	9/5/2017	9/6/2017	101	nd	nd
DP-14 (6-7)	9/5/2017	9/6/2017	97	nd	nd
DP-15 (5-6)	9/5/2017	9/6/2017	103	nd	nd
DP-16 (7-8)	9/5/2017	9/6/2017	102	nd	nd
DP-16 (7-8) Duplicate	9/5/2017	9/6/2017	105	nd	nd
Reporting Limits				50	100

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 50% TO 150%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Diesel Range Organics & Lube Oil Range Organics in Water by Method NWTPH-Dx Extended

Sample Number	Date Prepared	Date Analyzed	Surrogate Recovery (%)	Diesel Range Organics (ug/L)	Lube Oil Range Organics (ug/L)
Method Blank	9/1/2017	9/2/2017	95	nd	nd
LCS	9/1/2017	9/2/2017	100	84%	---
DP-1	9/1/2017	9/2/2017	98	nd	nd
DP-2	9/1/2017	9/2/2017	106	nd	nd
DP-3	9/1/2017	9/2/2017	98	nd	nd
DP-4	9/1/2017	9/2/2017	68	nd	nd
DP-5	9/1/2017	9/2/2017	105	nd	nd
DP-6	9/1/2017	9/2/2017	93	nd	nd
DP-7	9/1/2017	9/2/2017	101	nd	nd
DP-8	9/1/2017	9/2/2017	100	nd	nd
DP-9	9/1/2017	9/2/2017	91	nd	nd
DP-11	9/1/2017	9/2/2017	94	nd	nd
DP-12	9/1/2017	9/5/2017	64	nd	nd
DP-13	9/1/2017	9/5/2017	87	nd	nd
DP-14	9/1/2017	9/5/2017	85	nd	nd
DP-15	9/1/2017	9/5/2017	100	nd	nd
DP-16	9/1/2017	9/5/2017	83	nd	nd
Reporting Limits				100	250

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 50% TO 150%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Gasoline Range Organics in Soil
by Method NWTPH-Gx

Sample Number	Date Prepared	Date Analyzed	Surrogate Recovery (%)	Gasoline Range Organics (mg/kg)
Method Blank	9/7/2017	9/7/2017	108	nd
LCS	9/7/2017	9/7/2017	104	90%
DP-10 (9-10)	8/30/2017	9/7/2017	109	nd
DP-11 (7-9)	8/30/2017	9/7/2017	107	nd
DP-12 (6-7)	8/30/2017	9/7/2017	111	nd
DP-13 (12-13)	8/30/2017	9/7/2017	108	nd
DP-14 (6-7)	8/30/2017	9/7/2017	106	nd
DP-15 (5-6)	8/30/2017	9/7/2017	109	nd
DP-16 (7-8)	8/30/2017	9/7/2017	108	nd
DP-16 (7-8) Duplicate	8/30/2017	9/7/2017	108	nd
Reporting Limits				10

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 50% TO 150%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Gasoline Range Organics in Water
by Method NWTPH-Gx

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline Range Organics (ug/L)
Method Blank	9/1/2017	131	nd
LCS	9/1/2017	125	123%
DP-10	9/1/2017	121	nd
DP-11	9/1/2017	132	nd
DP-12	9/1/2017	128	nd
DP-13	9/1/2017	130	nd
DP-14	9/1/2017	121	nd
DP-15	9/1/2017	125	nd
DP-16	9/1/2017	143	nd
Reporting Limits			100

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 50% TO 150%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Volatile Organic Compounds in Soil by Method 8260C/5035

	RL	MB	LCS	LCSD	DP-1 (7-8)	DP-2 (2-3)	DP-3 (9-10)	DP-4 (9-10)	DP-5 (4-5)
Date extracted		09/06/17	09/06/17	09/06/17	08/29/17	08/29/17	08/29/17	08/29/17	08/29/17
Date analyzed	(mg/Kg)	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17
% Moisture					43%	23%	28%	24%	22%
Dichlorodifluoromethane	0.05	nd			nd	nd	nd	nd	nd
Chloromethane	0.05	nd			nd	nd	nd	nd	nd
Vinyl chloride	0.02	nd	89%	80%	nd	nd	nd	nd	nd
Bromomethane	0.05	nd			nd	nd	nd	nd	nd
Chloroethane	0.05	nd			nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd			nd	nd	nd	nd	nd
Acetone	0.25	nd			nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	81%	89%	nd	nd	nd	nd	nd
Methylene chloride	0.05	nd			nd	nd	nd	nd	nd
Methyl-t-butyl ether (MTBE)	0.05	nd			nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	0.05	nd			nd	nd	nd	nd	nd
1,1-Dichloroethane	0.05	nd			nd	nd	nd	nd	nd
2-Butanone (MEK)	0.25	nd			nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	0.05	nd			nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd			nd	nd	nd	nd	nd
Chloroform	0.05	nd	105%	121%	nd	nd	nd	nd	nd
Bromochloromethane	0.05	nd			nd	nd	nd	nd	nd
1,1,1-Trichloroethane	0.05	nd			nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.05	nd			nd	nd	nd	nd	nd
1,1-Dichloropropene	0.05	nd			nd	nd	nd	nd	nd
Carbon tetrachloride	0.05	nd			nd	nd	nd	nd	nd
Benzene	0.02	nd	98%	108%	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.02	nd	98%	108%	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.05	nd	95%	103%	nd	nd	nd	nd	nd
Dibromomethane	0.05	nd			nd	nd	nd	nd	nd
Bromodichloromethane	0.05	nd			nd	nd	nd	nd	nd
4-Methyl-2-pentanone (MIBK)	0.25	nd			nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.05	nd			nd	nd	nd	nd	nd
Toluene	0.05	nd	95%	106%	nd	nd	nd	nd	nd
trans-1,3-Dichloropropene	0.05	nd			nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.05	nd			nd	nd	nd	nd	nd
2-Hexanone	0.25	nd			nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd			nd	nd	nd	nd	nd
Dibromochloromethane	0.05	nd			nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	104%	113%	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB)	0.05	nd			nd	nd	nd	nd	nd
Chlorobenzene	0.05	nd	103%	110%	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.05	nd			nd	nd	nd	nd	nd
Ethylbenzene	0.05	nd	103%	110%	nd	nd	nd	nd	nd
Xylenes	0.15	nd	102%	109%	nd	nd	nd	nd	nd
Styrene	0.05	nd			nd	nd	nd	nd	nd
Bromoform	0.05	nd			nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.05	nd			nd	nd	nd	nd	nd
Isopropylbenzene	0.05	nd			nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.05	nd			nd	nd	nd	nd	nd
Bromobenzene	0.05	nd			nd	nd	nd	nd	nd

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Volatile Organic Compounds in Soil by Method 8260C/5035

	RL	MB	LCS	LCSD	DP-1 (7-8)	DP-2 (2-3)	DP-3 (9-10)	DP-4 (9-10)	DP-5 (4-5)
Date extracted		09/06/17	09/06/17	09/06/17	08/29/17	08/29/17	08/29/17	08/29/17	08/29/17
Date analyzed	(mg/Kg)	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17
% Moisture					43%	23%	28%	24%	22%
n-Propylbenzene	0.05	nd			nd	nd	nd	0.061	nd
2-Chlorotoluene	0.05	nd			nd	nd	nd	nd	nd
4-Chlorotoluene	0.05	nd			nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.05	nd			nd	nd	nd	0.061	nd
tert-Butylbenzene	0.05	nd			nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.05	nd			nd	nd	nd	nd	nd
sec-Butylbenzene	0.05	nd			nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.05	nd			nd	nd	nd	0.059	nd
1,4-Dichlorobenzene	0.05	nd			nd	nd	nd	nd	nd
Isopropyltoluene	0.05	nd			nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.05	nd			nd	nd	nd	nd	nd
n-Butylbenzene	0.05	nd			nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.05	nd			nd	nd	nd	nd	nd
1,2,4-Trichlorobenzene	0.05	nd			nd	nd	nd	nd	nd
Naphthalene	0.05	nd			nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.05	nd			nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	0.05	nd			nd	nd	nd	nd	nd
Surrogate recoveries									
Dibromofluoromethane		108%	97%	99%	106%	105%	107%	107%	107%
Toluene-d8		105%	96%	96%	105%	104%	105%	103%	105%
4-Bromofluorobenzene		109%	103%	99%	107%	106%	106%	109%	106%

Data Qualifiers and Analytical Comments
nd - not detected at listed reporting limits
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fa
lab@esnnw.com

Analysis of Volatile Organic Compounds in Soil by Method 8260C/5035

	RL	DP-6 (4-5)	DP-7 (3-4)	DP-8 (3-4)	DP-9 (3-4)	DP-10 (9-10)	DP-11 (7-9)	DP-12 (6-7)	DP-13 (12-13)
Date extracted		08/29/17	08/29/17	08/29/17	08/29/17	08/30/17	08/30/17	08/30/17	08/30/17
Date analyzed	(mg/Kg)	09/06/17	09/07/17	09/07/17	09/07/17	09/07/17	09/07/17	09/07/17	09/07/17
% Moisture		22%	27%	20%	17%	43%	33%	46%	33%
Dichlorodifluoromethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Chloromethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Vinyl chloride	0.02	nd	nd	nd	nd	nd	nd	nd	nd
Bromomethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Chloroethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Acetone	0.25	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Methylene chloride	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Methyl-t-butyl ether (MTBE)	0.05	nd	nd	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
2-Butanone (MEK)	0.25	nd	nd	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Chloroform	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Bromochloromethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Benzene	0.02	nd	nd	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.02	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Dibromomethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Bromodichloromethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
4-Methyl-2-pentanone (MIBK)	0.25	nd	nd	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Toluene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
trans-1,3-Dichloropropene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
2-Hexanone	0.25	nd	nd	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Dibromochloromethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB)	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Chlorobenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Ethylbenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Xylenes	0.15	nd	nd	nd	nd	nd	nd	nd	nd
Styrene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Bromoform	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Isopropylbenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Bromobenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fa
lab@esnnw.com

Analysis of Volatile Organic Compounds in Soil by Method 8260C/5035

	RL	DP-6 (4-5)	DP-7 (3-4)	DP-8 (3-4)	DP-9 (3-4)	DP-10 (9-10)	DP-11 (7-9)	DP-12 (6-7)	DP-13 (12-13)
Date extracted		08/29/17	08/29/17	08/29/17	08/29/17	08/30/17	08/30/17	08/30/17	08/30/17
Date analyzed	(mg/Kg)	09/06/17	09/07/17	09/07/17	09/07/17	09/07/17	09/07/17	09/07/17	09/07/17
% Moisture		22%	27%	20%	17%	43%	33%	46%	33%
n-Propylbenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Isopropyltoluene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
n-Butylbenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorobenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Naphthalene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	0.05	nd	nd	nd	nd	nd	nd	nd	nd
Surrogate recoveries									
Dibromofluoromethane		104%	103%	104%	106%	103%	109%	105%	107%
Toluene-d8		104%	103%	103%	106%	104%	105%	104%	103%
4-Bromofluorobenzene		114%	108%	112%	106%	109%	107%	111%	108%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Volatile Organic Compounds in Soil by Method 8260C/5035

	RL	DP-14 (6-7)	DP-15 (5-6)	DP-16 (7-8)
Date extracted		08/30/17	08/30/17	08/30/17
Date analyzed	(mg/Kg)	09/07/17	09/07/17	09/07/17
% Moisture		37%	49%	45%
Dichlorodifluoromethane	0.05	nd	nd	nd
Chloromethane	0.05	nd	nd	nd
Vinyl chloride	0.02	nd	nd	nd
Bromomethane	0.05	nd	nd	nd
Chloroethane	0.05	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd
Acetone	0.25	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd
Methylene chloride	0.05	nd	nd	nd
Methyl-t-butyl ether (MTBE)	0.05	nd	nd	nd
trans-1,2-Dichloroethene	0.05	nd	nd	nd
1,1-Dichloroethane	0.05	nd	nd	nd
2-Butanone (MEK)	0.25	nd	nd	nd
cis-1,2-Dichloroethene	0.05	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd
Chloroform	0.05	nd	nd	nd
Bromochloromethane	0.05	nd	nd	nd
1,1,1-Trichloroethane	0.05	nd	nd	nd
1,2-Dichloroethane (EDC)	0.05	nd	nd	nd
1,1-Dichloropropene	0.05	nd	nd	nd
Carbon tetrachloride	0.05	nd	nd	nd
Benzene	0.02	nd	nd	nd
Trichloroethene (TCE)	0.02	nd	nd	nd
1,2-Dichloropropane	0.05	nd	nd	nd
Dibromomethane	0.05	nd	nd	nd
Bromodichloromethane	0.05	nd	nd	nd
4-Methyl-2-pentanone (MIBK)	0.25	nd	nd	nd
cis-1,3-Dichloropropene	0.05	nd	nd	nd
Toluene	0.05	nd	nd	nd
trans-1,3-Dichloropropene	0.05	nd	nd	nd
1,1,2-Trichloroethane	0.05	nd	nd	nd
2-Hexanone	0.25	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd
Dibromochloromethane	0.05	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd
1,2-Dibromoethane (EDB)	0.05	nd	nd	nd
Chlorobenzene	0.05	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.05	nd	nd	nd
Ethylbenzene	0.05	nd	nd	nd
Xylenes	0.15	nd	nd	nd
Styrene	0.05	nd	nd	nd
Bromoform	0.05	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.05	nd	nd	nd
Isopropylbenzene	0.05	nd	nd	nd
1,2,3-Trichloropropane	0.05	nd	nd	nd
Bromobenzene	0.05	nd	nd	nd

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Volatile Organic Compounds in Soil by Method 8260C/5035

	RL	DP-14 (6-7)	DP-15 (5-6)	DP-16 (7-8)
Date extracted		08/30/17	08/30/17	08/30/17
Date analyzed	(mg/Kg)	09/07/17	09/07/17	09/07/17
% Moisture		37%	49%	45%
n-Propylbenzene	0.05	nd	nd	nd
2-Chlorotoluene	0.05	nd	nd	nd
4-Chlorotoluene	0.05	nd	nd	nd
1,3,5-Trimethylbenzene	0.05	nd	nd	nd
tert-Butylbenzene	0.05	nd	nd	nd
1,2,4-Trimethylbenzene	0.05	nd	nd	nd
sec-Butylbenzene	0.05	nd	nd	nd
1,3-Dichlorobenzene	0.05	nd	nd	nd
1,4-Dichlorobenzene	0.05	nd	nd	nd
Isopropyltoluene	0.05	nd	nd	nd
1,2-Dichlorobenzene	0.05	nd	nd	nd
n-Butylbenzene	0.05	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.05	nd	nd	nd
1,2,4-Trichlorobenzene	0.05	nd	nd	nd
Naphthalene	0.05	nd	nd	nd
Hexachloro-1,3-butadiene	0.05	nd	nd	nd
1,2,3-Trichlorobenzene	0.05	nd	nd	nd
Surrogate recoveries				
Dibromofluoromethane		104%	106%	106%
Toluene-d8		103%	104%	105%
4-Bromofluorobenzene		106%	109%	108%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Volatile Organic Compounds in Water by Method 8260C/5030C

Analytical Results

	RL	MB	LCS	LCSD	DP-1	DP-2	DP-3	DP-4	DP-5	DP-6
Date analyzed	(ug/L)	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17
Dichlorodifluoromethane	1.0	nd			nd	nd	nd	nd	nd	nd
Chloromethane	1.0	nd			nd	nd	nd	nd	nd	nd
Vinyl chloride	0.2	nd	95%	91%	nd	nd	nd	nd	nd	nd
Bromomethane	1.0	nd			nd	nd	nd	nd	nd	nd
Chloroethane	1.0	nd			nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	1.0	nd			nd	nd	nd	nd	nd	nd
Acetone	10.0	nd			nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	1.0	nd	107%	100%	nd	nd	nd	nd	nd	nd
Methylene chloride	1.0	nd			nd	nd	nd	nd	nd	nd
Methyl-t-butyl ether (MTBE)	1.0	nd			nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	1.0	nd			nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	1.0	nd			nd	nd	nd	nd	nd	nd
2-Butanone (MEK)	10.0	nd			nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	1.0	nd			nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	1.0	nd			nd	nd	nd	nd	nd	nd
Chloroform	1.0	nd	109%	105%	nd	nd	nd	nd	nd	nd
Bromochloromethane	1.0	nd			nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane	1.0	nd			nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	1.0	nd			nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	1.0	nd			nd	nd	nd	nd	nd	nd
Carbon tetrachloride	1.0	nd			nd	nd	nd	nd	nd	nd
Benzene	1.0	nd	94%	90%	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	1.0	nd	102%	98%	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	1.0	nd	101%	98%	nd	nd	nd	nd	nd	nd
Dibromomethane	1.0	nd			nd	nd	nd	nd	nd	nd
Bromodichloromethane	1.0	nd			nd	nd	nd	nd	nd	nd
4-Methyl-2-pentanone (MIBK)	1.0	nd			nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	1.0	nd			nd	nd	nd	nd	nd	nd
Toluene	1.0	nd	93%	90%	nd	nd	nd	nd	nd	nd
trans-1,3-Dichloropropene	1.0	nd			nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	1.0	nd			nd	nd	nd	nd	nd	nd
2-Hexanone	1.0	nd			nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	1.0	nd			nd	nd	nd	nd	nd	nd
Dibromochloromethane	1.0	nd			nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	104%	102%	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB)	1.0	nd			nd	nd	nd	nd	nd	nd
Chlorobenzene	1.0	nd	100%	99%	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	1.0	nd			nd	nd	nd	nd	nd	nd
Ethylbenzene	1.0	nd	94%	91%	nd	nd	nd	nd	nd	nd
Xylenes	3.0	nd	83%	84%	nd	nd	nd	nd	nd	nd
Styrene	1.0	nd			nd	nd	nd	nd	nd	nd
Bromoform	1.0	nd			nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	1.0	nd			nd	nd	nd	nd	nd	nd
Isopropylbenzene	1.0	nd			nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	1.0	nd			nd	nd	nd	nd	nd	nd
Bromobenzene	1.0	nd			nd	nd	nd	nd	nd	nd

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Volatile Organic Compounds in Water by Method 8260C/5030C

Analytical Results

	RL	MB	LCS	LCSD	DP-1	DP-2	DP-3	DP-4	DP-5	DP-6
Date analyzed	(ug/L)	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17
n-Propylbenzene	1.0	nd			nd	nd	nd	nd	nd	nd
2-Chlorotoluene	1.0	nd			nd	nd	nd	nd	nd	nd
4-Chlorotoluene	1.0	nd			nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	1.0	nd			nd	nd	nd	nd	nd	nd
tert-Butylbenzene	1.0	nd			nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	1.0	nd			nd	nd	nd	nd	nd	nd
sec-Butylbenzene	1.0	nd			nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	1.0	nd			nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	1.0	nd			nd	nd	nd	nd	nd	nd
Isopropyltoluene	1.0	nd			nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	1.0	nd			nd	nd	nd	nd	nd	nd
n-Butylbenzene	1.0	nd			nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	1.0	nd			nd	nd	nd	nd	nd	nd
1,2,4-Trichlorobenzene	1.0	nd			nd	nd	nd	nd	nd	nd
Naphthalene	1.0	nd			nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	1.0	nd			nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	1.0	nd			nd	nd	nd	nd	nd	nd
Surrogate recoveries										
Dibromofluoromethane		68%	109%	124%	73%	104%	88%	98%	102%	98%
Toluene-d8		97%	99%	98%	94%	96%	96%	95%	97%	96%
4-Bromofluorobenzene		136%	132%	124%	132%	128%	125%	142%	140%	144%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Volatile Organic Compounds in Water by Method 8260C/5030C

Analytical Results

	RL	DP-7	DP-8	DP-9	DP-10	DP-11	DP-12	DP-13	DP-14	DP-15	DP-16
Date analyzed	(ug/L)	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17
Dichlorodifluoromethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloromethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Vinyl chloride	0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromomethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloroethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Acetone	10.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Methylene chloride	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Methyl-t-butyl ether (MTBE)	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-Butanone (MEK)	10.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloroform	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromochloromethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibromomethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromodichloromethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-Methyl-2-pentanone (MIBK)	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Toluene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
trans-1,3-Dichloropropene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-Hexanone	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibromochloromethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB)	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chlorobenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ethylbenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Xylenes	3.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Styrene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromoform	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Isopropylbenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromobenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Volatile Organic Compounds in Water by Method 8260C/5030C

Analytical Results

	RL	DP-7	DP-8	DP-9	DP-10	DP-11	DP-12	DP-13	DP-14	DP-15	DP-16
Date analyzed	(ug/L)	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17
n-Propylbenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Isopropyltoluene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
n-Butylbenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorobenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Naphthalene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	1.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Surrogate recoveries											
Dibromofluoromethane		97%	98%	93%	80%	83%	102%	91%	83%	101%	73%
Toluene-d8		87%	97%	95%	92%	98%	98%	92%	94%	89%	92%
4-Bromofluorobenzene		138%	137%	121%	125%	137%	132%	134%	125%	129%	148%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Polynuclear Aromatic Hydrocarbons in Soil by Method 8270

Analytical Results

	RL	MB	LCS	DP-1 (7-8)	DP-2 (2-3)	DP-3 (9-10)	DP-4 (9-10)	DP-5 (4-5)	DP-6 (4-5)	DP-7 (3-4)
Date extracted		09/05/17	09/05/17	09/05/17	09/05/17	09/05/17	09/05/17	09/05/17	09/05/17	09/05/17
Date analyzed		09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17
Moisture, %	(mg/kg)			43%	23%	28%	24%	22%	22%	27%
Naphthalene	0.02	nd	99%	nd	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene	0.02	nd	94%	nd	nd	nd	nd	nd	nd	nd
1-Methylnaphthalene	0.02	nd	ns	nd	nd	nd	nd	nd	nd	nd
Acenaphthylene	0.02	nd	108%	nd	nd	nd	nd	nd	nd	nd
Acenaphthene	0.02	nd	106%	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.02	nd	108%	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.02	nd	90%	nd	nd	0.2	nd	nd	nd	nd
Anthracene	0.02	nd	90%	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	0.02	nd	103%	nd	nd	1.4	nd	nd	nd	nd
Pyrene	0.02	nd	100%	nd	nd	1.1	nd	nd	nd	nd
Benzo(a)anthracene*	0.02	nd	100%	nd	nd	0.2	nd	nd	nd	nd
Chrysene*	0.02	nd	98%	nd	nd	0.4	nd	nd	nd	nd
Benzo(b)fluoranthene*	0.02	nd	63%	nd	nd	0.3	nd	nd	nd	nd
Benzo(k)fluoranthene*	0.02	nd	68%	nd	nd	0.1	nd	nd	nd	nd
Benzo(a)pyrene*	0.02	nd	59%	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-cd)pyrene*	0.02	nd	85%	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h)anthracene*	0.02	nd	97%	nd	nd	nd	nd	nd	nd	nd
Benzo(ghi)perylene	0.02	nd	68%	nd	nd	nd	nd	nd	nd	nd
Total Carcinogens				nd	nd	1.0	nd	nd	nd	nd
Surrogate recoveries:										
2-Fluorobiphenyl		99%	102%	98%	116%	106%	110%	113%	118%	102%
p-Terphenyl-d14		129%	123%	116%	135%	131%	126%	130%	129%	126%

Data Qualifiers and Analytical Comments

* - Carcinogenic Analyte
nd - not detected at listed reporting limits
ns - not spiked
Results reported on dry-weight basis
Acceptable Recovery limits: 50% TO 150%
Acceptable RPD limit: 35%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Polynuclear Aromatic Hydrocarbons in Soil by Method 8270

Analytical Results

	RL	DP-8 (3-4)	DP-9 (3-4)	DP-10 (9-10)	DP-11 (7-9)	DP-12 (6-7)	DP-13 (12-13)	DP-14 (6-7)	DP-15 (5-6)	DP-16 (7-8)
Date extracted		09/05/17	09/05/17	09/05/17	09/05/17	09/05/17	09/05/17	09/05/17	09/05/17	09/05/17
Date analyzed		09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17	09/06/17
Moisture, %	(mg/kg)	20%	17%	43%	33%	46%	33%	37%	49%	45%
Naphthalene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
1-Methylnaphthalene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Acenaphthylene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Acenaphthene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Anthracene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Pyrene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)anthracene*	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene*	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene*	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene*	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene*	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-cd)pyrene*	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h)anthracene*	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(ghi)perylene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Total Carcinogens		nd	nd	nd	nd	nd	nd	nd	nd	nd
Surrogate recoveries:										
2-Fluorobiphenyl		106%	103%	115%	115%	105%	104%	96%	102%	105%
p-Terphenyl-d14		121%	129%	123%	133%	123%	125%	120%	127%	126%

Data Qualifiers and Analytical Comments

* - Carcinogenic Analyte
nd - not detected at listed reporting limits
ns - not spiked
Results reported on dry-weight basis
Acceptable Recovery limits: 50% TO 150%
Acceptable RPD limit: 35%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Analysis of Polynuclear Aromatic Hydrocarbons in Water by Method 8270

Analytical Results

	RL	MB	LCS	DP-1	DP-2	DP-3	DP-4	DP-5	DP-6	DP-7	DP-8	DP-9	DP-11	DP-12	DP-13	DP-14	DP-15	DP-16
Date extracted		09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17	09/01/17
Date analyzed	(ug/L)	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/05/17	09/05/17	09/05/17	09/05/17	09/05/17
Naphthalene	0.1	nd	98%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene	0.1	nd	93%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1-Methylnaphthalene	0.1	nd	ns	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Acenaphthylene	0.1	nd	108%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Acenaphthene	0.1	nd	102%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.1	nd	111%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.1	nd	90%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Anthracene	0.1	nd	90%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	0.1	nd	103%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Pyrene	0.1	nd	101%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)anthracene*	0.1	nd	98%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene*	0.1	nd	95%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene*	0.1	nd	90%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene*	0.1	nd	94%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene*	0.1	nd	86%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-cd)pyrene*	0.1	nd	77%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h)anthracene*	0.1	nd	83%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(ghi)perylene	0.1	nd	72%	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Total Carcinogens				nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Surrogate recoveries:																		
2-Fluorobiphenyl		94%	100%	104%	118%	118%	76%	103%	113%	115%	122%	118%	101%	70%	105%	106%	113%	98%
p-Terphenyl-d14		118%	118%	121%	131%	120%	83%	129%	114%	124%	123%	112%	116%	78%	104%	105%	124%	103%

Data Qualifiers and Analytical Comments

* - Carcinogenic Analyte
nd - not detected at listed reporting limits
ns - not spiked
Acceptable Recovery limits: 50% TO 150%
Acceptable RPD limit: 35%
C - coelution with sample peaks
M - matrix interference
J - estimated value

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Total Metals in Soil by EPA-6020 Series

Sample Number	Date Analyzed	Lead (Pb) (mg/kg)	Cadmium (Cd) (mg/kg)	Chromium (Cr) (mg/kg)	Arsenic (As) (mg/kg)	Silver (Ag) (mg/kg)	Barium (Ba) (mg/kg)	Selenium (Se) (mg/kg)	Mercury (Hg) (mg/kg)
Method Blank	9/7/2017	nd	nd	nd	nd	nd	nd	nd	nd
DP-1 (7-8)	9/7/2017	7.9	nd	18	nd	nd	nd	nd	nd
DP-2 (2-3)	9/7/2017	nd	nd	7.7	nd	nd	nd	nd	nd
DP-3 (9-10)	9/7/2017	nd	nd	10	nd	nd	nd	nd	nd
DP-4 (9-10)	9/7/2017	nd	nd	9.3	nd	nd	nd	nd	nd
DP-5 (4-5)	9/7/2017	nd	nd	12	nd	nd	nd	nd	nd
DP-6 (4-5)	9/7/2017	nd	nd	10	nd	nd	nd	nd	nd
DP-7 (3-4)	9/7/2017	nd	nd	10	nd	nd	nd	nd	nd
DP-8 (3-4)	9/7/2017	nd	nd	11	nd	nd	nd	nd	nd
DP-9 (3-4)	9/7/2017	nd	nd	10	nd	nd	nd	nd	nd
DP-9 (3-4) Duplicate	9/7/2017	nd	nd	10	nd	nd	nd	nd	nd
DP-10 (9-10)	9/7/2017	6.4	nd	14	nd	nd	nd	nd	nd
DP-11 (7-9)	9/7/2017	nd	nd	12	nd	nd	nd	nd	nd
DP-12 (6-7)	9/7/2017	nd	nd	17	nd	nd	nd	nd	nd
DP-13 (12-13)	9/7/2017	nd	nd	12	nd	nd	nd	nd	nd
DP-14 (6-7)	9/7/2017	nd	nd	10	nd	nd	nd	nd	nd
DP-15 (5-6)	9/7/2017	13	nd	20	nd	nd	nd	nd	nd
DP-16 (7-8)	9/7/2017	8.7	nd	16	nd	nd	nd	nd	nd
DP-16 (7-8) Duplicate	9/7/2017	10	nd	24	nd	nd	nd	nd	nd
Reporting Limits		5.0	1.0	5.0	5.0	20	50	20	0.5

"nd" Indicates not detected at listed detection limits.

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

QA/QC Data - Total Metals EPA-6020

Sample Number: DP-16 (7-8)

	Matrix Spike			Matrix Spike Duplicate			RPD
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	(%)
Lead	93.0	131	141M	83.7	115	137M	2.5
Cadmium	93.0	86.4	92.9	83.7	75.4	90.1	3.1
Chromium	93.0	108	116	83.7	87.9	105	10.0
Arsenic	93.0	80.5	86.6	83.7	70.3	84.0	3.0
Silver	93.0	83.7	90.0	83.7	74.0	88.4	1.8
Barium	93.0	122	131	83.7	105	125	4.5
Selenium	93.0	74.9	80.5	83.7	66.9	79.9	0.8
Mercury	9.30	11.7	126M	8.37	10.3	123	2.2

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%
M - Matrix Spike recovery failed due to matrix interference.

	Laboratory Control Sample		
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
Lead	100	136	136
Cadmium	100	94.4	94.4
Chromium	100	110	110
Arsenic	100	94.3	94.3
Silver	100	99.9	99.9
Barium	100	112	112
Selenium	100	90.5	90.5
Mercury	10.0	12.2	122.0

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 80%-120%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #17.0202.00
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Total Metals in Water by EPA-6020 Method

Sample Number	Date Analyzed	Lead (Pb) (ug/L)	Cadmium (Cd) (ug/L)	Chromium (Cr) (ug/L)	Arsenic (As) (ug/L)	Silver (Ag) (ug/L)	Barium (Ba) (ug/L)	Selenium (Se) (ug/L)	Mercury (Hg) (ug/L)
Method Blank	9/7/2017	nd	nd	nd	nd	nd	nd	nd	nd
DP-1	9/7/2017	2.4	nd	nd	5.7	nd	nd	nd	nd
DP-2	9/7/2017	3.0	nd	16	4.5	nd	59	nd	nd
DP-3	9/7/2017	nd	nd	nd	nd	nd	nd	nd	nd
DP-4	9/7/2017	nd	nd	19	5.0	nd	94	nd	nd
DP-4 Duplicate	9/7/2017	nd	nd	20	4.9	nd	93	nd	nd
DP-5	9/7/2017	nd	nd	23	13	nd	35	nd	nd
DP-6	9/7/2017	2.1	nd	8.8	2.7	nd	23	nd	nd
DP-7	9/7/2017	4.4	nd	16	7.1	nd	58	nd	nd
DP-8	9/7/2017	11	nd	46	14	nd	80	nd	nd
DP-9	9/7/2017	57	nd	130	52	nd	210	nd	nd
DP-10	9/7/2017	3.0	nd	25	30	nd	38	nd	nd
DP-11	9/7/2017	nd	nd	34	46	nd	27	nd	nd
DP-12	9/7/2017	nd	nd	9.4	4.2	nd	nd	nd	nd
DP-13	9/7/2017	4.2	nd	29	5.7	nd	63	nd	nd
DP-14	9/7/2017	4.6	nd	66	37	nd	87	37	nd
DP-15	9/7/2017	nd	nd	48	26	nd	20	19	nd
DP-16	9/7/2017	nd	nd	10	59	nd	nd	160	nd
Reporting Limits		2.0	2.0	10	2.0	10	20	10	1.0

"nd" Indicates not detected at listed detection limits.

QA/QC Data - Total Metals EPA-6020

	Laboratory Control Sample			Laboratory Control Sample Duplicate			RPD
	Spiked Conc. (ug/L)	Measured Conc. (ug/L)	Spike Recovery (%)	Spiked Conc. (ug/L)	Measured Conc. (ug/L)	Spike Recovery (%)	(%)
Lead	20	23.3	117	20	23.3	117	0.00
Cadmium	20	20.7	104	20	20.9	105	0.96
Chromium	20	18.6	93.0	20	19.6	98.0	5.24
Arsenic	20	18.1	90.5	20	18.9	94.5	4.32
Silver	20	18.9	94.5	20	19.3	96.5	2.09
Barium	20	21.2	106	20	21.2	106	0.00
Selenium	20	20.3	102	20	20.6	103	1.47
Mercury	2.0	2.59	130*	2.0	2.55	128*	1.56

ACCEPTABLE RECOVERY LIMITS FOR LABORATORY CONTROL SAMPLES: 80%-120%
ACCEPTABLE RPD IS 20%
*Mercury exceeded acceptable recovery limit in LCS and LCSD. Samples were non-detect for Mercury, therefore, no further action was taken.

ACCU LABORATORY

12524 130th Lane NE
Kirkland, WA 98034

Tel: (425) 214-5858
(425) 214-5868
Email: lisa@accu-lab.com
Website: www.accu-lab.com

September 07, 2017

Mr. Steve Loague
ESN NW, Inc.
1210 Eastside Street SE, Suite #200
Olympia, WA 98501

Dear Mr. Loague:

Please find enclosed the analytical reports for:

Project Name:	***BERGERABAM-BHP***
Project#:	***A17.0202.00***
Date Received:	***August 31, 2017***
Accu Lab WO#:	***17-AL0831-5***

The results of analyses are presented in the attached tables, Applicable reporting limits, QA/QC data and data qualifiers are included. An invoice for the work is also enclosed.

Accu Laboratory appreciates the opportunity to provide analytical service for this project. If you should have any question pertaining to the report, or if we can be of further assistance, please feel free to contact me.

Sincerely,

Lisa Y Zhang
Laboratory Manager

ACCU LABORATORY

12524 130th Lane NE
Kirkland WA 98034

Tel: (425) 214-5858
(425) 214-5868
Email: lisa@accu-lab.com
Website: www.accu-lab.com

Analytical Report

Client	ESN NW, Inc	Acculab WO#	17-AL0831-5
	1210 Eastside Street SE, Suite #200		
	Olympia, WA 98501	Date Sampled	8/30/2017
Project Manager	Steve League	Date Received	8/31/2017
Project Name	BERGERABAM-BHP	Date Reported	9/7/2017
Project#	A17.0202.00		

Polychlorinated Biphenyls in Water by EPA 8082A/3510C

Accu Lab Analytical Batch# AL090117-6

					DUP	RPD	DP-11	DP-12	DP-13
Lab ID	MRL	Unit	MTH BLK	LCS	LCS	LCS	17-AL0831-5-8	17-AL0831-5-9	17-AL0831-5-10
Matrix			Water	Water	Water	Water	Water	Water	Water
Date Extracted			9/1/2017	9/1/2017	9/1/2017	9/1/2017	9/1/2017	9/1/2017	9/1/2017
Date Analyzed			9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017
A1016	0.1	ug/L	nd				nd	nd	nd
A1221	0.1	ug/L	nd				nd	nd	nd
A1232	0.1	ug/L	nd				nd	nd	nd
A1242	0.1	ug/L	nd				nd	nd	nd
A1248	0.1	ug/L	nd				nd	nd	nd
A1254	0.1	ug/L	nd				nd	nd	nd
A1260	0.1	ug/L	nd	88%	91%	3%	nd	nd	nd
A1262	0.1	ug/L	nd				nd	nd	nd
Surrogate Recoveries									
Decachlorobiphenyl			112%	113%	115%	99%	100%	78%	112%
Tetrachloro-m-xylene			100%	114%	120%	104%	127%	106%	98%

Acceptable Recovery Limits:
Surrogates 70-130%
LCS/MS/MSD 65-135%
Acceptable RPD limit: 30%

ACCU LABORATORY

12524 130th Lane NE
Kirkland WA 98034

Tel: (425) 214-5858
(425) 214-5868
Email: lisa@accu-lab.com
Website: www.accu-lab.com

Analytical Report

Client	**ESN NW, Inc**	**Acculab WO#**	**17-AL0831-5**
	1210 Eastside Street SE, Suite #200		
	Olympia, WA 98501	Date Sampled	8/30/2017
Project Manager	Steve League	Date Received	8/31/2017
Project Name	**BERGERABAM-BHP**	Date Reported	9/7/2017
Project#	**A17.0202.00**		

Polychlorinated Biphenyls in Water by EPA 8082A/3510C

Accu Lab Analytical Batch# AL090117-6

			DP-14	DP-15	DP-16
Lab ID	MRL	Unit	17-AL0831-5-11	17-AL0831-5-12	17-AL0831-5-13
Matrix			Water	Water	Water
Date Extracted			9/1/2017	9/1/2017	9/1/2017
Date Analyzed			9/6/2017	9/6/2017	9/6/2017
A1016	0.1	ug/L	nd	nd	nd
A1221	0.1	ug/L	nd	nd	nd
A1232	0.1	ug/L	nd	nd	nd
A1242	0.1	ug/L	nd	nd	nd
A1248	0.1	ug/L	nd	nd	nd
A1254	0.1	ug/L	nd	nd	nd
A1260	0.1	ug/L	nd	nd	nd
A1262	0.1	ug/L	nd	nd	nd
Surrogate Recoveries					
Decachlorobiphenyl			93%	93%	101%
Tetrachloro-m-xylene			96%	80%	100%

Acceptable Recovery Limits:
Surrogates 70-130%
LCS/MS/MSD 65-135%
Acceptable RPD limit: 30%

ACCU LABORATORY

12524 130th Lane NE
Kirkland WA 98034

Tel: (425) 214-5858
(425) 214-5868
Email: lisa@accu-lab.com
Website: www.accu-lab.com

Analytical Report

Client	ESN NW, Inc	Acculab WO#	17-AL0831-5
	1210 Eastside Street SE, Suite #200		
	Olympia, WA 98501	Date Sampled	8/30/2017
Project Manager	Steve League	Date Received	8/31/2017
Project Name	BERGERABAM-BHP	Date Reported	9/7/2017
Project#	A17.0202.00		

Polychlorinated Biphenyls in Soil by EPA 8082A/3550C

Accu Lab Analytical Batch# AL090617-3

Client sample ID					DP-10 (9-10)	DP-11 (7-9)	DP-12 (6-7)	DP-13 (12-13)	DP-14 (6-7)
Lab ID	MRL	Unit	MTH BLK	LCS	17-AL0831-5-1	17-AL0831-5-2	17-AL0831-5-3	17-AL0831-5-4	17-AL0831-5-5
Matrix			Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date Extracted			9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017
Date Analyzed			9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017
Molsture (%)					35%	34%	45%	34%	38%
A1016	0.1	mg/Kg	nd		nd	nd	nd	nd	nd
A1221	0.1	mg/Kg	nd		nd	nd	nd	nd	nd
A1232	0.1	mg/Kg	nd		nd	nd	nd	nd	nd
A1242	0.1	mg/Kg	nd		nd	nd	nd	nd	nd
A1248	0.1	mg/Kg	nd		nd	nd	nd	nd	nd
A1254	0.1	mg/Kg	nd		nd	nd	nd	nd	nd
A1260	0.1	mg/Kg	nd	87%	nd	nd	nd	nd	nd
A1262	0.1	mg/Kg	nd		nd	nd	nd	nd	nd
Surrogate Recoveries									
Decachlorobiphenyl			112%	99%	110%	111%	107%	102%	108%
Tetrachloro-m-xylene			101%	104%	115%	111%	106%	99%	101%

Acceptable Recovery Limits:
Surrogates 70-130%
LCS/ MS/MSD 65-135%
Acceptable RPD limit: 30%

ACCU LABORATORY

12524 130th Lane NE
Kirkland WA 98034

Tel: (425) 214-5858
(425) 214-5868
Email: lisa@accu-lab.com
Website: www.accu-lab.com

Analytical Report

Client	ESN NW, Inc	Acculab WO#	17-AL0831-5
	1210 Eastside Street SE, Suite #200		
	Olympia, WA 98501	Date Sampled	8/30/2017
Project Manager	Steve League	Date Received	8/31/2017
Project Name	BERGERABAM-BHP	Date Reported	9/7/2017
Project#	A17.0202.00		

Polychlorinated Biphenyls in Soil by EPA 8082A/3550C

Accu Lab Analytical Batch# AL090617-3

Client sample ID	MRL	Unit	DP-15 (5-6)	DP-16 (7-8)	MS DP-16 (7-8)	MSD DP-16 (7-8)	RPD DP-16 (7-8)
Lab ID			17-AL0831-5-6	17-AL0831-5-7	17-AL0831-5-7	17-AL0831-5-7	17-AL0831-5-7
Matrix			Soil	Soil	Soil	Soil	Soil
Date Extracted			9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017
Date Analyzed			9/6/2017	9/6/2017	9/6/2017	9/6/2017	9/6/2017
Moisture (%)			24%	39%	39%	39%	39%
A1016	0.1	mg/Kg	nd	nd			
A1221	0.1	mg/Kg	nd	nd			
A1232	0.1	mg/Kg	nd	nd			
A1242	0.1	mg/Kg	nd	nd			
A1248	0.1	mg/Kg	nd	nd			
A1254	0.1	mg/Kg	nd	nd			
A1260	0.1	mg/Kg	nd	nd	84%	83%	2%
A1262	0.1	mg/Kg	nd	nd			
Surrogate Recoveries							
Decachlorobiphenyl			105%	99%	113%	123%	
Tetrachloro-m-xylene			123%	100%	125%	130%	

Acceptable Recovery Limits:

Surrogates 70-130%
LCS/MS/MSD 65-135%
Acceptable RPD limit: 30%

ACCU LABORATORY

12524 130th Lane NE
Kirkland WA 98034

Tel: (425) 214-5858
(425) 214-5868
Email: lisa@accu-lab.com
Website: www.accu-lab.com

Analytical Report

Client	**ESN NW, Inc**	**Acculab WO#**	**17-AL0831-5**
	1210 Eastside Street SE, Suite #200		
	Olympia, WA 98501	Date Sampled	8/30/2017
Project Manager	Steve League	Date Received	8/31/2017
Project Name	**BERGERABAM-BHP**	Date Reported	9/7/2017
Project#	**A17.0202.00**		

Data Qualifiers and Comments:

Results reported on dry-weight basis for soil samples.

MRL- Method Reporting Limit
nd- Indicates the analyte is not detected at the listing reporting limit.
C- Coelution with other compounds.
M- % Recovery of surrogate, MS/MSD is out of the acceptable limit due to matrix effect.
B- Indicates the analyte is detected in the method blank associated with the sample.
J- The analyte is detected at below the reporting limit.
E- The result reported exceeds the calibration range, and is an estimate.
D- Sample required dilution due to matrix. Method Reporting Limits were elevated due to dilutions.
H- Sample was received or analyzed past holding time
Q- Sample was received with head space, improper preserved or above recommended temperature.

SPECTRA Laboratories ...*Where experience matters*

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

09/07/2017

ESN Northwest
1210 Eastside St SE
Suite 200
Olympia, WA 98501
Attn: Julie Woods

Project: Bergerabam-BHP
Sample Matrix: Water
Date Sampled: 08/30/2017
Date Received: 09/01/2017
Spectra Project: 2017090022

Client ID	Spectra #	Analyte	Result	Units	Method
DP-12	1	Total Cyanide	<0.01	mg/L	SM 4500-CN⁻ E
DP-12 (6-7)	2	Total Cyanide	<0.1	mg/Kg	SM 4500-CN⁻ E

SPECTRA LABORATORIES

Jeffrey Cooper, Laboratory Manager

a7/0jn

SPECTRA Laboratories ...Where experience matters
2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 www.spectra-lab.com

09/26/2017

ESN Northwest
1210 Eastside St SE
Suite 200
Olympia, WA 98501
Attn: Julie Woods

Project: Bergerabam-BHP
Client ID: DP-15(5-6)
Sample Matrix: Soil
Date Sampled: 09/30/2017
Date Received: 09/22/2017
Spectra Project: 2017090685
Spectra Number: 1

Analyte	Result	Units	Method
Hexavalent Chromium	<5	mg/Kg	SW846 7196A

SPECTRA LABORATORIES

Jeffrey Cooper, Laboratory Manager

a6/hjn

ESN NORTHWEST, INC. | Environmental Services Network

CHAIN-OF-CUSTODY RECORD

CLIENT: BergerABAM Dan Harrison
ADDRESS:
PHONE: 970-385-6870 FAX:
CLIENT PROJECT #: A17.0202 PROJECT MANAGER: Amber Kocker

DATE: 9-26- PAGE 1 OF 3
PROJECT NAME: BHP
LOCATION: Hoquiam, WA
COLLECTOR: Dan Harrison DATE OF COLLECTION: 9-26

Sample Number	Depth	Time	Sample Type	Container Type	TPH - HCID	TPH - Diesel & Oil	TPH - Gasoline	BTEX	VOC 8260CL	VOC 8260	SemiVol 8270	PAH's 8270	PCB's 8082	CL Pesticides 8081	RCRA 8 Metals	MTCA 5 Metals	Pb CC As	Asbestos - PLM	GRO Suite	DRO Suite	WO Suite	As	As, CC	NOTES	Total Number of Containers	Laboratory Note Number
1. DP-5a		11:52	Water	40mL Poly										X							X					
2. DP-8a		11:05												X							X					
3. DP-9a		10:15												X		X										
4. DP-10a		16:27												X							X					
5. DP-11a		17:03												X							X					
6. DP-14a		14:53												X								X				
7. DP-15a		15:42												X							X					
8. DP-16a		14:20												X							X					
9. DP-17		13:35												X		X										
10. DP-18		8:42												X		X										
11. DP-19		12:57												X		X										
12. DP-20		9:30												X		X										
13.																										
14.																										
15.																										
16.																										
17.																										
18.																										

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
[signature]	9-26 5:15	[signature]	1715 9/26/17
RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

Turn Around Time: 24 HR 48 HR 5-DAY

1210 Eastside Street SE, Suite 200
Olympia, Washington 98501
Phone: 360-459-4670
Fax: 360-459-3432
Website: www.esnnw.com
E-Mail: info@esnnw.com

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #A17.0202
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Dissolved Metals in Water by EPA-6020 Method

Sample Number	Date Analyzed	Lead (Pb) (ug/L)	Chromium (Cr) (ug/L)	Arsenic (As) (ug/L)
Method Blank	10/3/2017	nd	nd	nd
DP-9a	10/3/2017	3.4	100	52
DP-9a	10/3/2017	7.5	120	59
DP-17	10/3/2017	nd	69	140
DP-18	10/3/2017	nd	18	2.3
DP-19	10/3/2017	nd	23	34
DP-20	10/3/2017	nd	37	24
Reporting Limits		2.0	10	2.0

"nd" Indicates not detected at listed detection limits.

QA/QC Data - Dissolved Metals EPA-6020

	Laboratory Control Sample			Laboratory Control Sample Duplicate			RPD
	Spiked Conc. (ug/L)	Measured Conc. (ug/L)	Spike Recovery (%)	Spiked Conc. (ug/L)	Measured Conc. (ug/L)	Spike Recovery (%)	(%)
Lead	20.0	19.8	99.0	20.0	21.3	107	7.30
Chromium	20.0	18.0	90.0	20.0	18.3	91.5	1.65
Arsenic	20.0	18.1	90.5	20.0	19.2	96.0	5.90

ACCEPTABLE RECOVERY LIMITS FOR LABORATORY CONTROL SAMPLES: 80%-120%
ACCEPTABLE RPD IS 20%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #A17.0202
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Dissolved Metals in Water by EPA-6020 Method

Sample Number	Date Analyzed	Chromium (Cr) (ug/L)	Arsenic (As) (ug/L)
Method Blank	10/3/2017	nd	nd
DP-14a	10/3/2017	43	51
Reporting Limits		10	2.0

"nd" Indicates not detected at listed detection limits.

QA/QC Data - Dissolved Metals EPA-6020

	Laboratory Control Sample			Laboratory Control Sample Duplicate			RPD
	Spiked Conc. (ug/L)	Measured Conc. (ug/L)	Spike Recovery (%)	Spiked Conc. (ug/L)	Measured Conc. (ug/L)	Spike Recovery (%)	(%)
Chromium	20.0	18.0	90.0	20.0	18.3	91.5	1.65
Arsenic	20.0	18.1	90.5	20.0	19.2	96.0	5.90

ACCEPTABLE RECOVERY LIMITS FOR LABORATORY CONTROL SAMPLES: 80%-120%
ACCEPTABLE RPD IS 20%

ESN NORTHWEST CHEMISTRY LABORATORY

BergerABAM
PROJECT BHP
PROJECT #A17.0202
Hoquiam, Washington

ESN Northwest
1210 Eastside Street SE Suite 200
Olympia, WA 98501
(360) 459-4670 (360) 459-3432 Fax
lab@esnnw.com

Dissolved Metals in Water by EPA-6020 Method

Sample Number	Date Analyzed	Arsenic (As) (ug/L)
Method Blank	10/3/2017	nd
DP-5a	10/3/2017	55
DP-8a	10/3/2017	65
DP-10a	10/3/2017	30
DP-11a	10/3/2017	12
DP-15a	10/3/2017	44
DP-16a	10/3/2017	49
DP-16a Duplicate	10/3/2017	46
Reporting Limits		2.0

"nd" Indicates not detected at listed detection limits.

QA/QC Data - Dissolved Metals EPA-6020

	Laboratory Control Sample			Laboratory Control Sample Duplicate			RPD
	Spiked Conc. (ug/L)	Measured Conc. (ug/L)	Spike Recovery (%)	Spiked Conc. (ug/L)	Measured Conc. (ug/L)	Spike Recovery (%)	(%)
Arsenic (As)	20	18.1	90.5	20	19.2	96.0	5.90

ACCEPTABLE RECOVERY LIMITS FOR LABORATORY CONTROL SAMPLES: 80%-120%
ACCEPTABLE RPD IS 20%