



April 18, 2016
Project No. 6-61M-132210

Oregon Department of Environmental Quality
NWR Cleanup Program
700 NE Multnomah St., Suite #600
Portland, OR 97232

Attention: Mr. Kevin Dana
Project Manager

**Subject: Phase II Environmental Site Assessment Work Plan
NW Raleigh and 14th Street
Portland, Oregon**

Dear Mr. Dana:

Innovative Housing, Inc., through Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) presents this Phase II Environmental Site Assessment (ESA) work plan for the above-referenced site. The site is an approximately 10,000 square foot property at the intersection of NW Raleigh Avenue and NW 14th Street in Portland, Oregon (Figure 1). In February 2016, Amec Foster Wheeler completed a Phase I ESA of the site. In the Phase I ESA, contaminants of concern (COCs) were identified for the site. These COCs are diesel- and heavy oil-range total petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbons (PAHs), and lead. Concentrations of PAHs and lead in soil samples collected from the northeast portion of the site exceed the DEQ risk-based concentration (direct contact) for urban residential and occupational receptors. Known concentrations of COCs at the site are presented on Figure 2.

The Phase I ESA identified two recognized environmental conditions (RECs) for the site:

- The presence of PAHs and lead contamination in onsite soil;
- Historical activities on and near the site, including battery manufacturing, fueling, and railyard operations.

These RECs were discussed in our meeting on March 31, 2016. During this meeting DEQ identified two possible data gaps:

- Whether gasoline-range hydrocarbons are present; and
- Whether methane is present due to possible breakdown of organic fill material present beneath parts of the site.

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The following scope of work is designed to address the RECs and data gaps for the site with the goal of securing a prospective purchaser agreement (PPA) and ultimately, a no-further-action (NFA) finding by DEQ for the site. Specifically, testing will be conducted for the purposes of:

1. determining whether previously detected concentrations of TPH, PAHs, and lead at the site are related to the area-wide impact associated with the former Hoyt Street Railyard (covered by an existing DEQ Record of Decision), or whether these compounds are related to a local source; and
2. identifying whether volatile constituents (gasoline and methane) may also be present at the site.

SCOPE OF WORK

TASK 1 – PREPARE SITE-SPECIFIC HEALTH AND SAFETY PLAN

A site-specific Health and Safety Plan (HASP) will be prepared to cover field safety protocol for Amec Foster Wheeler employees conducting the subsurface investigation tasks described below, as required by the Occupational Safety and Health Administration (OSHA).

TASK 2 – UTILITY LOCATION

Amec Foster Wheeler will notify the Oregon Utility Notification Center at least 48 hours in advance of initiating sampling activities to facilitate a public utility locate within the identified work area. In addition, Amec Foster Wheeler will subcontract with a private utility locating service to identify active and abandoned utility lines in the vicinity of proposed sampling locations.

TASK 3 – SUBSURFACE INVESTIGATION

Amec Foster Wheeler will schedule drilling activities with a licensed drilling company. Five borings will be installed on the site (B-5 through B-9) to evaluate for the presence of methane (B-5 and B-9), to collect soil samples (B-8), and to collect soil and groundwater samples (B-6 and B-7). The anticipated locations of the borings are shown in Figure 3. The information gathered will be used to:

1. confirm whether the migration of contaminants onto or off of the site is a concern,
2. confirm remedial options for the site (i.e. protective cap or vapor mitigation),
3. prepare a Contaminated Media Management Plan (CMMP) for future excavation workers at the site, and
4. establish a contaminant profile as necessary to secure landfill acceptance of contaminated soils during future excavation activities.

Details of the investigation are presented as follows:

Borings B-5 and B-9. Temporary soil vapor monitoring wells will be installed in borings B-5 and B-9 to evaluate for the presence of methane. Based on a previous subsurface investigations on the site conducted by Northwest Geotech, Inc. and GeoDesign, Inc., the greatest occurrence of woody debris and sawdust encountered on the site was along the northern part of the site at depths ranging from 7.5 to 15.0 feet below ground surface (bgs).

A direct-push drilling rig will be used to advance a cased boring to 15 feet bgs. The probes will be constructed of threaded 1-inch-diameter Schedule 40 PVC plastic with preppacked screens. Each probe will be screened from a depth of 5 to 15 feet bgs; this depth interval chosen because it spans the zone between the water table (located approximately 15 to 20 feet bgs) and the future building foundation. Sand will be placed in the annular space up to a depth of 4 feet, above which hydrated bentonite chips will be placed to the ground surface. Each probe will be completed with a wellhead cap and valve, protective casing, and traffic bollards.

Daily field measurements using a calibrated field meter will be taken for one week to measure methane, carbon dioxide, oxygen, carbon monoxide, hydrogen sulfide, static gas pressure, and barometric pressure. Measurements will be tabulated, and methane readings will be compared with lower and upper explosive level standards.

Borings B-6 and B-7. Soil and groundwater samples will be collected from two borings advanced in the vicinity of the former boring B-3. These will be advanced to first encountered groundwater, 25 feet bgs, or refusal, whichever comes first.

Boring B-8. Soil samples will be collected from the location of boring B-8, which will be advanced in the anticipated areas of future underground water storage tanks to the maximum anticipated depth of future excavation activities in that area (10 feet bgs).

Drilling Methodology

A direct-push drilling method will be employed to collect the soil and groundwater samples in an effort to minimize disturbance to the site and to minimize generation of soil cuttings. The direct-push sampling technique involves advancing a 2-inch diameter hollow rod using a truck-mounted percussion hammer. Soil samples are collected continuously, (soil conditions permitting) within disposable plastic sleeves. Soil type will be logged continuously to characterize the nature of subsurface soils at the site. Soil will be classified according to the Unified Soil Classification System.

Soil samples will be collected from the 5-, 10-, and 15-foot depths from borings B-5, B-6, and B-7, and from the 5- and 10-foot depths in boring B-8.

Soils will be screened in the field using a photo-ionization detector (PID), and by visual means. We anticipate a total of 11 soil samples will be submitted for laboratory analysis. If groundwater is encountered, the driller will advance new tubing down the encased boring, and purge the groundwater to assure that the groundwater sample collected is representative. Once the purge water turbidity clears, Amec Foster Wheeler will collect a representative groundwater sample from the boring. Following the completion of subsurface sampling activities, the borings will be permanently backfilled with hydrated bentonite chips. Drilling equipment will be decontaminated both prior to completion of the borings, as well as prior to departure from site. Soil cuttings and/or purge water generated as a result of Amec Foster Wheeler's field explorations will be temporarily stored at the site pending proper disposal. Following receipt of laboratory analysis, the investigation-derived waste (IDW) will be profiled for disposal prior to removal from the site.

TASK 4 - LABORATORY ANALYSIS

Amec Foster Wheeler will submit the soil and groundwater samples under approved chain-of-custody procedures to Apex Laboratories in Tigard, Oregon. The anticipated analytical tests include the following as appropriate:

Soil Samples:

- Petroleum hydrocarbon identification by Method NW TPH-HCID, with appropriate follow-up if TPH is detected:
 - TPH Gasoline + BTEX by Method NW TPH-Gx/8021A
 - TPH Diesel/Oil by Method NW TPH-Dx
 - PAHs by EPA Method 8270-SIM
- Resource Conservation and Recovery Act (RCRA) Metals (8) by EPA Method 6000, from the sample collected five feet bgs at each boring, with Toxicity Characteristic Leaching Procedure (TCLP) follow-up for samples exceeding the "20x rule".
- Lead by EPA Method 6000, from the samples collected at 10 and 15 feet bgs in each boring, with TCLP follow-up for samples exceeding the "20x rule"

Groundwater Samples:

- Petroleum hydrocarbon identification by Method NW TPH-HCID, with appropriate follow-up if TPH is detected:
 - TPH Gasoline + BTEX by Method NW TPH-Gx/8021A

- TPH Diesel/Oil by Method NW TPH-Dx
- PAHs by EPA Method 8270-SIM

TASK 5 – DATA ANALYSIS AND REPORTING

Following receipt of final laboratory testing results, Amec Foster Wheeler will prepare a report documenting the field activities, laboratory results, and our interpretation of the results. The report will include:

- A brief discussion of sampling activities and site conditions,
- Laboratory testing results,
- Summary tables for soil, groundwater, and soil gas analytical results with a comparison to applicable and appropriate screening levels, and
- A map and cross-section showing sample locations

If you have any questions or comments regarding this work plan, please contact the undersigned at (503) 639-3400.

Sincerely,

Amec Foster Wheeler
Environment & Infrastructure, Inc.

Reviewed by:



John L. Kuiper, RG
Principal Geologist



Jack Spadaro, PhD, CHMM
Associate Scientist

Attachments: Figure 1 – Location Map
Figure 2 – Prior Sampling Location Diagram
Figure 3 – Proposed Sampling Locations

c: Julie Garver, Innovative Housing
David Blount, Landye Bennett Blumstein



ATTACHMENTS



INNOVATIVE HOUSING, INC.

Amec Foster Wheeler
Environment & Infrastructure, Inc.
7376 S.W. Durham Road
Portland, OR 97224



PHASE II ENVIRONMENTAL SITE ASSESSMENT
NW RALEIGH STREET & NW 14th AVENUE
PORTLAND, OREGON

SITE LOCATION MAP

DATE	APRIL 2016
SCALE	1" = 1,000'
PROJECT NO.	6-61M-13221-0
FIGURE	1

	B-2 (2.5-4')	B-2 (7.5-9')	B-2 (15-16.5')
Diesel	ND	ND	ND
Oil	ND	ND	ND
Acenaphthene	ND	ND	ND
Acenaphthylene	ND	ND	ND
Anthracene	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND
Benzo(b+k)fluoranthene(s)	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND
Chrysene	ND	ND	ND
Dibenz(a,h)anthracene	ND	ND	ND
Fluoranthene	ND	0.017	ND
Fluorene	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND
Naphthalene	ND	0.020	0.011
Phenanthrene	ND	0.015	ND
Pyrene	ND	0.018	ND
Lead	17.8	40.5	ND

LEGEND:

-  Boring (Northwest Geotech Inc., 2014)
-  Site Boundary
-  Test Pit (Emcon, 1998)
-  Taxlot

	B-3 (2.5-4')	B-3 (7.5-9')	B-3 (15-16.5')	B-3 (Groundwater)
Diesel	ND	40.6	ND	-
Oil	686	65.2	92.7	-
Acenaphthene	ND	0.43	2.33	0.591
Acenaphthylene	ND	0.026	0.12	ND
Anthracene	ND	0.58	3.34	0.0757
Benzo(a)anthracene	0.17	0.94	5.71	0.150
Benzo(a)pyrene	0.20	1.12	6.88	0.172
Benzo(b+k)fluoranthene(s)	0.64	1.45	8.75	0.225
Benzo(g,h,i)perylene	0.21	0.61	3.34	0.0857
Chrysene	0.27	1.11	6.88	0.162
Dibenz(a,h)anthracene	ND	0.11	0.64	ND
Fluoranthene	0.24	2.29	12.60	0.270
Fluorene	ND	0.29	2.09	0.0467
Indeno(1,2,3-cd)pyrene	0.22	0.57	3.19	0.0846
Naphthalene	ND	0.30	4.33	0.216
Phenanthrene	ND	2.68	14.50	0.213
Pyrene	0.25	2.67	15.30	0.345
Lead	435	133	122	-

	EM-26D (0-5')	EM-26D (5-10')	EM-26D (10-15')
Diesel	ND	ND	ND
Oil	-	-	-
Acenaphthene	-	-	-
Acenaphthylene	-	-	-
Anthracene	-	-	-
Benzo(a)anthracene	-	-	-
Benzo(a)pyrene	-	-	-
Benzo(b+k)fluoranthene(s)	-	-	-
Benzo(g,h,i)perylene	-	-	-
Chrysene	-	-	-
Dibenz(a,h)anthracene	-	-	-
Fluoranthene	-	-	-
Fluorene	-	-	-
Indeno(1,2,3-cd)pyrene	-	-	-
Naphthalene	-	-	-
Phenanthrene	-	-	-
Pyrene	-	-	-
Lead	58	18	21

	EM-26E (0-5')	EM-26E (5-10')	EM-26E (10-15')
Diesel	ND	ND	ND
Oil	-	-	-
Acenaphthene	ND	-	-
Acenaphthylene	ND	-	-
Anthracene	ND	-	-
Benzo(a)anthracene	ND	-	-
Benzo(a)pyrene	ND	-	-
Benzo(b+k)fluoranthene(s)	-	-	-
Benzo(g,h,i)perylene	ND	-	-
Chrysene	ND	-	-
Dibenz(a,h)anthracene	-	-	-
Fluoranthene	1.8	-	-
Fluorene	ND	-	-
Indeno(1,2,3-cd)pyrene	-	-	-
Naphthalene	ND	-	-
Phenanthrene	1.5	-	-
Pyrene	2.3	-	-
Lead	280	22	18

	B-1 (2.5-4')	B-1 (7.5-9')	B-1 (10-11.5')	B-1 (Groundwater)
Diesel	ND	ND	ND	-
Oil	ND	ND	ND	-
Acenaphthene	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND
Benzo(a)anthracene	ND	ND	0.013	ND
Benzo(a)pyrene	ND	ND	0.023	ND
Benzo(b+k)fluoranthene(s)	ND	ND	0.052	ND
Benzo(g,h,i)perylene	ND	ND	0.024	ND
Chrysene	ND	ND	0.023	ND
Dibenz(a,h)anthracene	ND	ND	ND	ND
Fluoranthene	ND	ND	0.020	ND
Fluorene	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	0.025	ND
Naphthalene	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND
Pyrene	ND	ND	0.020	ND
Lead	20.5	12.1	22.2	-

	B-4 (2.5-4')	B-4 (7.5-9')	B-4 (10-11.5')
Diesel	ND	ND	ND
Oil	ND	ND	ND
Acenaphthene	ND	ND	ND
Acenaphthylene	ND	ND	ND
Anthracene	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND
Benzo(b+k)fluoranthene(s)	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND
Chrysene	ND	ND	ND
Dibenz(a,h)anthracene	ND	ND	ND
Fluoranthene	ND	ND	ND
Fluorene	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND
Naphthalene	ND	ND	ND
Phenanthrene	ND	ND	ND
Pyrene	ND	ND	ND
Lead	17.7	18.3	11.6

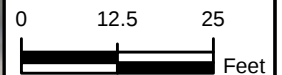
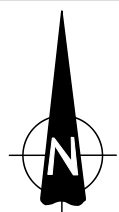
NOTE: Results shown in mg/kg

ND : Not Detected

Bold : Indicates Constituent Exceeds Either Clean Fill Screening Criteria or RBC

- : Not Tested

NW/Raleigh St.



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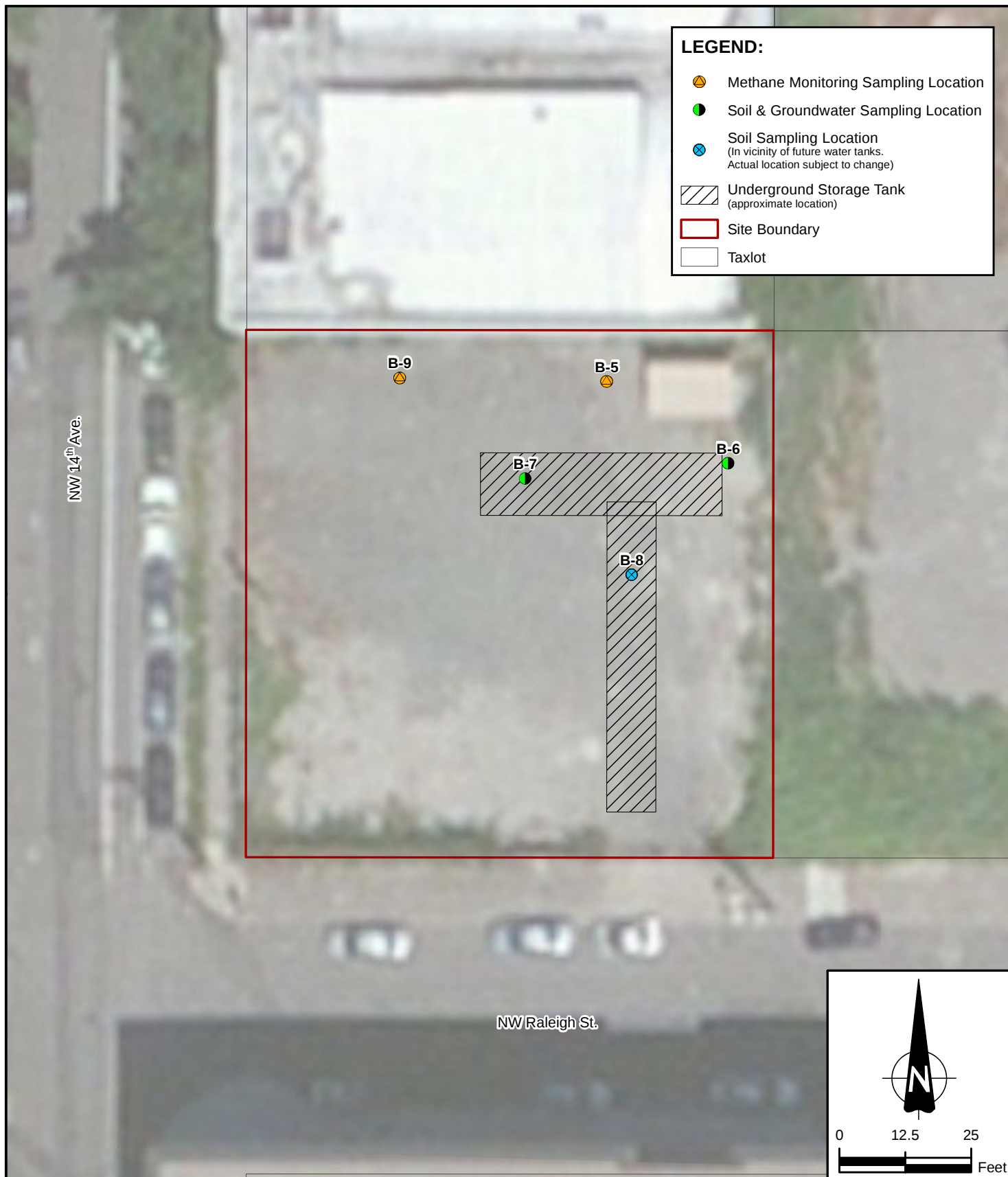
PRIOR ENVIRONMENTAL
SAMPLING LOCATION DIAGRAM

DATE
APRIL 2016

SCALE
1" = 25'

PROJECT NO.
6-61M-13221-0

FIGURE
2



LEGEND:

- Methane Monitoring Sampling Location
- Soil & Groundwater Sampling Location
- ⊗ Soil Sampling Location
(In vicinity of future water tanks.
Actual location subject to change)
- Underground Storage Tank
(approximate location)
- Site Boundary
- Taxlot

DRAWN BY: SD CHECKED BY: JK

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PHASE II ENVIRONMENTAL SITE ASSESSMENT
NW RALEIGH STREET & NW 14th AVENUE
PORTLAND, OREGON

**PROPOSED
SAMPLING LOCATIONS**

DATE
APRIL 2016

SCALE
1" = 25'

PROJECT NO.
6-61M-13221-0

FIGURE
3