DRAFT
TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Steve Teel, L. Hg., Washington State Department of Ecology

cc: John Felder, PE, Environmental Services, Washington State Department of Natural Resources

FROM: Lauren Knickrehm, E.I.T. and Eric Weber, L.Hg.

DATE: April 16, 2014

RE: SUBSURFACE INVESTIGATION ACTIVITIES WORK PLAN
WEBSTER NURSERY SITE, SITE ID 3380
TUMWATER, WASHINGTON

INTRODUCTION

This technical memorandum presents a work plan to complete a subsurface investigation at the Washington State Department of Natural Resources (DNR) former pesticide storage warehouse at Webster Nursery, located at 9805 Blomberg Street SW in Tumwater, Washington. This work plan has been prepared in response to a recent letter from Washington State Department of Ecology (Ecology) concerning potential residual pesticide soil contamination near the former pesticide storage warehouse (Ecology 2014). The proposed subsurface investigation consists of shallow direct-push drilling in the vicinity of a former remedial excavation area (the excavation area) and two existing groundwater monitoring wells impacted by pesticides (SW-10 and SW-11). Soil samples will be collected from the direct-push borings and submitted for laboratory analysis to evaluate the nature and extent of any residual pesticide soil contamination. The analytical results and soil characterization evaluation will be discussed with Ecology to determine if an additional soil removal activity should be conducted. The site location is shown on Figure 1.

BACKGROUND

In 1978, a concrete underground storage tank (UST) was installed south of the former pesticide storage warehouse. The UST was used to contain wash water and spills from pesticide mixing operations at the nursery. The original concrete tank was replaced with a metal UST in 1982. Upon removal of the metal UST in July 1996, pesticide contamination of soil and groundwater was confirmed resulting in subsequent excavation and disposal of approximately 70 cubic yards of contaminated soil. According to the site cleanup action plan (CAP), field screening during the excavation indicated soil contamination was left in place due to groundwater seepage in the bottom of the excavation. In August 1996, four shallow groundwater monitoring wells were installed around the excavation area to characterize groundwater. In April 1999, shallow soil borings [typical boring depth of 12.5 feet (ft)] were installed to complete the

remedial investigation/feasibility study (RI/FS). The excavation area, well and soil boring locations are shown Figure 2.

Six of the 1999 soil borings (SB06 through SB10) were located in and around the excavation area. Detections of heptachlor and heptachlor epoxide were detected in soil, but were below the Model Toxics Control Act (MTCA) Method B soil cleanup levels (Tetra Tech 1999). The parent pesticide compound heptachlor was only detected at soil boring SB10 (through center of excavation area; below the excavation's vertical limits). Daughter product heptachlor epoxide was also detected at SB10, SB07 (located between SW-10 and SW-11), and SB09 (located west of excavation area). At the depths where heptachlor was detected at SB10, heptachlor epoxide was also detected.

The surface topography around the soil boring locations is relatively flat. A summary of sample depth ranges where heptachlor epoxide was detected is as follows:

- SB10: 6.5 to 12.5 ft below ground surface (BGS) (four samples; vertical extent of 6 ft)
- SB07: 3.0 to 10.5 ft BGS (three samples; vertical extent of 7.5 ft)
- SB09: 2.5 to 5.5 ft BGS (one sample; vertical extent of 3 ft).

SB10 is located closest to the excavation and SB09 is located farthest away to the west. The extent of residual soil contamination found appears to be from beneath the former excavation and to the southeast. The original RI/FS data summary table is provided in Attachment 1.

In January 2001, the current Agreed Order (AO) for the site between Ecology and DNR (No. DE 00TCPSR-295, dated January 8, 2001) became effective. Attached to the AO is the site CAP. Per the CAP, a component of the selected cleanup action is monitored natural attenuation (MNA), which requires ongoing groundwater monitoring of pesticide concentrations. The MNA groundwater monitoring plan has been in effect for more than ten years, and heptachlor is no longer detected in groundwater while heptachlor epoxide continues to be detected above MTCA cleanup levels at wells SW-10 and SW-11. The long-term timeframe discussed in the CAP for the site remedy is five to ten years, and the ongoing presence of heptachlor epoxide at concentrations above MTCA cleanup levels after more than 10 years has been noted by Ecology in their recent letter (Ecology 2014).

The most recent groundwater sampling event (February 2014) indicates heptachlor epoxide contamination still exists at wells SW-10 and SW-11. These wells are directly south and east of the former excavation. Consistent with previous groundwater sampling events, heptachlor (parent compound) was not detected. Monitoring well locations and data results for heptachlor and heptachlor epoxide from February 2014 are shown on Figure 3.

ADDITIONAL SUBSURFACE INVESTIGATION: SCOPE AND SCHEDULE

The January 2014 letter from Ecology recommended that an additional subsurface investigation be conducted to assess residual pesticide soil contamination. DNR requested a meeting with Ecology to discuss the letter and next steps. During a meeting with Ecology on February 19, 2014, a scope of work and timeline was agreed upon for this subsurface investigation (Felder and Teel 2014). Three borings will be advanced at the site to a maximum depth of 15 ft BGS. One boring will be located along the edge of the excavation (east of SB10) and two will be located adjacent to SW-10 and SW-11 (near SB07). Specifically, the three borings are located as follows:

- LAI-B11: between SW-10 and the south excavations wall
- LAI-B12: between SW-11 and the west excavations wall, and
- LAI-B13: within northeast extent of the excavation area.

The approximate locations of the three proposed direct-push boring locations are shown on Figure 2.

The borings will be advanced to a maximum depth of 15 ft BGS, or refusal. If refusal is encountered at a depth less than 14 feet, an additional boring will be attempted within close proximity to collect soil samples at the depths that were not reached during the initial boring. Soil samples will be collected at an approximate interval of 1.5 ft. A total of four samples will be collected from each location for laboratory analysis. One to two additional samples will be collected in the deeper portion of the soil core to be put on hold. No samples will be collected from the fill located within the excavation area. Based on historical data, heptachlor epoxide is expected to be present between 6.5 and 12.5 ft BGS within the excavation area, and between three and 10.5 ft BGS outside of the excavation area to the southeast (Attachment 1). The timeline for this project identifies the completion of the subsurface investigation field work before June 2014. A technical memorandum including analytical results and recommendations will be submitted to Ecology no later than June 25, 2014.

DIRECT-PUSH DRILLING APPROACH AND PROCEDURE

A direct-push drilling rig will be used to advance a 2-inch inside-diameter core barrel with a removable polyethylene liner. The depth to water at the site typically varies from 5 ft to 15 ft BGS during the wet weather and dry weather seasons, respectively. A continuous soil core will be collected inside the liner. Once the desired depth is reached, the liner and soil core will be removed from the core barrel. Soil lithology will be documented and described in accordance with the United Soil Classification System [USCS; ASTM International (ASTM) D2487] using the visual-manual procedure for describing soils (ASTM D2488). Four soil samples will be collected from each boring. The two borings located outside of the exaction area will be sampled between 3 ft BGS and 15 ft BGS (a sample at 13 ft and at 15 ft will

be placed on hold at the analytical laboratory). For the one boring located inside the excavation area, samples will be collected between 6.5 ft BGS and 15 ft (a 15 ft sample will be placed on hold at the analytical laboratory); only native material will be collected for sample analysis. A complete sampling matrix including sample depths and additional samples to be collected and placed on hold is presented in Table 1.

Upon completion of all sampling activities the borings will be backfilled in accordance with applicable regulations (Washington Administrative Code 173-160) and will be patched to be consistent with the surrounding ground surface (soil). Soil cuttings will be drummed on site and labeled. Disposal will be coordinated and overseen by DNR. One composite soil sample will be collected and submitted to the laboratory for analyses of pesticides by U.S. Environmental Protection Agency (EPA) Method 8081 and Resource Conservation and Recovery Act (RCRA) 8 metals.

The soil conditions outside of the excavation area are anticipated to consist of coarse, sandy gravel to approximately 6.5 ft BGS, and silty, fine to medium sand to clayey silt. The soil within the excavation area is anticipated to be loose to medium dense fill until the native material, which should be similar to the soil outside of the excavation area. Historical soil boring logs from the vicinity of the proposed borings are included in Attachment 2 as a reference.

All samples will be stored in coolers with ice and transported using proper chain-of-custody procedures to TestAmerica laboratories in Tacoma, Washington. Samples will be analyzed by EPA Method 8081A on a 2-week turnaround time for organochlorine pesticides. As described above and presented in Table 1, select sample depths will be placed on hold at the analytical laboratory. The sample will only be run if further depth delineation is required.

Prior to drilling, public locates will be placed with "Call Before You Dig." Additionally, a private utility locates contractor will be subcontracted to Landau Associates to complete a private locate. The drilling will be conducted by a subcontractor to Landau Associates.

A project health and safety plan is presented at Attachment 3. All Landau Associates employees will follow the procedures described in the plan. The drilling company personnel will either adopt the health and safety plan presented in Attachment 3 or prepare their own plan. Prior to the start of each workday, a meeting will be conducted with project personnel to review health and safety issues.

EFW/LKK/SMM/emw

REFERENCES

Ecology. 2014. Letter: *Need for Additional Work, Washington State Department of Natural Resources (DNR) Webster Nursery Site, 9805 Bloomberg Street SW, Tumwater, Washington, Agreed Order DE 00 TCPSR-295, Facility/Site No. 8786341, Cleanup Site ID No. 3380*. From Steve Teel, Toxics Cleanup Program, Washington State Department of Ecology, to John Felder, Engineering Division, Washington State Department of Natural Resources. January 9.

Felder, J. and S. Teel. 2014. Personal communication (project team meeting attended by Lauren Knickrehm, Senior Project Engineer, Landau Associates). John Felder, Environmental Services Coordinator, Washington Department of Natural Resources and Steve Teel, Cleanup Project Manager/Hydrogeologist, Washington State Department of Ecology. Re: *Webster Nursery.* February 9.

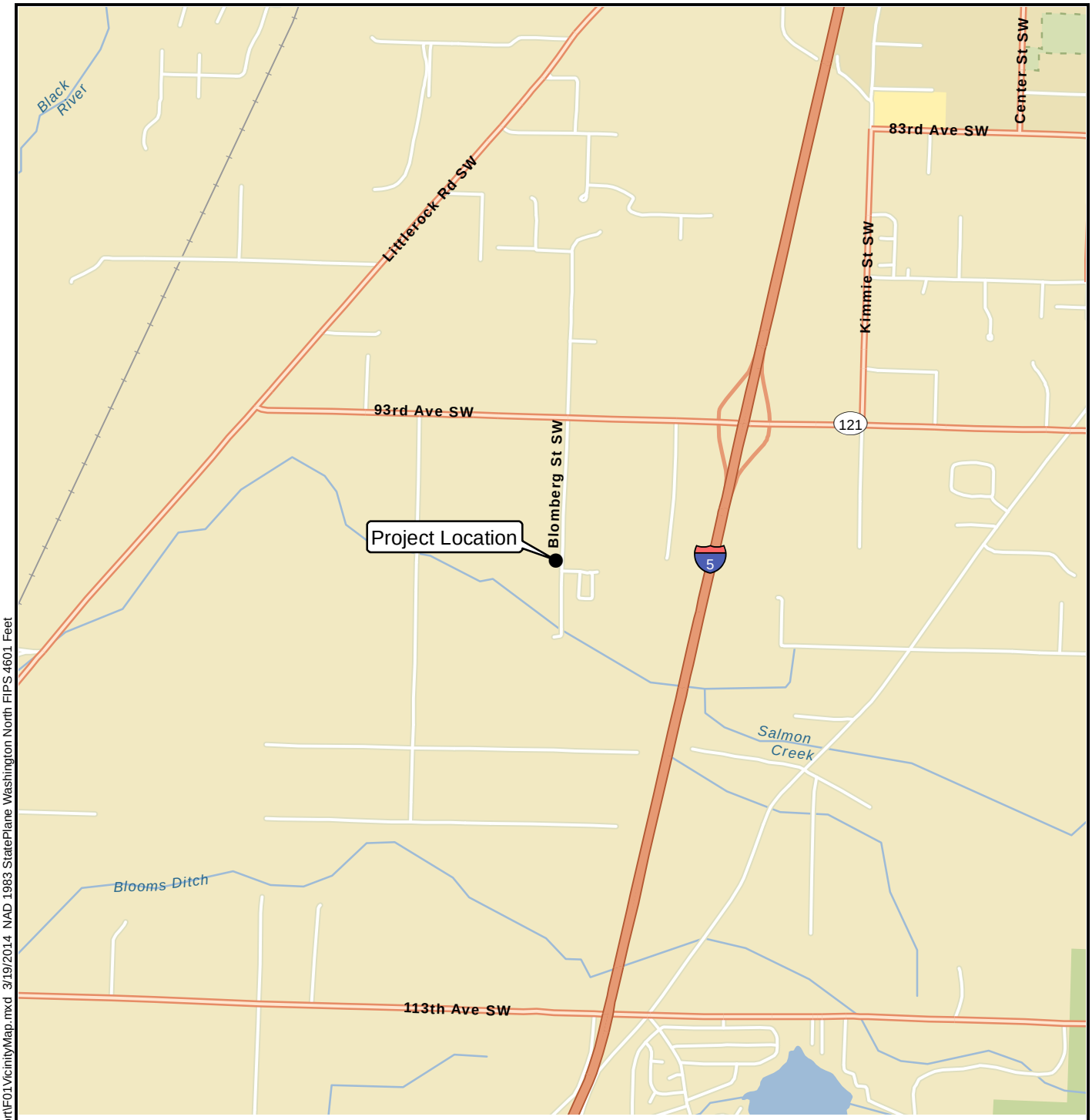
Tetra Tech. 1999. Report: *Remedial Investigation/Feasibility Study, Pesticide Storage Warehouse, Webster Nursery, Thurston County, Washington.* Prepared for Washington State Department of Natural Resources, Engineering Division, Olympia, Washington. June.

ATTACHMENTS

Figure 1: Vicinity Map
Figure 2: Historical and Proposed Boring Locations
Figure 3: Most Recent Heptachlor Epoxide Groundwater Concentrations

Table 1: Drilling and Soil Quality Sampling Matrix

Attachment 1: Summary of 1999 Subsurface Soil Investigation Analytical Results
Attachment 2: Previous Nearby Boring Logs
Attachment 3: Health and Safety Plan



N

0 0.5 1

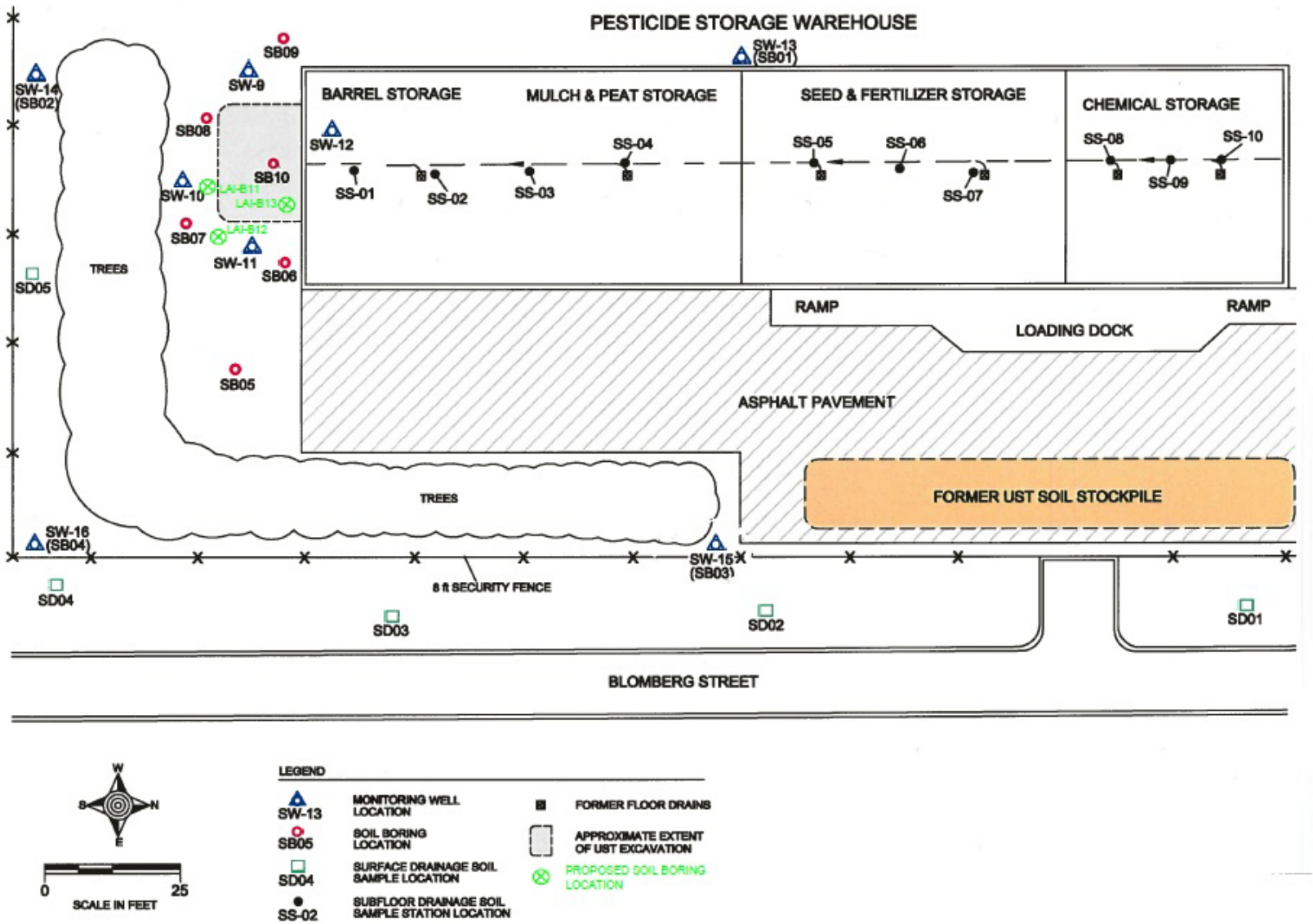
Miles

Data Source: Esri 2012

G:\Projects\774\006\Semiannual GW Monitoring Report\F01VicinityMap.mxd 3/19/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

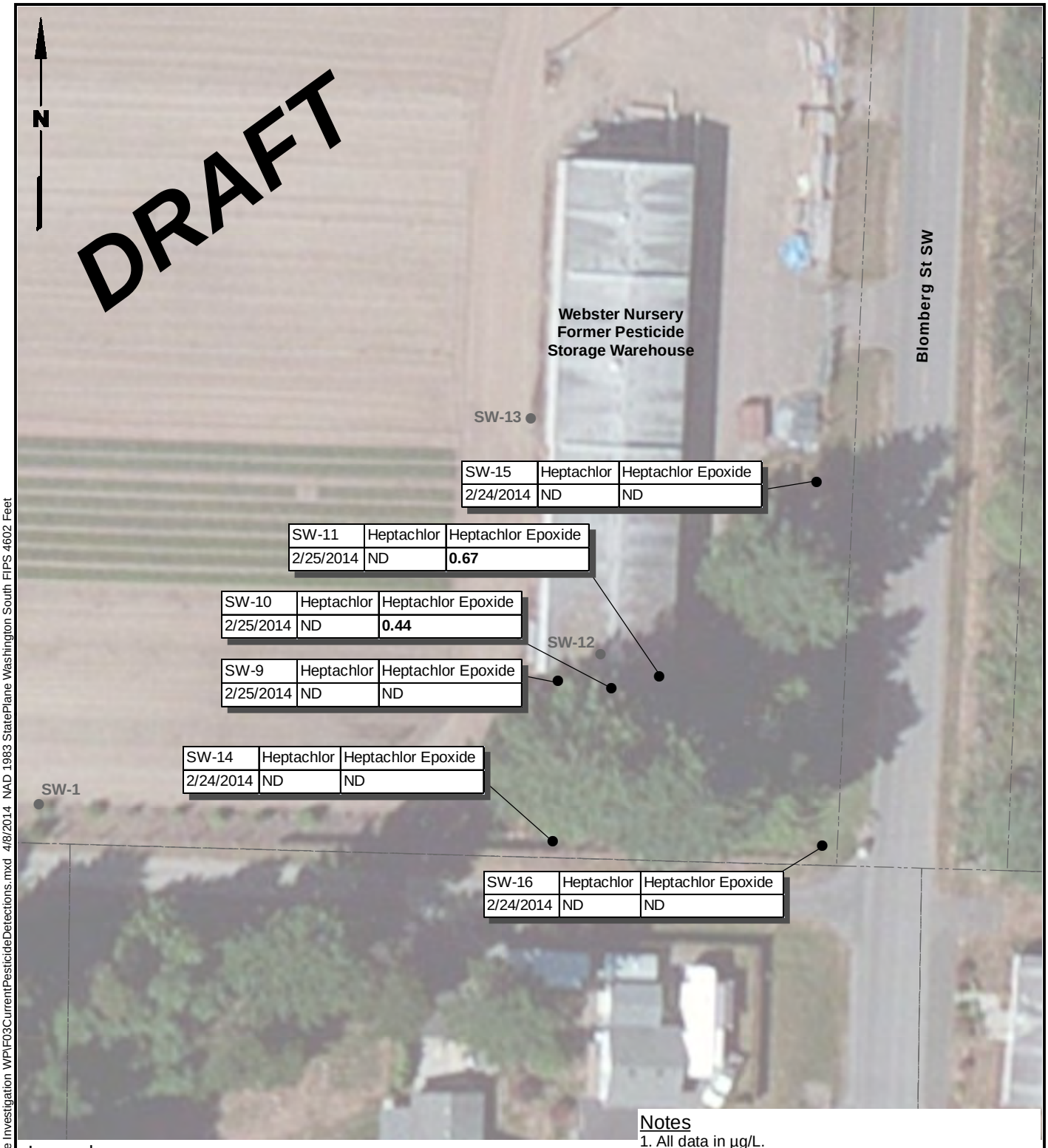
Webster Nursery Site Tumwater, Washington	**Vicinity Map**	Figure 1



Resource: Tetra Tech 1999, Figure 5; historical borings from 1999; proposed borings for 2014.

LANDAU ASSOCIATES	Webster Nursery Site Tumwater, Washington	**Historical and Proposed Boring Locations**

Figure
2



Legend

- Organochlorine Pesticide Groundwater Sampling Location
- Other Monitoring Wells
- Tax Parcels

0 50 100

Scale in Feet

Notes

1. All data in µg/L.
2. **Bold** = exceedance of cleanup level.
3. MTCA Method B screening criteria was used. Groundwater cleanup level for heptachlor = 0.019 µg/L and heptachlor epoxide = 0.009 µg/L.
4. Non-detect for heptachlor and heptachlor epoxide = 0.098 µg/L.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Sources: Thurston County GIS; Esri World Imagery.

G:\Projects\774\006\010\013\Subsurface Investigation WP\F03CurrentPesticideDetections.mxd 4/8/2014 NAD 1983 StatePlane Washington South FIPS 4602 Feet

LANDAU ASSOCIATES

Webster Nursery Site Tumwater, Washington	**Most Recent Heptachlor Epoxide Groundwater Concentrations**	Figure 3

TABLE 1
DRILLING AND SOIL QUALITY SAMPLING MATRIX
WEBSTER NURSERY DIRECT-PUSH INVESTIGATION
TUMWATER, WASHINGTON

				Soil Analysis	
	Boring Location	Boring Depth (ft)	Soil Quality Sampling Depth (ft)	Organochlorine Pesticides 8081A	Laboratory Hold (a)
Inside Former Excavation	LAI-B13	15	6.5	X	
			9.0	X	
			11.0	X	
			14.0	X	
			15.0		X
Outside Former Excavation	LAI-B11	15	3.0	X	
			5.5	X	
			8.0	X	
			10.5	X	
			13.0		X
			15.0		X
	LAI-B12	15	3.0	X	
			5.5	X	
			8.0	X	
			10.5	X	
			13.0		X
			15.0		X

(a) Samples to be put on hold will only be analyzed if the soil sample collected from directly above has pesticide detections.

DRAFT

ATTACHMENT 1

Summary of 1999 Subsurface Soil Investigation Analytical Results

TABLE 8. SUMMARY OF SUBSOIL SAMPLE ANALYTICAL RESULTS
PESTICIDE STORAGE WAREHOUSE RI/FS
WEBSTER NURSERY, THURSTON COUNTY, WASHINGTON

Sample Designation	Sample[a] Depth (ft – bgs)	Analytical Results (ug/kg)[b]						
		Organochlorine Pesticides (EPA 8081A)				Chlorinated Herbicides (EPA 8151A)		Percent Total Organic Carbon[c] (EPA 9060)
		Alpha Chlordane	Gamma Chlordane	Heptachlor	Heptachlor Epoxide	2,4-D	2,4,5 TP	
PSW-SB01-5.0	5.0 – 6.5	ND[d]	ND	ND	ND	ND J[f]	ND J	NA[e]
PSW-SB02-5.0	5.0 – 6.5	ND	ND	ND	ND	ND	ND	NA
PSW-SB03-5.0	5.0 – 6.5	ND	ND	ND	ND	ND	ND	NA
PSW-SB04-5.0	5.0 – 6.5	ND	ND	ND	ND	ND	ND	NA
PSW-SB05-2.5	2.5 – 5.5	ND	ND	ND	ND	ND	ND	NA
PSW-SB05-5.5	5.5 – 8.5	ND	ND	ND	ND	ND	ND	NA
PSW-SB05-8.5	8.5 – 10.5	ND	ND	ND	ND	ND	ND	NA
PSW-SB05-10.5	10.5 – 12.5	ND J	ND J	ND J	ND J	ND	ND	NA
PSW-SB06-2.5	2.5 – 5.5	ND	ND	ND	ND	ND	ND	0.16
PSW-SB06-6.0	6.0 – 8.5	ND	ND	ND	ND	ND	ND	NA
PSW-SB06-8.5	8.5 – 10.5	ND	ND	ND	ND	ND	ND	NA
PSW-SB06-10.5	10.5 – 12.5	ND J	ND J	ND J	ND J	ND	ND	NA
PSW-SB07-3.0	3.0 – 5.5	ND	ND	ND	2.14	ND	ND	NA
PSW-SB07-5.5	5.5 – 8.5	ND J	ND J	ND J	31.7 J	ND	ND	0.16
PSW-SB07-8.5	8.5 – 10.5	ND J	ND J	ND J	19.0 J	ND	ND	NA
PSW-SB07-10.5	10.5 – 12.5	ND J	ND J	ND J	ND J	ND	ND	NA
PSW-SB08-3.0	3.0 – 5.5	ND J	ND J	ND J	ND J	ND	ND	NA
PSW-SB08-6.0	6.0 – 8.5	ND J	ND J	ND J	ND J	ND	ND	NA
PSW-SB08-15.0[g]	6.0 – 8.5	ND	ND	ND	ND	ND	ND	NA
PSW-SB08-8.5	8.5 – 10.5	ND J	ND J	ND J	ND J	ND	ND	NA
PSW-SB08-10.5	10.5 – 12.5	ND J	ND J	ND J	ND J	ND	ND	NA
PSW-SB09-2.5	2.5 – 5.5	ND J	ND J	ND J	2.33 J	8.17 J[h]	ND	NA
PSW-SB09-5.5	5.5 – 8.5	ND J	ND J	ND J	ND J	ND	ND	NA
PSW-SB09-8.5	8.5 – 10.5	ND	ND	ND	ND	ND	ND	NA
PSW-SB09-10.5	10.5 – 12.5	ND J	ND J	ND J	ND J	ND	ND	NA
PSW-SB10-6.5	6.5 – 8.5	27.1	139	144	31.5	ND	ND	NA
PSW-SB10-8.5	8.5 – 10.5	20.9	90.1	55.3	18.6	ND	30.9	0.09
PSW-SB10-10.5	10.5 – 12.5	ND J	ND J	ND J	10.5 J	ND J[i]	ND J[i]	NA
PSW-SB10-12.5	10.5 – 12.5	3.04 J	ND J	ND J	3.13 J	ND	ND	NA
Equipment Blank	NA	ND	ND	ND	ND	ND	ND	NA
Laboratory Reporting Limit (ug/kg)		1.0	0.8	1.0	1.0	5.0	1.0	0.05
MTCA Method B Residential Soil Cleanup Level (ug/kg)[j]		2,860[k]		222	110	800,000	640,000	NA

a ft – bgs = Feet below ground surface.
b The summary of soil sample results specifically includes only those compounds detected at or above the associated laboratory reporting limit during the investigation.
c Total organic carbon results reported as percent TOC
d ND = Not detected at or above the associated laboratory reporting limit.
e NA = Not Applicable.
f J = Unless otherwise indicated, data flag indicates an estimated concentration due to slight exceedance of the recommended sample holding time.
g Field duplicate Sample PSW-SB08-15.0 collected concurrently with project sample PSW-SB08-6.0.
h J - flag indicates an estimated concentration based on poor laboratory duplicate precision for this compound.
i J – flag indicates an estimated concentration base don low surrogate recoveries.
j Model Toxics Control Act (MTCA) Method B Residential Soil Cleanup Levels, as published in the Cleanup Levels and Risk Calculations (CLARC) Update, February 1996. For those contaminants with both carcinogenic and noncarcinogenic State Cleanup Levels, the carcinogenic value has been applied.
k Chlordane cleanup level based on change in chronic slope factor from 1.3 to 0.35 $(mg/kg\text{-}day)^{-1}$, EPA Integrated Risk Information System (IRIS), on-line database search conducted June 11, 1998.

ATTACHMENT 2

Previous Nearby Boring Logs

TETRA TECH

SOIL BORING AND SAMPLE COLLECTION LOG

CLIENT: WDNR
SITE: Webster Nursery
LOCATION: Thurston County, Washington
BORING IDENTIFICATION: SB06

Drilling Contractor: Cascade Drilling
Construction Date: 4/1/99
Logged By: R. Osgood

Rig Type: CME PROBE 45 / GEOPROBE
Hole Diameter: 2 inch

Geologic Log

PID Record (ppm)	Sample Identification	Depth (feet)	Geology (USCS)	
		0		
ND	PSW-SB06-2.5		SP	Brown fine Sand w/ trace silt, poorly graded, very moist to wet, no odor or staining. Water encountered at 3 feet below ground surface (ft-bgs).
ND	PSW-SB06-5.5	5	SM	Brown silty Sand grading to sandy Silt at 7 ft-bgs, wet, no odor or staining.
ND	PSW-SB06-8.5		ML	Brown silty Sand, poorly graded, wet, no odor or staining. Grades to sandy, clayey, Silt back to silty Sand, wet, no odor or staining.
			SM	
		10		
ND	PSW-SB06-10.5		ML	
			SM	Total Boring Depth-12.5 ft-bgs
		15		
		20		

TETRA TECH

SOIL BORING AND SAMPLE COLLECTION LOG

CLIENT: WDNR
SITE: Webster Nursery
LOCATION: Thurston County, Washington
BORING IDENTIFICATION: SB07

Drilling Contractor: Cascade Drilling
Construction Date: 4/1/99
Logged By: R. Osgood

Rig Type: CME PROBE 45 / GEOPROBE
Hole Diameter: 2 inch

Geologic Log

PID Record (ppm)	Sample Identification	Depth (feet)	Geology (USCS)	
		0		
ND	PSW-SB07-2.5		SP	Brown very fine Sand w/ trace silt, poorly graded, very moist, no odor or staining. Water encountered at 3.5 feet below ground surface (ft-bgs).
ND	PSW-SB07-5.5	5	SM	Brown fine silty Sand (10% silt) wet, no odor, slight iron oxidation.
ND	PSW-SB07-8.5		ML	Grayish brown sandy, clayey, Silt, grading to silty Sand, wet, no odor or staining.
		10	SM	
ND	PSW-SB07-10.5		ML	Brown sandy, clayey, Silt grading to medium Sand, poorly graded, wet, no odor, moderate iron oxidation.
			SP	
				Total Boring Depth-12.5 ft-bgs
		15		
		20		

TETRA TECH

SOIL BORING AND SAMPLE COLLECTION LOG

CLIENT: WDNR
SITE: Webster Nursery
LOCATION: Thurston County, Washington
BORING IDENTIFICATION: SB08

Drilling Contractor: Cascade Drilling
Construction Date: 4/1/99
Logged By: R. Osgood

Rig Type: CME PROBE 45 GEOPROBE
Hole Diameter: 2 inch

Geologic Log

PID Record (ppm)	Sample Identification	Depth (feet)	Geology (USCS)	
		0		
ND	PSW-SB08-2.5		SP	Brown fine Sand w/ trace silt, and minor wook fragments, poorly graded, wet, no odor or staining. Water encountered at 3 feet below ground surface (ft-bgs).
ND	PSW-SB08-5.5 (PSW-SB08-15.0)	5		
			SM	Brown silty Sand, wet, no odor, slight iron oxidation.
ND	PSW-SB08-8.5			
			ML/SM	Grayish brown silty, clayey, Sand (15%) w/ interbedded lenses of clayey silt, wet, no odor or staining.
		10		
ND	PSW-SB08-10.5		SP	Grayish brown fine to medium Sand, poorly graded, wet, no odor, moderate iron oxidation.
				Total Boring Depth-12.5 ft-bgs
		15		
		20		

TETRA TECH

SOIL BORING AND SAMPLE COLLECTION LOG

CLIENT: WDNR
SITE: Webster Nursery
LOCATION: Thurston County, Washington
BORING IDENTIFICATION: SB09

Drilling Contractor: Cascade Drilling
Construction Date: 4/1/99
Logged By: R. Osgood

Rig Type: CME PROBE 45 GEOPROBE
Hole Diameter: 2 inch

Geologic Log

PID Record (ppm)	Sample Identification	Depth (feet)	Geology (USCS)	
		0		
ND	PSW-SB09-2.5		SP	Brown fine to medium Sand w/ trace silt, poorly graded, wet, no odor or staining. Water encountered at 3 feet below ground surface (ft-bgs).
ND	PSW-SB09-5.5	5		
ND	PSW-SB09-8.5		SM	Brownish gray silty Sand (12% silt), wet, no odor or staining.
		10		
ND	PSW-SB09-10.5		ML	Grayish brown clayey Silt grading to fine to medium Sand, poorly graded, wet, no odor, moderate iron oxidation.
			SP	Total Boring Depth-12.5 ft-bgs
		15		
		20		

TETRA TECH

SOIL BORING AND SAMPLE COLLECTION LOG

CLIENT: WDNR
SITE: Webster Nursery
LOCATION: Thurston County, Washington
BORING IDENTIFICATION: SB10

Drilling Contractor: Cascade Drilling
Construction Date: 4/1/99
Logged By: R. Osgood

Rig Type: CME PROBE 45 / GEOPROBE
Hole Diameter: 2 inch

Geologic Log

PID Record (ppm)	Sample Identification	Depth (feet)	Geology (USCS)	
		0		
ND	PSW-SB10-6.5		FILL MATERIAL	Gravel and cobble excavation backfill material. Water encountered at 1.5 feet below ground surface (ft-bgs).
		5		
ND	PSW-SB10-8.5		SM	Course sandy gravel w/ cobble (fill) to 6.5 ft-bgs. Brownish gray silty, clayey, Sand (15% fines), poorly graded, wet, no odor or staining.
		10		
ND	PSW-SB10-10.5		ML	Browninsh gray clayey Silt grading to fine to medium Sand, poorly graded, wet, no odor with moderate iron oxidation.
ND	PSW-SB10-12.5		SP	
				Total Boring Depth-14.5 ft-bgs
		15		
		20		

ATTACHMENT 3

Health and Safety Plan

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

WORK LOCATION PERSONNEL PROTECTION AND SAFETY EVALUATION FORM

Attach Pertinent Documents/Data
Fill in Blanks As Appropriate

Job No.:	0774006.010.013		
Prepared by:	Sierra Mott	Reviewed by:	Christine Kimmel
Date:	April 1, 2014	Date:	April 2, 2014
Modified by:			
Date:			

A. WORK LOCATION DESCRIPTION

1. **Project Name:** Washington State Department of Natural Resources (DNR) Webster Nursery Subsurface Soil Investigation

2. **Location:** Tumwater, Washington

3. **Anticipated Activities:** Advancement of 3 soil borings to a maximum depth of 15 feet below ground surface (ft BGS) using direct-push drilling method. Collection of five to six soil samples at each location; samples will be analyzed for organochlorine pesticides only [U.S. Environmental Protection Agency (EPA) Method 8081A]. Groundwater sampling is not included in this plan.

4. **Size:** Property is 4 acres; project area is less than 1 acre

5. **Surrounding Population:** Residential/Agricultural

6. **Buildings/Homes/Industry:** Current DNR tree seedling nursery; equipment storage

7. **Topography:** Relatively flat

8. **Anticipated Weather:** Sun or rain, 45 to 65 degrees Fahrenheit

9. **Unusual Features:** None

10. **Site History:** A warehouse constructed in 1978 stored pesticides up to the mid-1990s. Pesticide containers were likely rinsed-out in this building and diluted pesticide wash water overflowed or leaked over time from the onsite underground storage tank (UST). Upon removal of the UST, pesticide residues were found in surrounding soils. Contaminated soil was removed and disposed of; minor residual subsurface soil contamination may remain. Monitoring wells were installed immediately surrounding the former UST location. Subsequently, the Washington State Department of Ecology (Ecology) issued an Agreed Order to

DNR. Additional wells were installed. All cleanup actions were completed except long-term groundwater monitoring. At this time, only the detected pesticide heptachlor epoxide exceeds Model Toxics Control Act (MTCA) groundwater cleanup standards. The two wells with exceedances (SW-10 and SW-11) are located about 5 ft outside the former UST excavation. Ecology believes the exceedance may be related to unexcavated pesticide residuals in the immediate vicinity of the former UST location. Other chemicals are detected at wells SW-10 and SW-11 (only). These chemicals are at low concentrations (below MTCA cleanup standards, where applicable) and include the following: heptachlor, gamma-Chlordane, alpha-Chlordane.

B. HAZARD DESCRIPTION

1. Background Review: ☒ Complete ☐ Partial

If partial, why?

2. Hazardous Level: ☐ B ☐ C ☒ D (Modified) ☐ Unknown

Justification: Existing data regarding site conditions and limited exposure based on field activities and equipment to be used

3. Types of Hazards: (Attach additional sheets as necessary)

A. ☒ Chemical ☒ Inhalation ☐ Explosive
☐ Biological ☒ Ingestion ☐ O2 Def. ☒ Skin Contact

Describe: Sampling of soil impacted by heptachlor and heptachlor epoxide and other pesticides compounds.

B. ☒ Physical ☐ Cold Stress ☒ Noise ☐ Heat Stress ☒ Other

Describe: Physical hazards associated with direct push drilling and soil sampling including slips, trips, and falls, noise, and moving parts of the drill rig.

C. ☐ Radiation

Describe:

4. Nature of Hazards:

☒ Air	Describe: Potentially contained in vapor from soil.
☒ Soil	Describe: Potential for contact with or ingestion of contaminated sediment during drilling and soil sampling.
☐ Surface Water	Describe:
☒ Groundwater	Describe: Potential for contact with or ingestion of contaminated groundwater during drilling and soil sampling.
☐ Other	Describe:

5. Chemical Contaminants of Concern ☐ N/A The primary chemical contaminants of concern are Heptachlor and its daughter product, Heptachlor Epoxide. Alpha- and gamma-chlordane are also present.

Contaminant	PEL (ppm)	I.D.L.H. (ppm)	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
Heptachlor	0.5 mg/m^3	35 mg/m^3	May be present in soil.	Inhalation, absorption, ingestion, dermal contact.	Tremors, convulsion, liver damage (carcinogen).	Haz Dust Meter Visual-Dust (white to light-tan crystals with a camphor-like odor)
Heptachlor Epoxide	0.5mg/m^3	Not available	Present in groundwater (0.67 mg/m^3) CUL = 0.0048 mg/m^3	Inhalation, absorption, ingestion, dermal contact.	Tremors, convulsion, liver damage (carcinogen)	Haz Dust MeterVisual-Dust (white to light-tan crystals with a camphor-like odor)
Chlordane	0.5 mg/m^3	100 mg/m^3	Present in groundwater (Total Chlordane, 0.089 mg/m^3) well below cleanup level (0.25 mg/m^3)	Inhalation, absorption, ingestion, dermal contact.	Blurred vision, delirium, cough, abdominal pain, nausea, vomiting, diarrhea (carcinogen).	Haz Dust Meter-Amber-colored, viscous liquid with a pungent, chlorine-like odor.

Notes: Heptachlor changes to heptachlor epoxide once mixed with water (including in the body).
PEL is the Permissible Exposure Limit for an 8 hour day

6. Physical Hazards of Concern ☐ N/A

Hazard	Description	Location	Procedures Used to Monitor Hazard
Slip/trip/fall	Wet or uneven ground	Throughout area	Visual and area awareness
Travel to and from site	Operating motor vehicle in traffic on highways and rural roads	Route to and from site	Operate motor vehicle while well rested and physically able to drive safely. Conduct pre-trip vehicle inspection, all vehicles to be maintained and in good working order. Obey all traffic laws including no cell phone use while driving. Secure all cargo properly to avoid shifting. Allow sufficient time to travel to site at safe speeds. Engage emergency brake when parking vehicles. Establish planned route prior to departure.
Weather Stress	Exposure to hot or cold temperatures, wind, and rain	Throughout area	Have drinking water accessible, wear appropriate clothing (layers of light for heat, warm for cold), avoid caffeine, and take short breaks as needed.
Moving parts of drill rig, falling and flying objects	Direct push drill rig	Near drill rig	Alert observation of surroundings, minimize time spent near drill rig, no loose clothing, use of safety glasses, hard hat, and steel toes boots, make eye contact with operator prior to advancing towards drill area.
Noise	Drill rigs are noisy, particularly direct push probe rigs	Near drill rig	Wear hearing protection when ever drill rig is operating.

7. Work Location Instrument Readings ☒ N/A

Location: _____

Percent O_2: _____ Percent LEL: _____

Radioactivity: _____ PID: _____

FID: _____ Other: _____

Dust: _____ Other: _____

Other: _____ Other: _____

Location: _____

Percent O_2: _____ Percent LEL: _____

Radioactivity: _____ PID: _____

FID: _____ Other: _____

Dust: _____ Other: _____

Other: _____ Other: _____

Location: _____

Percent O_2: _____ Percent LEL: _____

Radioactivity: _____ PID: _____

FID: _____ Other: _____

Dust: _____ Other: _____

Other: _____ Other: _____

Location:			
Percent O_2:		Percent LEL:	
Radioactivity:		PID:	
FID:		Other:	
Dust:		Other:	
Other:		Other:	

8. Hazards Expected In Preparation For Work Assignment ☒ N/A

Describe:

C. PERSONAL PROTECTIVE EQUIPMENT

1. Level of Protection

☐ A ☐ B ☐ C ☒ D (Modified)

Location/Activity: All

☐ A ☐ B ☒ C ☐ D

Location/Activity: If action levels (Attachment A) are exceeded.

2. Protective Equipment (specify probable quantity required)

Respirator ☐ N/A	**Clothing** ☐ N/A
☐ SCBA, Airline	☐ Fully Encapsulating Suit
☐ Full-Face Respirator	☐ Chemically Resistant Splash Suit
☒ Half-Face Respirator (Cart. organic	☐ Apron, Specify:

vapor) (Only if upgrade to Level C)

- ☐ Escape mask
- ☐ None
- ☐ Other:
- ☐ Other:

- ☒ Tyvek Coverall (Taped Up, with hood and booties)
- ☐ Saranex Coverall
- ☐ Coverall, Specify
- ☒ Other: Dedicated field clothing, highly visible safety vest

Head & Eye ☐ N/A

- ☒ Hard Hat
- ☒ Goggles
- ☐ Face Shield (during high temperature soil sampling)
- ☒ Safety Eyeglasses
- ☒ Other: Hearing protection

Hand Protection ☐ N/A

- ☒ Undergloves; Type: Nitrile
- ☐ Gloves; Type:
- ☒ Overgloves; Type:
- ☐ None
- ☐ Other:

Foot Protection ☐ N/A

- ☐ Neoprene Safety Boots with Steel Toe/Shank
- ☒ Disposable Overboots
- ☒ Other: Chemical Resistant Steel-Toe Work Boots

3. Monitoring Equipment ☐ N/A

☐ CGI (trenches/excavations)
☐ PID
☐ O^2 Meter
☐ FID
☐ Rad Survey
☒ Other (Haz Dust Meter)
☐ Detector Tubes (optional)

Type:

D. PERSONNEL DECONTAMINATION (ATTACH DIAGRAM)

☒ Required
☐ Not Required

Decontaminate exposed skin before each break in the work shift and before eating or drinking using hot water and soap. Use disposable PPE and discard as solid waste. Avoid hand to mouth contact.

EQUIPMENT DECONTAMINATION (ATTACH DIAGRAM)

☒ Required
☐ Not Required

If required, describe and list equipment:

Decontamination of non-dedicated sampling equipment soil and groundwater sampling equipment with Alconox/tap water solution followed by tap water rinse and deionized water rinse. Field staff will be prepared to set up a wash sink on site. All contaminated water will be stored onsite in 55-gallon drums.

E. PERSONNEL

	Name	Work Location Title/Task	Medical Current	Fit Test Current
1.	**Sierra Mott**	**Field Staff**	☒	☒
2.	**Lauren Knickrehm**	**Project Manager**	☒	☒
3.				

Site Safety Coordinator: Sierra Mott

F. ACTIVITIES COVERED UNDER THIS PLAN

Task No.	Description	Preliminary Schedule
1	Subsurface soil investigation: direct-push probe work	May 2014

G. SUBCONTRACTOR'S HEALTH AND SAFETY PROGRAM EVALUATION ☐ N/A

Name and Address of Subcontractor: Holocene Drilling
11412 62nd Ave E
Puyallup, Washington 98373

EVALUATION CRITERIA

Item	Adequate	Inadequate	Comments
Medical Surveillance Program	☒	☐	
Personal Protective Equipment Availability	☒	☐	
Onsite Monitoring Equipment Availability	☒	☐	
Safe Working Procedures Specification	☒	☐	
Training Protocols	☒	☐	
Ancillary Support Procedures (if any)	☒	☐	
Emergency Procedures	☒	☐	
Evacuation Procedures Contingency Plan	☒	☐	
Decontamination Procedures Equipment	☒	☐	
Decontamination Procedures Personnel	☒	☐	

GENERAL HEALTH AND SAFETY PROGRAM EVALUATION: ☒ Adequate ☐ Inadequate

Additional Comments: Review based on previous experience.

Evaluation Conducted By: Christine Kimmel Date: April 2, 2014

EMERGENCY FACILITIES AND NUMBERS

Hospital:
Capital Medical Center
3900 Capital Mall Dr SW
Olympia, WA 98502

Directions: Attachment B

Telephone: (360) 754-5858

Emergency Transportation Systems (Fire, Police, Ambulance) – 911

Emergency Routes – Map (Attachment B)

Emergency Contacts:

	Offsite	Onsite
Lauren Knickrehm	253-926-2493 (Office)	520-405-8864 (Cell)
Christine Kimmel	425-778-0907 (office)	206-786-3801 (cell)

In the event of an emergency, do the following:

1. Call for help as soon as possible. Call 911. Give the following information:
   - WHERE the emergency is – use cross streets or landmarks
   - PHONE NUMBER you are calling from
   - WHAT HAPPENED – type of injury
   - WHAT is being done for the victim(s)
   - YOU HANG UP LAST – let the person you called hang up first.

2. If the victim can be moved, paramedics will transport to the hospital. If the injury or exposure is not life threatening, decontaminate the individual first. If decontamination is not feasible, wrap the individual in a blanket or sheet of plastic prior to transport.

HEALTH AND SAFETY PLAN
APPROVAL/SIGN OFF FORMAT

I have read, understood, and agreed with the information set forth in this Health and Safety Plan (and attachments) and discussed in the Personnel Health and Safety briefing.

Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Field Staff	Signature	Date
Sierra Mott Site Safety Coordinator/ Field Staff	Signature	Date
Christine Kimmel Landau Associates Health and Safety Manager	Signature	Date
Lauren Knickrehm Project Manager	Signature	Date

Personnel Health and Safety Briefing Conducted By:

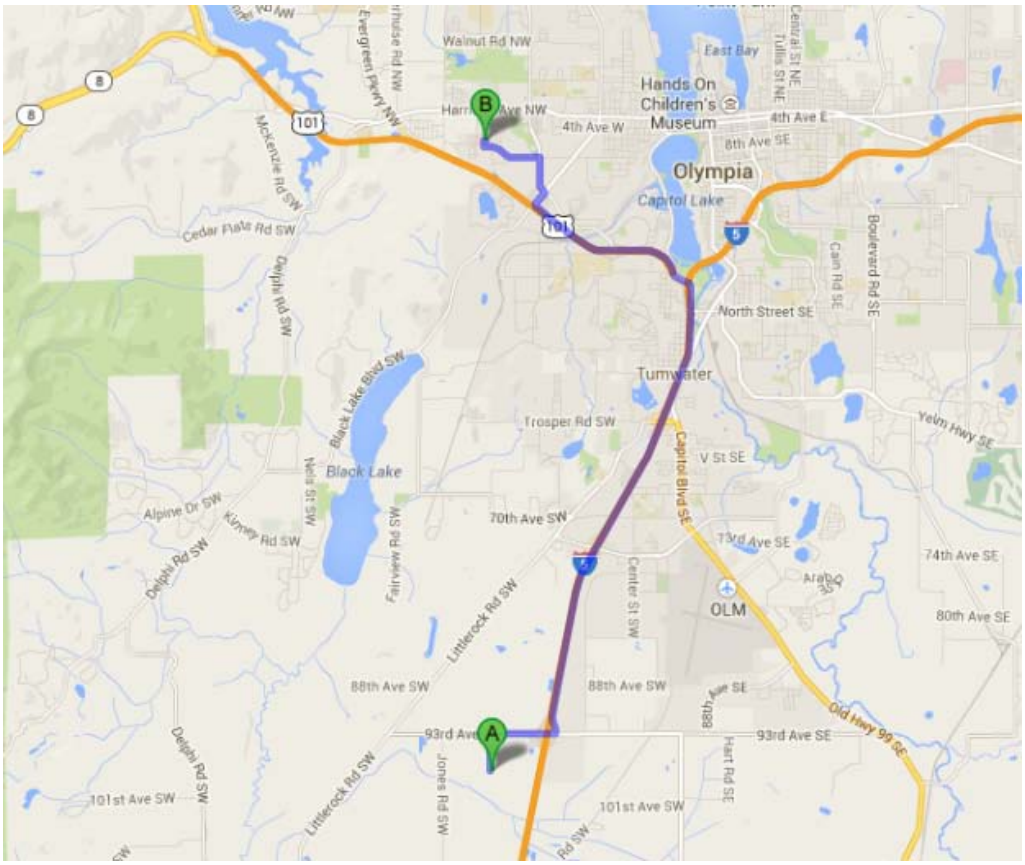
Name	Signature	Date
Sierra Mott Name	Signature	Date

ATTACHMENT A

ACTION LEVELS FOR RESPIRATORY PROTECTION

Monitoring Parameter	Reading	Level of Protection
Dust	HAZ-DUST reading 0.0 – 0.02 mg/m^3	Modified Level D PPE Monitor breathing zone
	HAZ-DUST reading 0.021 – 0.2 mg/ m^3	Evacuate area and upgrade to Level C-half face respirator with with organic vapor/HEPA cartridge, establish contamination reduction zone with waste containers and decontamination fluids provided for personal decontamination
	HAZ-DUST reading >0.2 mg/ m^3	Evacuate area and move upwind, and immediately notify Landau Associates Health and Safety Officer.

ATTACHMENT B
DIRECTIONS TO HOSPITAL



A 9805 Blomberg St SW, Olympia, WA 98512

	1. Head **north** on **Blomberg St SW** toward **93rd Ave SW** About 54 secs	go 0.4 mi total 0.4 mi
↱	2. Take the 1st right onto **93rd Ave SW** About 2 mins	go 0.7 mi total 1.1 mi
5	3. Turn left to merge onto **I-5 N** About 5 mins	go 4.8 mi total 5.8 mi
101	4. Take exit **104** to merge onto **US-101 N** toward **Aberdeen/Port Angeles** About 2 mins	go 1.7 mi total 7.6 mi
↗	5. Take the **Black Lake Blvd** exit toward **W Olympia**	go 0.4 mi total 8.0 mi
↱	6. Keep right at the fork, follow signs for **West Olympia** and merge onto **Black Lake Blvd SW**	go 0.2 mi total 8.1 mi
↰	7. Turn left onto **Cooper Point Rd SW** About 52 secs	go 0.4 mi total 8.5 mi
↰	8. Turn left onto **Capital Mall Dr SW** About 2 mins	go 0.6 mi total 9.1 mi
↱	9. Turn right	go 312 ft total 9.2 mi
↰	10. Turn left Destination will be on the right	go 75 ft total 9.2 mi

B **Capital Medical Center**
3900 Capitol Mall Dr SW, Olympia, WA 98502