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JOHN'S AUTO WRECKING
411 93RD AVENUE SOUTHEAST, OLYMPIA, WASHINGTON
SUPLIMENTAL REMEDIAL INVESTIGATION/CLEANUP ACTION
(VCP Project No. SW1613)
May 15, 2020

by

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1.0 Introduction

Havens Estate Investments, LLC (Havens) contracted with Robinson Noble to provide environmental consulting services to investigate and address documented soil and groundwater contamination at the former John's Auto Wrecking yard (site). The site is located at 411 93rd Avenue Southeast in unincorporated Thurston County, Washington. A vicinity map of the site is presented as Figure 1. Currently, the site is largely vacant and undeveloped. Previously, however, it was occupied by an extensive auto-wrecking business (John's Auto Wrecking), which was operated by the now deceased owner (John Havens) up until his death in around 2001. Figure 2 presents an aerial photograph (aerial) of the site taken in 2000, which reflects the conditions of the site when it was still an active wrecking yard. Figure 3 presents a 2018 aerial, which shows the current vacant condition of the site.

The site is listed with the Washington State Department of Ecology (Ecology) as having confirmed or suspected soil and/or groundwater contamination (arsenic, lead, other priority pollutant metals, unspecified petroleum products, and polycyclic aromatic hydrocarbons). The site is identified by Ecology Facility/Site No. 57665495. Site investigations and remediation are currently being addressed through the auspices of Ecology's Voluntary Cleanup Program (VCP) and is assigned VCP Project No. SW1613 (note, earlier cleanup work was completed for the law office of Alan Wertjes under now closed VCP Project No. SW1127). Table 1 summarizes key regulatory information for the site. Pertinent regulatory information is provided in Appendix A.

Table 1. Key Regulatory Information

<table>
<tr><td>Site Name</td><td colspan="4">John's Auto Wrecking</td></tr>
<tr><td>AKA</td><td colspan="4">Havens Estate Investments, LLC</td></tr>
<tr><td>Site Address</td><td colspan="4">411 93rd Avenue SE, Olympia, Washington 98501-9701 (Thurston County)</td></tr>
<tr><td>Facility/Site No.</td><td colspan="4">57665495</td></tr>
<tr><td>VCP Project No.</td><td colspan="4">SW1613 (previous work completed for Alan Wertjes under SW1127)</td></tr>
<tr><td colspan="5">Contact Information</td></tr>
<tr><td colspan="2">Name</td><td>Address</td><td>Phone #</td><td>Email</td></tr>
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</table>

The supplemental remedial investigation/cleanup action documented in this report represents the culmination of cleanup work that has been ongoing at the site since 2008. Initial assessment and remediation work is documented in Robinson Noble's 2013 comprehensive remedial investigation (RI) that addressed the various issues of concern cited by Ecology in previous opinion letters. Following their review of the 2013 RI, Ecology noted that most of the previously cited issues had been satisfactorily addressed, but agreed with our findings that several areas/issues at the site still posed regulatory and environmental concerns and would need to be addressed further. These additional concerns (which have now all been addressed) are the subject of this report. A description of previously completed remediation work is presented in Section 3.1 and a detailed scope of work for the current remedial investigation/cleanup action is presented in Section 3.2. Robinson Noble's 2013 RI is on file with Ecology and is included in Appendix B of this report for reference.

Havens is specifically seeking regulatory closure for the site through the issuance of a no-further-action (NFA) determination through Ecology's VCP. Based on the information provided in this report, the 2013 RI, and Robinson Noble's first-hand involvement with the remedial actions that have been completed to date, it is our opinion that the issuance of a NFA is appropriate at this time.

2.0 Site Description

2.1 General

The John's Auto Wrecking site is located in unincorporated Thurston County just south of the incorporated limits of the city of Tumwater. As shown on Figure 1, the site is bounded on the north by 93rd Avenue Southeast and is situated between Tilley Road Southeast to the west and Hart Road Southeast to the east. The address assigned to the site by the Thurston County Assessor is 411 93rd Avenue Southeast, Olympia, Washington 98501. The site is located within Section 23 of Township 17 North, Range 2 West, relative to the Willamette Meridian.

The site is comprised of six contiguous tax parcels identified by Thurston County Assessor records as parcel numbers 12723210000, 12723210100, 12723210400, 12723210401, 12723210700, and 12723220200. A parcel location map is presented as Figure 4, and parcel information from Thurston County Assessor records is presented in Appendix C. The total land area of the site is approximately 16.04 acres as outlined below in Table 2.

Table 2. Parcel Information

Parcel Number	Area (acres)
12723210000	5.18
12723210100	1.62
12723210400	2.09
12723210401	1.95
12723210700	5.01
12723220200	0.19
Total Site Area	**16.04**

As discussed above, the site is largely vacant and undeveloped but was previously occupied by an extensive auto-wrecking yard (see Figures 2 and 3). The surface elevation ranges from approximately 202 feet above mean sea level (MSL) at the north end of the site to 195 feet above MSL at the south end of the site. The overall topography is generally flat with a slight slope to the south. The southern half of the site is designated by Thurston County as wetlands and wetlands buffer (Figure 5). As shown on Figure 1, the wetlands on the site are part of the headwater area of the Salmon Creek drainage. Salmon Creek proper is located approximately ¼ mile south of the site at its closest point. Surface water from Salmon Creek flows generally westward to the Black River, which then flows to the Chehalis River, and then into Grays Harbor on the coast.

As shown on Figure 5, Hopkins Ditch traverses the wetlands at the southern end of the site from approximately east to west. Hopkins Ditch, and the small pond located just to the north of the ditch, are both manmade features. Hopkins Ditch was likely excavated through the wetland area by the previous owner (John Havens) to enhance drainage during the wet season. The purpose of creating the small pond to the north of Hopkins Ditch is unclear, but, as discussed below in Section 4.2.2, our investigation found that the northern side of the pond was created in part with a tire-berm, which was dismantled and removed as part of the current site remediation. Hopkins Ditch and the wetland area only contain surface water during the wetter portions of the year. When there is water in the ditch, it does not appear to flow and is, in fact, more akin to a linear series of small disconnected ponds rather than a ditch.

2.2 Geology and Hydrogeology

Noble and Wallace (1966) and Drost and others (1998) both map the surface geology in the area of the site as Vashon recessional outwash (Qvr). They describe the Qvr as consisting of a mix of poorly sorted silt, sand, and gravel, and note that the average thickness in the area of the site is approximately 25 feet. The standard sequence of Vashon glacial deposits is Qvr, underlain by Vashon till (Qvt) and then Vashon advance outwash (Qva). The Qvt generally consists of a random mixture of clay, silt, sand, and gravel. This unit is also typically compact and has a relatively low permeability, at least as compared with the Qvr and Qva deposits. The Qva deposits, similar to the Qvr, are generally comprised of silty sands and gravels, but often show better sorting than the Qvr. Qvr and Qva deposits, when saturated, generally form aquifers. Qvt deposits tend to form an aquitard. Mapping by Drost and others (1998) indicates that both the Qvt and Qva are present below the Qvr in the area of the site. Their maps indicate that the thickness of the Qvt is probably at least 25 feet in the area around the site and would, therefore, provide a relatively competent confining unit between the Qvr and Qva.

Drilling and excavation activities associated with this investigation reached a maximum depth of 20 feet. The materials encountered were consistent with the descriptions of the Qvr provided by Noble and Wallace (1966) and Drost and others (1998). None of the borings or excavations completed during this project extended deep enough to penetrate into the Qvt.

Soils in the area of the site are classified by the United States Department of Agriculture (Soil Survey for the Thurston County, Washington Area, 1990) as Nisqually loamy fine sand, 0 to 3% slopes (covering approximately the northern three quarters of the site) and Norma fine sandy loam (covering approximately the southern quarter of the site). The Nisqually loamy fine sand is described as having developed on glacial outwash plains and as being somewhat excessively well drained. The Norma fine sandy loam is described as having developed on alluvial deposits and as being poorly drained.

Groundwater monitoring conducted throughout this investigation (see Section 4.3) indicates that groundwater at the site is relatively shallow, ranging from approximately ten feet below ground surface (bgs) at the northern end of the site to near land surface at the southern end of the site in the wetlands area (Figure 5). Geographic information system (GIS) data obtained from the Thurston County Assessor-Treasurer’s website also shows that the portions of the site are classified as a high groundwater hazard area (Figure 6) and much of the southern portion of the property as a flood zone (Figure 7).

Noble and Wallace (1966) determined that the regional flow direction of the shallowest groundwater (water table) in the area of the site is to the northwest. The water table is presumed to reflect conditions within the Qvr aquifer. Similarly, the numerical groundwater model of northern Thurston County compiled by Drost and others (1999) indicates that the regional groundwater flow direction within the Qva and deeper aquifers is also to the northwest. Drost and others (1999) did not specifically model flow directions within the Qvr, but based on Noble and Wallace (1966) and observations made during this investigation, flow directions within the Qvr aquifer appear to be consistent with those in deeper systems.

Figure 8 presents a groundwater flow (potentiometric surface) map for the Qvr aquifer, constructed from the water levels measured in shallow monitoring wells at the site. As shown, shallow groundwater below the northern half of the site flows primarily toward the northwest, consistent with the regional flow direction determined by other workers. The potentiometric surface map, however, also shows that there is localized flow on the southern portion of the site towards Hopkins Ditch. The potentiometric surface map presented in Figure 8, however, reflects conditions during the wetter portion of the year (late February) and this apparent draw of groundwater toward the ditch suggest that there is at least a minor amount of flow through the ditch during this period. It is presumed that this localized effect is diminished or absent during warmer periods of the year when water in the ditch is lower or absent and groundwater flow for the entire property is northwesterly.

3.0 Site History

As described above in Section 1.0, the site was formally occupied by a relatively large auto-wrecking operation which involved the majority of the 16-acre site (see Figure 2). Ecology and Thurston County Health Department (TCHD) records indicate that site was used as a wrecking yard since approximately 1982. There are no records indicating that the site was developed prior to 1982. The operation of the wrecking yard ceased in 2001 upon the death of the former owner, John Havens, and there has been no subsequent use of the site for any other purposes since that time. Most of the equipment, materials, and miscellaneous debris associated with the former wrecking yard (old automobiles and parts, various machinery, and dilapidated structures) were removed from the site between 2008 and 2009 (see Figure 3), and a number of remedial investigations and cleanup actions have been completed since that time.

3.1 Previous Investigations and Cleanup Actions

Robinson Noble first became involved with site remediation in 2008 working for the law office of Alan Wertjes, the State-assigned attorney for the estate of John Havens. In 2008, Robinson Noble (dba Robinson, Noble & Saltbush, Inc.) completed a review of available records and documents on file with Ecology and the TCHD. This review found that the site was listed on Ecology's Hazardous Site List with a Site Hazard Assessment (SHA) ranking of "1" (see Appendix A). Sites with SHA rankings of "1" or "2" are loosely defined by Ecology as posing a risk to human health and the environment and as having the highest priority for cleanup. Our review also found that the site had previously been enrolled in Ecology's VCP to address the issues associated with the SHA ranking but had been removed from the program due to inactivity.

Limited investigations completed while the site was previously enrolled in the VCP (prior to Robinson Noble's involvement in 2008) identified nine areas of concern (AOCs). These AOCs were defined based on observations made at that time by the TCHD (Mr. Patrick Soderberg) and by the specific types of reported past uses within each AOC. Upon Robinson Noble becoming involved with the cleanup efforts in 2008, the site was reenrolled in the VCP under VCP project No. SW1127 with Alan Wertjes as the VCP client (Table 1 and Appendix A). Subsequent investigation and remediation work completed by Robinson Noble focused on resolving the specific issues within each of the previously designated AOCs. The majority of these issues were resolved, and the results of this effort are documented in our 2013 RI (Appendix B).

Following the completion of the 2013 RI, and with direct input from Ecology, Robinson Noble compiled a work plan in October 2014 outlining the scope of work for the current project. This current scope of work is discussed in greater detail below in Section 3.2. The remediation effort for the current scope of work was started under Alan Wertjes and VCP Project No. SW1127 in early 2015. However, ownership of the site and oversight of the cleanup effort were transferred to Havens in 2017. As such, VCP Project No. SW1127 was terminated and the site was reassigned to VCP Project No. SW1613. The remaining remediation work was completed by Havens under this new VCP project number. Copies of the VCP termination and acceptance letters are included in Appendix A.

3.2 Current Scope of Work

The work completed for this supplemental remedial investigation/cleanup action is based on our 2013 work plan. The work plan was derived from the findings presented in our 2013 RI and direct input from Ecology following their formal review of the RI and concurrent site inspection conducted on June 25, 2013 (see Ecology's June 2013 email and Section 4.0 of the 2013 RI in Appendix B). Robinson Noble compiled a draft work plan (dated October 16, 2013) based on these findings and input and then submitted it to Ecology for review and comment. Ecology reviewed and approved the draft work plan via email on January 31, 2014. Ecology did not recommend any changes to the draft work plan, so the draft work plan was adopted as final. Copies of the 2013 work plan and Ecology's January 2014 email approving the plan are included in Appendix B for reference.

The approved work plan includes eight specific tasks to be completed for the supplemental remedial investigation/clean up action:

- Task 1: Completion of the final work plan following Ecology review
- Task 2: Final debris removal and associated soil sampling
- Task 3: Investigation of possible polychlorinated biphenyl (PCB) containing transformers
- Task 4: Investigation of possible imported fill
- Task 5: Quarterly groundwater sampling of monitoring well MW-1
- Task 6: Wetland delineation and site-specific terrestrial ecological evaluation (TEE)
- Task 7: EIM preparation and upload
- Task 8: Report preparation

As discussed above, Ecology did not recommend any changes to the draft work plan so it was adopted as the final work plan (Task 1). Tasks 2 through 5 are discussed below in Section 4. Tasks 6 and 7 are discussed in Sections 5 and 6, respectively. Task 8 is this supplemental remedial investigation/cleanup action report.

4.0 Current Field Investigation and Remediation

The additional remedial investigation (Tasks 2, 3 and 4) began in October 2014 with a site reconnaissance to evaluate the logistics for the debris removal and the additional soil sampling. Debris removal and associated soil sampling then commenced in November 2014. The completion of Tasks 2, 3 and 4 is described below in Section 4.2. In October 2014, we also initiated quarterly groundwater monitoring (Task 5), which was conducted through August 2015. Groundwater monitoring is discussed below in Section 4.3.

4.1 General Field, Sampling, and Analytical Procedures

During the completion of all field activities, specific field-assessment and sample-collection procedures were adhered to to help ensure that as accurate and reliable data as possible was generated. In addition to field and sampling procedures, this also included the use of qualified laboratories to perform all chemical analyses.

To assess relative levels of soil contamination, Robinson Noble personnel utilized standard field screening methods throughout this project. This included the use of visual and olfactory indicators, as well as use of a hand-held photoionization detector (PID). Where applicable, the results of field screening were used to select samples for additional laboratory analyses. It was, however, often necessary to submit soil samples for laboratory analyses regardless of field screening results, and it should be noted that field screening was never used as a final means of determining contamination levels in critical areas such as the final margins of remedial excavations. Field screening was used only as a general assessment tool during this project.

For soil sample collection, samples were collected into appropriate, pre-cleaned, laboratory supplied sample containers and immediately placed in a cooler containing Blue Ice® and maintained at temperatures below 4° Celsius pending delivery to the laboratory. All soil samples were delivered to the laboratory and analyzed within prescribed holding times. Some laboratory analyses were performed by an on-site mobile laboratory. For these analyses, samples were again collected into appropriate, pre-cleaned, laboratory supplied containers and delivered directly to the on-site mobile laboratory for immediate handling and, in most cases, same-day analyses.

For groundwater sampling, monitoring wells were purged prior to sample collection and then sampled using a bladder pump and Ecology prescribed low-flow sampling protocols. New pump tubing and bladders were used for each sampling location, and the pump was decontaminated using an Alconox® wash and a double-distilled water rinse between sampling locations. During the purging process, various field parameters, including pH, temperature, conductivity, total dissolved solids, dissolved oxygen, and oxidation-reduction potential (ORP), were monitored and recorded on individual field-data sheets. Groundwater samples were obtained after the measured field parameters reached stabilization or a minimum of three well volumes had been purged. On occasion, more than three well volumes were purged to try to reach better stabilization or clear turbidity. Groundwater samples were collected into appropriate pre-cleaned, laboratory supplied sample containers and immediately placed in a cooler containing Blue Ice® and maintained at temperatures below 4° Celsius pending delivery to the laboratory. All groundwater samples were delivered to the laboratory and analyzed within prescribed holding times.

Throughout this project, Libby Environmental, Inc. (Libby) was the primary laboratory utilized to conduct chemical analyses. Libby provided all on-site mobile laboratory services as well. On occasion, Libby subcontracted with other laboratories to perform particular analyses, but all samples and chain of custodies for this project were processed through Libby as the primary analytical contractor. Libby and their subcontracted laboratories are all accredited with the State of Washington to perform the various analyses conducted for this project. The additional laboratories subcontracted by Libby include Spectra Laborites, Inc. (Spectra) and Fremont Analytical, Inc. (Fremont).

The primary analyses used during this project, and the analytical methods utilized to conduct each, are summarized below in Table 3. Additional analytical methodologies for less frequently utilized analyses are provided in the individual reports supplied by the various laboratories. The complete laboratory reports for the initial soil investigation analyses (Section 4.2) and the groundwater monitoring analyses (Section 4.3) are provided in Appendices D and E, respectively. These reports also provide narratives and the analytical data for required quality assurance/quality control (QA/QC). Our review of the QA/QC data provided in the various laboratory reports did not identify any discrepancies that would significantly alter our interpretations of the analytical data provided. Summary tables of analytical results are provided in Appendix F.

Table 3. Primary Analytes and Analytical Methods

Analyte	Analytical Method
Gasoline-Range Hydrocarbons	Ecology NWTPH-Gx
Diesel- through Oil-Range Hydrocarbons	Ecology NWTPH-Dx/Dx Extended
Volatile Organic Compounds (VOCs)	EPA Method 8260C
Total Lead, Cadmium, Chromium, Arsenic, Copper, Zinc	EPA Method 7010 Series
Total Mercury	EPA Method 7471
Total Nickel, TCLP-Lead	EPA Method SW846 6010C
Hexavalent Chromium	EPA Method 7196A
Polycyclic Aromatic Hydrocarbons (PAHs)	EPA Method 8270 (SIM)
Polychlorinated Biphenyls (PCBs)	EPA Method 8082

4.2 Final Debris Removal and Associated Soil Sampling (Tasks 2, 3, and 4)

As described above in Section 3.0, the preponderance of the debris and other materials associated with the former wrecking yard were removed in around 2008. However, as described in Task 2 of the 2013 work plan (Appendix B), minor miscellaneous materials (tires, car parts, and building materials) remained, scattered across various areas of the site. In November 2014, Langseth Environmental, Inc. (Langseth) began the process of removing the final site debris per Task 2 of the work plan. Because the site is heavily vegetated, debris removal was conducted during the winter when most of the underbrush is dormant and it was easier to find and remove the scattered materials. Debris removal was completed manually for the most part, placing the various materials into the scoop of a rubber-tired backhoe and then transferring it to stockpiles near the northeast entrance of the site. From there, the debris was loaded into trucks and removed from the site to be recycled or disposed of as appropriate.

As per Task 2 of the work plan, following debris removal in specific areas of the site, Robinson Noble personnel conducted additional soil testing to evaluate potential impacts. These specific areas of concern are designated as AOC-10 through AOC-13, adding to and, in some cases, expanding the AOCs from the 2013 RI (see Figure 9 of the 2013 RI in Appendix B). The locations of these new AOCs are shown on Figure 9 of this report, and include the following:

- AOC-10; The two existing buildings located at the northwest corner of the site and the debris pile (building materials) from the demolished building adjacent to the south of the two existing buildings.
- AOC-11; A suspected tire-berm located along the northern side of the small pond on the southern half of the site.
- AOC-12; A large timber, potentially treated with creosote, in the wetland area at the south end of the site. This AOC also designates the area investigated for possible fill material described under Task 4 of the 2013 work plan.
- AOC-13; The debris pile located just outside the main gate at the northeast corner of the site.

As discussed under Task 3 of the 2013 work plan (Appendix B), AOC-14 was designated for the area around a power pole with possible PCB-containing transformers near the center of the site (Figure 9). As discussed under Task 4 of the 2013 work plan, possible fill materials were investigated in the southeast corner of the site in the area designated as AOC-12 (described above).

4.2.1 AOC-10 (Area of Existing Buildings)

On November 5, 2014, a Robinson Noble geologist and a crew from Langseth were on site to investigate potential soil impacts in the area of the buildings at the northwest corner of the site (see AOC-10 on Figure 9). Prior to this, Langseth had removed the building debris from a previously demolished building adjacent to the south of the two existing buildings.

Upon inspecting the interior areas of the two buildings, both were found to be empty with the exception of some wooden shelves and a minor amount of miscellaneous building materials (primarily lumber and insulation) in the easternmost of the two buildings. Both buildings were constructed on concrete slab foundations, and at the time of our investigation, we did not note any obvious staining or other indications of previous spills or leaks. The concrete slabs in both buildings were also noted to generally be in good condition with no major cracks. No floor drains or other plumbing was observed in either building.

The subsurface investigation of AOC-10 began in the easternmost of the two buildings with Langseth's crew cutting holes through the concrete slab to access the underling soils. Three test pits, designated as TP12, TP13, and TP14, were then either hand dug with shovels or excavated with a backhoe, depending on accessibility. Langseth's crew then cut holes through the slab of the westernmost building and excavated test pits TP15 and TP16 using a backhoe. Two additional test pits, designated as TP17 and TP18, were excavated in the area of the former debris pile adjacent to the south of the two buildings. Test pit locations are shown on Figure 10. Logs of the materials encountered in each test pit are presented in Figure 11.

During test pit excavation, our on-site geologist field screened the materials encountered for signs of potential impact using the procedures described above in Section 4.1. Field screening results are summarized in Table F-1 of Appendix F. As shown in Table F-1 from that appendix, field screening did not indicate the presence of any soil impacts in any of the test pits from AOC-10.

Our on-site geologist collected representative soil samples from each of the test pits, following the sampling procedures and protocols described above in Section 4.1, and then submitted them to Libby for various chemical analyses. For AOC-10, these analyses included gasoline-through oil-range hydrocarbons, volatile organic compounds (VOCs), MTCA-5 metals (lead, cadmium, chromium, arsenic, and mercury) plus copper, zinc and nickel, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), and polychlorinated biphenyls (PCBs). Select detected analytes are presented below in Table 4. The complete laboratory reports for these analyses are presented in Appendix D and are summarized in Table F1 of Appendix F.

Table 4. Soil Analytical Results for Total Metals in AOC-10

Sample #[1]	MTCA-5 Metals					Copper (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)
	Lead (mg/kg)	Cadmium (mg/kg)	Chromium[3] (mg/kg)	Arsenic (mg/kg)	Mercury (mg/kg)			
TP12-1	13	<1	27	7	<0.5	15	<5	24
TP12-3	<5	<1	34	9	<0.5	12	9	23
TP13-1	13	<1	8	7	<0.5	10	<5	24
TP13-3	7	<1	13	8	<0.5	13	7	23
TP14-1.5	**5,552**	<1	116	8	<0.5	3,113	<5	26
TP14-3	21	<1	23	7	<0.5	15	<5	23
TP15-1	7	<1	9	7	<0.5	10	<5	16
TP15-3	<5	<1	46	9	<0.5	12	<5	20
TP16-1	17	<1	39	7	<0.5	10	<5	21
TP16-3	<5	<1	25	8	<0.5	12	<5	23
TP17-1	<5	<1	85	8	<0.5	12	<5	20
TP17-3	<5	<1	15	7	<0.5	10	<5	19
TP18-1	<5	<1	57	7	<0.5	11	<5	20
TP18-3	<5	<1	11	7	<0.5	20	6	21
MTCA	250[2]	2[2]	2,000/19[4]	20[2]	2[2]	3,200[5]	24,000[5]	1,600[5]

1: Sample # indicates test pit number and sample depth (i.e. TP12-1 was collected from test pit 12 at a depth of 1')
2: MTCA Method A soil cleanup level for unrestricted land uses
3: Concentration of total chromium (includes both Chromium III and Chromium VI)
4: The MTCA Method A soil cleanup level for unrestricted land uses is 2,000 mg/kg for Chromium III and 19 mg/kg for Chromium VI (hexavalent chromium)
5: MTCA Method B non-cancerous soil cleanup level
Red bolded values indicate results that exceed the applicable MTCA cleanup level

As shown in Table F1 in Appendix F, analyses did not detect the presence of VOCs or cPAHs above applicable laboratory detection limits in any of the samples from AOC-10. Analyses also did not detect the presence of gasoline- through oil-range hydrocarbons or PCBs in any of the samples from AOC-10 with the exception of sample TP14-1.5. Analyses did detect the presence of oil-range hydrocarbons and PCBs above laboratory detection limits in soil sample TP14-1.5, but as show in Table F1, both were below the applicable MTCA Method A cleanup limits for unrestricted land uses.

As shown above in Table 4, analyses also indicate the presence of various metals above applicable laboratory detection limits within AOC-10. These include lead, chromium, arsenic, copper, zinc, and nickel. Analyses did not detect the presence of cadmium or mercury above laboratory detection limits in any of the samples. With the exception of lead in sample TP14-1.5 and the chromium levels in several of the other soil samples, all metal analyses indicated concentrations below applicable cleanup levels. The elevated lead concentration indicated for the soils in the area of sample TP14-1.5 was later addressed through remedial excavation, which is discussed in more detail below in Section 5.3.1.

With regards to chromium, the results presented above in Table 4 represent total chromium concentrations, which include both Chromium III and Chromium VI (hexavalent chromium). The MTCA Method A cleanup levels for unrestricted land uses for Chromium III and Chromium VI are 2,000 mg/kg and 19 mg/kg, respectively. As shown in Table 4, several of the soil samples from AOC-10, which were analyzed for total chromium, are in excess of the 19 mg/kg hexavalent chromium cleanup level. Additional analyses of select soil samples with relatively high total chromium concentrations were conducted specifically for hexavalent chromium. These include soil samples TP12-3, TP14-1.5, TP15-3, TP16-1, TP17-1, and TP18-1. Analysis did not indicate the presence of hexavalent chromium above laboratory detection limits in any of these soil samples. This indicates that hexavalent chromium is not prevalent at the site and that the preponderance of the total chromium detections are comprised primarily of chromium III. The detected concentrations of total chromium are, therefore, well below the applicable cleanup level. Laboratory analyses for hexavalent chromium are presented in the individual laboratory reports in Appendix D and are summarized on Table F1 in Appendix F.

4.2.2 AOC-11 (Tire Berm)

In early November 2014, Langseth unearthed and then dismantled the tire berm on the southern half of the site (see AOC-11 on Figures 9 and 10). During Ecology's 2013 site inspection, when the berm was first discovered, only a few tires were visible above the ground surface and the full extent of the berm was unknown. As Langseth unearthed the berm, it was found to extend to depths of up to six feet in some areas and laterally from the pond area approximately 200 feet to the west. The berm was also found to be constructed with a mix of both stacked tires and lumber. As with the other site debris, Langseth used a rubber-tire backhoe to transport the tires and lumber from the berm to the area near the northeast entrance gate, where it was stockpiled for later removal.

On November 7, after the tire berm had been removed, a Robinson Noble geologist was on site with a crew from Langseth to evaluate the soil conditions below the area of the berm. This was accomplished by excavating a series of shallow test pits along the trace of the former berm and analyzing select soil samples from each pit. The locations of the tire-berm test pits, which are designated as TP26 through TP30, are shown on Figure 10. Logs of the materials encountered in each are presented in Figure 11.

During test pit excavation, our geologist field screened the materials for signs of potential impact using the procedures described above in Section 4.1. Field screening results are summarized in Table F-1 of Appendix F. As shown in Table F-1, field screening did not indicate the presence of any soil impacts in any of the test pits from AOC-11.

Our geologist collected representative soil samples from each of the test pits, following the sampling procedures and protocols described above in Section 4.1, and then submitted them to Libby for various chemical analyses. For AOC-11, these analyses included gasoline- through oil-range hydrocarbons, VOCs, MTCA-5 metals plus copper, zinc, and nickel, polycyclic aromatic hydrocarbons (PAHs; which also includes all cPAHs) semi-volatile organic compounds (semi-VOCs), and PCBs. Detected analytes are presented below in Table 5. The complete laboratory reports are presented in Appendix D and are summarized in Table F1 of Appendix F.

As shown in Table F1 in Appendix F, analyses did not detect the presence of gasoline- through oil-range hydrocarbons, VOCs, PAHs or PCBs above applicable laboratory detection limits in any of the samples from AOC-11. Analyses did detect the presence of some semi-VOCs above applicable laboratory detection limits in soil sample TP26-2, but as indicated in Table F1, the detected concentrations were negligible and below all applicable cleanup limits.

As shown below in Table 5, analyses also indicate the presence of various metals above the laboratory detection limits within AOC-11. These include lead, chromium, and nickel. None of the detected metal concentrations, however, exceed the applicable cleanup limits for any of the soil samples. Analyses did not detect the presence of cadmium, arsenic, mercury, copper, or zinc above laboratory detection limits in any of the samples from AOC-11.

Table 5. Soil Analytical Results for Total Metals in AOC-11

Sample #[1]	MTCA-5 Metals					Copper (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)
	Lead (mg/kg)	Cadmium (mg/kg)	Chromium[3] (mg/kg)	Arsenic (mg/kg)	Mercury (mg/kg)			
TP26-2	**8**	<1	**8**	<5	<0.5	<5	<5	**4**
TP27-2	<5	<1	**11**	<5	<0.5	<5	<5	**9**
TP28-2	<5	<1	**10**	<5	<0.5	<5	<5	**15**
TP29-2	<5	<1	**11**	<5	<0.5	<5	<5	**8**
TP30-2	<5	<1	**11**	<5	<0.5	<5	<5	**15**
MTCA	**250[2]**	**2[2]**	**2,000/19[4]**	**20[2]**	**2[2]**	**3,200[5]**	**24,000[5]**	**1,600[5]**

1: Sample # indicates test pit number and sample depth (i.e. TP26-2 was collected from test pit 26 at a depth of 2')
2: MTCA Method A soil cleanup level for unrestricted land uses
3: Concentration of total chromium (includes both Chromium III and Chromium VI)
4: The MTCA Method A soil cleanup level for unrestricted land uses is 2,000 mg/kg for Chromium III and 19 mg/kg for Chromium VI (hexavalent chromium)
5: MTCA Method B non-cancerous soil cleanup level

4.2.3 AOC-12 (Possible Creosote-Treated Timber and Fill Material)

During the 2013 site inspection, Ecology personnel noted a large timber (approximately 4"x12" x 20') in the southeast corner of the site (see AOC-12 on Figures 9 and 10). Ecology noted that the timber was potentially treated with creosote and recommended that it be removed and the soils below it be subsequently tested. During the site inspection, Ecology personnel also noted that some of the ground in this same generally area appeared to have been imported or re-worked (fill). The Robinson Noble hydrogeologist accompanying Ecology during the site inspection did not concur with Ecology's assessment of the possible creosote or the fill material, but agreed that additional subsurface investigation would be completed to further address these potential issues. It should be noted that Robinson Noble has not identified fill material in any of the borings or test pits completed during past investigations (see Robinson Noble's 2013 RI in Appendix B).

AOC-12 was investigated by excavating a series of test pits, which are designated as TP22 through TP25. The locations of these test pits are shown on Figure 10 and logs of the materials encountered in each are presented in Figure 11. TP22 through TP24 were used specifically to evaluate the possible presence of fill. This was accomplished by examining the soil/sediment profile in the sides of each test pit. Our examination of the soil/sediment profiles did not indicate that the soils in this area were reworked and/or imported (fill). Chemical analyses were also conducted so that if the materials were imported, the analyses would determine whether or not the materials were impacted. Following the removal of the large timber, test pit TP25 was excavated to evaluate potential impacts from possible leaching of creosote.

During test pit excavation, our geologist field screened the materials for signs of potential impact using the procedures described above in Section 4.1. Field screening results are summarized in Table F-1 of Appendix F. As shown in Table F-1, field screening did not indicate the presence of any soil impacts in any of the test pits from AOC-12.

Our geologist collected representative soil samples from each of the test pits, following the sampling procedures and protocols described above in Section 4.1, and then submitted them to Libby for various chemical analyses. For the test pits in AOC-12, these analyses included gasoline- through oil-range hydrocarbons, VOCs, MTCA-5 metals plus copper, zinc, and nickel, cPAHs, and PCBs. Detected analytes are presented below in Table 6. The complete laboratory reports are presented in Appendix D and are summarized in Table F1 of Appendix F.

As shown in Table F1 in Appendix F, analyses did not detect the presence of gasoline- through oil-range hydrocarbons, VOCs, cPAHs or PCBs above applicable laboratory detection limits in any of the samples from AOC-12. As shown below in Table 6, analyses did indicate the presence of various metals above laboratory detection limits. These include lead, chromium, arsenic, copper, zinc, and nickel. However, none of the detected metal concentrations exceed the applicable cleanup limits for any of the soil samples. Analyses did not detect cadmium or mercury above laboratory detection limits in any of the samples from AOC-12.

Table 6. Soil Analytical Results for Total Metals in AOC-12

Sample #[1]	MTCA-5 Metals					Copper (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)
	Lead (mg/kg)	Cadmium (mg/kg)	Chromium[3] (mg/kg)	Arsenic (mg/kg)	Mercury (mg/kg)			
TP22-1	**5**	<1	**59**	**5**	<0.5	**5**	**9**	**18**
TP22-3	<5	<1	**9**	**7**	<0.5	<5	<5	**20**
TP23-1	<5	<1	**34**	**5**	<0.5	**6**	<5	**16**
TP23-4	<5	<1	**37**	**7**	<0.5	**6**	**7**	**18**
TP24-1	<5	<1	**53**	**5**	<0.5	**7**	<5	**16**
TP24-3	<5	<1	**23**	<5	<0.5	**8**	<5	**22**
TP25-1	**16**	<1	**19**	**7**	<0.5	**13**	<5	**24**
TP25-3	<5	<1	**83**	**7**	<0.5	**7**	<5	**26**
MTCA	**250[2]**	**2[2]**	**2,000/19[4]**	**20[2]**	**2[2]**	**3,200[5]**	**24,000[5]**	**1,600[5]**

1: Sample # indicates test pit number and sample depth (i.e. TP22-1 was collected from test pit 22 at a depth of 1')
2: MTCA Method A soil cleanup level for unrestricted land uses
3: Concentration of total chromium (includes both Chromium III and Chromium VI)
4: The MTCA Method A soil cleanup level for unrestricted land uses is 2,000 mg/kg for Chromium III and 19 mg/kg for Chromium VI (hexavalent chromium)
5: MTCA Method B non-cancerous soil cleanup level

The chromium results presented above in Table 6 represent total chromium concentrations, which, as previously mentioned, include both Chromium III and Chromium VI (hexavalent chromium). The MTCA Method A cleanup levels for unrestricted land uses for Chromium III and Chromium VI are 2,000 mg/kg and 19 mg/kg, respectively. As shown in Table 6, several of the soil samples from AOC-12 exceed the 19 mg/kg cleanup level for hexavalent chromium. Additional analyses of select soil samples with relatively high total chromium concentrations were conducted specifically for hexavalent chromium. These included samples TP22-1, TP23-4, TP24-1, and TP25-3. Analysis did not indicate the presence of hexavalent chromium above laboratory detection limits in any of these samples. This again indicates that hexavalent chromium is not prevalent at the site and that the total chromium detections are comprised largely, if not entirely, of chromium III (see chromium discussion above in Section 4.2.1). The detected concentrations of total chromium are, therefore, well below the applicable cleanup level. Laboratory analyses for hexavalent chromium are presented in the individual laboratory reports in Appendix D and are summarized on Table F1 in Appendix F.

4.2.4 AOC-13 (Entrance-Gate Debris Pile)

During the 2013 site inspection, it was noted that illegal dumping was occurring in the area near the northeast entrance gate. Havens expanded the fence in this area to try to dissuade further dumping. At the start of the current project, Langseth removed the debris, which consisted largely of household trash and old furniture, from this area. Following debris removal, the underlying soils were evaluated through the excavation and testing of a single test pit, designated as TP21. The location of TP21 is shown on Figure 10 and the log of the materials encountered is shown on Figure 11.

During test pit excavation, our geologist field screened the materials for signs of potential impact using the procedures described above in Section 4.1. As shown in Table F-1 (Appendix F), field screening did not indicate the presence of any soil impacts in TP21. Representative soil samples were collected from TP21, again following the sampling procedures described above in Section 4.1, and were submitted to Libby for analysis of gasoline- through oil-range hydrocarbons, VOCs, MTCA-5 metals plus copper, zinc, and nickel, cPAHs, and PCBs. Detected analytes are presented below in Table 7. The complete laboratory reports are presented in Appendix D and are summarized in Table F1.

As shown in Table F1 (Appendix F), analyses did not detect the presence of gasoline- through oil-range hydrocarbons, VOCs, cPAHs or PCBs above applicable laboratory detection limits in any of the samples from TP21 (AOC-13). As shown below in Table 7, analyses did indicate the presence of various metals above the laboratory detection limits. These include chromium, arsenic, copper, and nickel. However, none of the detected metal concentrations exceed the applicable cleanup limits for any of the soil samples. Analyses did not detect lead, cadmium, mercury, or zinc above laboratory detection limits in any of the samples from AOC-13.

Table 7. Soil Analytical Results for Total Metals in AOC-13

Sample #[1]	MTCA-5 Metals					Copper (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)
	Lead (mg/kg)	Cadmium (mg/kg)	Chromium[3] (mg/kg)	Arsenic (mg/kg)	Mercury (mg/kg)			
TP21-1	<5	<1	**56**	**8**	<0.5	**11**	<5	**19**
TP21-3	<5	<1	**72**	**8**	<0.5	**12**	<5	**23**
MTCA	**250[2]**	**2[2]**	**2,000/19[4]**	**20[2]**	**2[2]**	**3,200[5]**	**24,000[5]**	**1,600[5]**

1: Sample # indicates test pit number and sample depth (i.e. TP21-1 was collected from test pit 21 at a depth of 1')
2: MTCA Method A soil cleanup level for unrestricted land uses
3: Concentration of total chromium (includes both Chromium III and Chromium VI)
4: The MTCA Method A soil cleanup level for unrestricted land uses is 2,000 mg/kg for Chromium III and 19 mg/kg for Chromium VI (hexavalent chromium)
5: MTCA Method B non-cancerous soil cleanup level

The total chromium results presented above in Table 7 represent total chromium concentrations, which include both Chromium III and Chromium VI (hexavalent chromium), and exceed the 19 mg/kg cleanup level for hexavalent chromium. Additional analysis of sample TP21-3 (which has the higher of the two total chromium results) for hexavalent chromium did not indicate the presence of hexavalent chromium. This again indicates that hexavalent chromium is not prevalent at the site and that the total chromium detections are comprised largely, if not entirely, of chromium III (see chromium discussion above in Sections 4.2.1 and 4.2.3). The detected concentrations of total chromium are, therefore, well below the applicable cleanup level. Laboratory analyses for hexavalent chromium are presented in the individual laboratory reports in Appendix D and are summarized on Table F1 in Appendix F.

4.2.5 AOC-14 (Possible PCB-Containing Transformers)

During the 2013 site inspection, Ecology personnel noted a power pole near the center of the site that was equipped with two electrical transformers. Ecology noted that the transformers could potentially contain PCB-containing dielectric fluids and, that if there had been previous leaks, this could have impacted the soils in the area below the transformers. For this project, Robinson Noble tried to identify additional electrical transformers on the site, but no other power poles or transformers were identified on or near the site. Possible impacts to the soils below the two identified transformers were investigating by excavating two test pits directly below the power pole and analyzing the soils from each. The locations of these two test pits, which are designated as TP19 and TP20, are shown on Figure 10. Logs of the materials encountered in each test pit are present on Figure 11.

During test pit excavation, materials from both test pits were field screened for signs of potential impact using the procedures described above in Section 4.1. As shown in Table F-1 (Appendix F), field screening did not indicate the presence of any soil impacts in either of the two test pits. Representative soil samples were collected from both test pits, again following the sampling procedures described above in Section 4.1, and submitted to Libby for analysis of mineral oil and PCBs. Mineral oil is the predominant dielectric fluid used in electrical transformers. Libby also inadvertently analyzed the soil samples from test pits TP19 and TP20 for cPAHs. The complete laboratory reports for these analyses are presented in Appendix D and summarized in Table F1. As shown in Table F1, analyses did not indicate the presence of mineral oil, PCBs, or cPAHs above the applicable laboratory detection limits in any of the samples from TP19 or TP20.

4.3 Quarterly Groundwater Monitoring (Task 5)

As noted in the 2013 RI, previous laboratory analyses indicated a possible intermittent issue with low levels of arsenic in the groundwater in the area of MW-1 (see Section 4.0 of the 2013 RI; Appendix B). MW-1 is located in the southeast portion of the site and is one of five monitoring wells that is still currently installed at the site. The locations of existing monitoring wells, designated as MW-1 through MW-5, are shown on Figure 8. As noted in the 2013 RI, most of the metal detections that were recorded during our investigations appeared to be the result of high suspended solids (turbid samples) collected through temporary wells in borings and/or monitoring wells that had not been sufficiently purged or developed. To resolve this potential issue, Ecology recommended conducting four consecutive quarters of groundwater monitoring at MW-1 and testing for MTCA-5 metals (lead, cadmium, chromium, arsenic, and mercury) plus copper, zinc, and nickel (see Task 5 of the 2013 work plan in Appendix B). Initial laboratory analyses were to be for total metals, but if there were issues with turbidity, subsequent analyses for dissolved metals would be conducted for analytical comparison.

Quarterly monitoring of MW-1 commenced on October 9, 2014. Three additional monitoring events were conducted on January 8, May 5, and August 12, 2015. During each of the four quarterly monitoring events, MW-1 was purged and sampled following the procedures and protocols described above in Section 4.1. The water quality parameters measured during the purging process for each monitoring event were recorded on individual field data sheets, which are included in Appendix G. Following collection, all groundwater samples were submitted to Libby for analyses of MTCA-5 metals plus copper, zinc, and nickel. The complete laboratory reports for each groundwater monitoring event are presented in Appendix E and summarized below in Table 8.

As shown in Table 8, with the exception of lead during the 4th quarter of monitoring and zinc during the 1st, 3rd, and 4th quarters of monitoring, all of the analytical results were below laboratory detection limits. The detected zinc values are also well below the applicable cleanup limit. The lead analyses for the 4th quarter of monitoring (the August 2015 monitoring event) showed a lead concentration of 16 μg/L, which is just above the MTCA Method A cleanup limit of 15 μg/L; the duplicate QA/QC value for this sample indicates a lead concentration of 15 mg/L, which is at the cleanup level (see full laboratory reports in Appendix E).

Table 8. Groundwater Analytical Results for Total Metals in MW-1

Monitoring Event	MTCA-5 Metals					Copper (μg/L)	Zinc (μg/L)	Nickel (μg/L)
	Lead (μg/L)	Cadmium (μg/L)	Chromium (μg/L)	Arsenic (μg/L)	Mercury (μg/L)			
October 2014	<5	<0.5	<5	<3	<0.5	<5	**48**	<15
January 2015	<5	<0.5	<5	<3	<0.5	<5	<5	<0.5
May 2015	<5	<0.5	<5	<3	<0.5	<5	**6**	<15
August 2015	**16**[1]	<1	<5	<5	<0.5	<5	**16**	<15
MTCA	**15**[2]	**5**[2]	**50**[2]	**5**[2]	**2**[2]	**640**[3]	**4,800**[3]	**320**[3]

1: The duplicate QA/QC analytical value for this sample is 15 μg/L (see Appendix E)
2: MTCA Method A groundwater cleanup level
3: MTCA Method B non-cancerous groundwater cleanup level
Red bolded values indicate results that exceed the applicable MTCA cleanup level

A review of the field data sheets (Appendix G) shows that the groundwater sample for the August 2015 monitoring event had elevated turbidity that could not be cleared, which likely biased the lead results high. Subsequent analyses for dissolved lead indicated a concentration of 7 μg/L, which is below the applicable cleanup level for lead. Given that there have been no previous lead detections in this well (either during this or any previous investigations), the fact that the August 2015 sample had high turbidity and the dissolved metal result was below the cleanup level, and the fact that the duplicate result does not exceed the current cleanup level, we do not consider this detection as a significant issue. Additional groundwater monitoring is not recommended for the site.

5.0 Wetlands Delineation and Terrestrial Ecological Evaluation (Task 6)

The southern portion of the site is occupied by wetlands (see Sections 2.1 and 2.2) that support a variety of wildlife and plant species. These represent potential ecological receptors of contamination that may be present at the site. No exclusionary criteria from performing a terrestrial ecological evaluation (TEE) listed under MTCA; WAC 173-340-7491(1) apply to the site, and a site-specific TEE is required to be completed by the criteria listed under WAC 173-340-7491(2).

5.1 Preliminary Chemical Analyses

Data collection to assist with the process of completing a site-specific TEE was initiated during the completion of the 2013 RI (Appendix B). This included the collection and analysis of a number of grab samples from the wetlands area. The locations of these samples, designated as PS1, SS2 through SS5, and WS6 through WS8, are shown on Figure 12.

The initial wetland samples were all submitted to Libby for analysis of gasoline-through oil-range hydrocarbons, MTCA-5 metals plus copper, zinc, and nickel, and PAHs. As reported in the 2013 RI, these analyses did not detect gasoline-through oil-range hydrocarbons above laboratory detection limits in any of the samples. Select metals, including lead, chromium, copper, zinc, and nickel were detected in each of the samples. Cadmium, arsenic, or mercury were not detected. The sample analyses also detected various PAHs in samples PS1, WS6, and WS8, but did not detect PAHs above laboratory detection limits in any of the other samples. The results of the metal analyses and select PAHs, as reported in the 2013 RI, are summarized below in Tables 9 and 10, respectively. The full laboratory reports for these previous analyses are provided in Appendix C of the 2013 RI (see Appendix B of this report).

Table 9. 2013 RI; Soil Analytical Results for Total Metals in the Wetlands Area

Sample #	MTCA-5 Metals					Copper (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)
	Lead (mg/kg)	Cadmium (mg/kg)	Chromium[2] (mg/kg)	Arsenic (mg/kg)	Mercury (mg/kg)			
PS1	34	<1	<5	<5	<0.5	11	40	10
SS2	40	<1	<5	<5	<0.5	8	47	12
SS3	25	<1	<5	<5	<0.5	<5	<5	8
SS4	6	<1	<5	<5	<0.5	<5	<5	5
SS5	22	<1	<5	<5	<0.5	<5	6	3
WS6	**1,230**	<1	10	<5	<0.5	68	8	12
WS7	53	<1	<5	<5	<0.5	12	<5	13
WS8	**525**	<1	<5	<5	<0.5	40	156	18
MTCA	250[1]	2[1]	2,000/19[3]	20[1]	2[1]	3,200[4]	24,000[4]	1,600[4]

1: MTCA Method A soil cleanup level for unrestricted land uses
2: Concentration of total chromium (includes both Chromium III and Chromium VI)
3: The MTCA Method A soil cleanup level for unrestricted land uses is 2,000 mg/kg for Chromium III and 19 mg/kg for Chromium VI (hexavalent chromium)
4: MTCA Method B non-cancerous soil cleanup level
Red bolded values indicate results that exceed the applicable MTCA cleanup level

Table 10. 2013 RI; Select Soil Analytical Results for PAHs in the Wetlands Area

PAH Analyte (mg/kg)	PS1	WS6	WS8	MTCA
Phenanthrene	0.252	nd	0.104	na[2]
Fluoranthene	0.528	nd	0.216	3,200[3]
Pyrene	0.416	nd	0.185	2,400[3]
Benzo(a)anthracene[1]	0.187	nd	0.092	1.4[4]
Chrysene[1]	0.212	nd	0.100	140[4]
Benzo(b)fluoranthene[1]	0.349	0.093	0.153	1.4[4]
Benzo(k)fluoranthene[1]	0.103	nd	nd	14[4]
Benzo(a)pyrene[1]	**0.202**	nd	0.085	0.1[5]
Indeno(1,2,3-cd)pyrene[1]	0.135	nd	nd	1.4[4]
TTEC for benzo(a)pyrene	**0.282**	nd	**0.110**	0.1[5]
Benzo(g,h,i)perylene	0.115	nd	nd	na[2]

1: cPAH analytes used to calculate total toxic equivalent concentration (TTEC) for benzo(a)pyrene
2: No applicable cleanup level has been established for this analyte
3: MTCA Method B non-carcinogenic cleanup level
4: MTCA Method B carcinogenic cleanup level
5: MTCA Method A soil cleanup level for unrestricted land uses
"nd" indicates the analyte was not detected above applicable laboratory detection limits
Red bolded values indicate results that exceed the applicable MTCA cleanup level

As shown above in Table 9, laboratory analyses indicated that, in 2013, lead was present at concentrations above the MTCA Method A cleanup level for unrestricted land uses in samples

WS6 and WS8. As shown in Table 10, the 2013 analyses also indicated the presence of PAHs in samples PS1, WS6, and WS8. Although most of the PAH concentrations that were detected in these three samples were below applicable cleanup levels, the concentration of benzo(a)pyrene exceeded the MTCA Method A cleanup level for unrestricted land uses in sample PS1. The total toxic equivalent concentration (TTEC) for benzo(a)pyrene (calculated from individual cPAH concentrations per WAC 173-340-708(8)), also exceeded the MTCA Method A cleanup level for unrestricted land uses in samples PS1 and WS8.

5.2 Wetlands Delineation

To facilitate the completion of a site-specific TEE, and as per Ecology's recommendations following the completion of the 2013 RI, Alan Wertjes (on behalf of Havens Estate under now closed VCP Project No. SW1127) subcontracted with Normandeau Associates, Inc. (Normandeau) to conduct a wetland survey and a wetlands delineation of the site. A copy of both the wetland survey and the wetland delineation report are included in Appendix H.

Normandeau's wetland delineation identified two surface water bodies at the site (Hopkins Ditch and the small pond just to the north of it) and three individual wetlands that they designate as Wetlands A, B, and C. In their report, Normandeau confirms Robinson Noble's findings that Hopkins Ditch does not actually flow and is not a ditch, per se, but rather a series of small disconnected pools. Normandeau also confirmed that there is only the one pond north of Hopkins Ditch located on the site; the additional pond previously identified by Ecology during their 2013 site inspection (see first bullet of Ecology's June 26, 2013 email; Appendix B) is actually located on the property to the south of the site.

Normandeau describes Wetland A as a palustrine forested and emergent wetland that occurs along the banks of Hopkins Ditch. Wetland A, which is the largest of the three wetlands, extends well beyond the boundaries of the site. Wetland A covers a total area of approximately 50 acres (3.8 acres on the site). Wetland B is described as a palustrine emergent depressional wetland located on the southeast portion of the site. Wetland B is relatively small, covering an area of approximately 0.06 acres. Wetland B is partially contiguous with Wetland A. Normandeau describes Wetland C as a depression emergent wetland that occupies a steep-sided depression in the southeast corner of the site. Wetland C covers an area of approximately 0.15 acres and is not connected to Wetland A or B. Full details of each wetland, including maps and photographs, are included in Normandeau's wetland delineation report in Appendix H.

5.3 Site-Specific Terrestrial Ecological Evaluation

Following the completion of the wetlands delineation (Section 5.2), Havens subcontracted with Coho Environmental, Inc. (Coho) to complete a site-specific TEE. Coho coordinated this effort with Robinson Noble and began their investigation by conducting a reconnaissance inspection of the site with Robinson Noble and reviewing the analytical data that Robinson Noble had collected to date. After completing a majority of the TEE evaluation, Coho concluded that the high lead levels found in AOC-10 (see sample TP14-1.5 in Table 4 of Section 4.2.1) and the elevated lead and PAH levels present in the wetlands area (see samples PS1, WS6, and WS8 in Table 9 of Section 5.1) represented chemicals of ecological concern (COEC) under current MTCA guidelines.

Because the soil contamination in these areas appeared to be relatively shallow, Coho recommended that Robinson Noble attempt to remove the impacted soils using remedial excavation. Once the soil contamination had been successfully remediated, Coho would then complete the final site-specific TEE. These soil impacts were successfully removed through remedial excavation, which is discussed below in Section 5.3.1. The completion of the final site-specific TEE is described below in Section 5.3.2. A copy of Coho's final TEE report is provided in Appendix I.

5.3.1 Remedial Excavation

Because the planned remedial excavation work was to be conducted in a designated wetland, specific State and County permits were required before the remediation effort could proceed. This included obtaining a Critical Area Review Permit (CARP) from Thurston County and the completion of a State Environmental Policy Act (SEPA) checklist. Following their review of the SEPA checklist, Thurston County (the lead agency) issued a determination of nonsignificance (DNS) for the planned remediation work. Other required permits for this project included coverage under the State of Washington's construction stormwater general permit (CSWGP). All of the requirements stipulated by Ecology for CSWGP coverage were strictly adhered to during the completion of this project. Applicable permits and associated documents for conducting remediation within the site wetlands are included in Appendix J.

Prior to conducting remedial excavation, additional samples were collected from the wetlands area. These samples were collected both to provide better statistical data for the final TEE (Section 5.3.2) and to better delineate the extent of the contamination present in the areas of samples WS6 and WS8 (see Table 9 of Section 5.1). Each of the additional samples were collected as a composite soil sample from depths between ground surface and one foot bgs. The locations of these additional samples, which are designated as WS10 through WS24, are shown on Figure 12. All of the additional delineation samples were collected following the procedures and protocols described above in Section 4.1 and submitted to Libby for analysis of total lead. The analytical results are summarized below in Table 11. The complete laboratory reports are presented in Appendix K.

Table 11. Soil Analytical Results for Lead in Additional Wetlands Delineation Samples

Sample #	**Lead** (mg/kg)
WS10	165
WS11	67
WS12	21
WS13	47
WS14	17
WS15	9
WS16	8
WS17	8
WS18	**386**
WS19	11
WS20	43
WS21	123
WS22	15
WS23	13
WS24	85
MTCA	250[1]

1: MTCA Method A soil cleanup level for unrestricted land uses
Red bolded values indicate results that exceed the applicable MTCA cleanup level

As shown above in Table 11, analyses indicate the presence of lead above the laboratory detection limit in each of the additional wetland delineation samples. However, with the exception of soil sample WS18, all of the detected concentration are below the MTCA Method A soil cleanup level for unrestricted land uses. The analysis of sample WS18 indicates a lead concentration of 386 mg/kg, which is above the 250 mg/kg cleanup level. However, as shown on Figure 12, sample WS18 was collected near sample WS6, which also exhibited a high lead concentration (see Table 9 in Section 5.1). This further confirms the presence of lead in the shallow soils in this particular area.

In all, soil contamination at the site was (prior to remedial excavation) limited to four distinct areas, which included lead in the area of TP14 in AOC-10 (see Table 4 in Section 4.2.1), lead in the area of samples WS6 and WS 18 (see Table 9 in Section 5.1), lead and PAHs in the area of sample WS8 (see Tables 9 and 10 in Section 5.1), and PAHs in the area of PS1 (see Table 10 in Section 5.1). Remediation of these four areas was accomplished by excavating the soils and then transporting them from the site to an appropriate disposal facility. Figure 13 shows the locations of the four remedial excavation areas, which are designated as the North Excavation (the area around TP14 in AOC-10), South Excavation #1 (the area around samples WS6 and WS18), South Excavation #2 (the area around sample WS8), and the Pond-area Excavation (the area around sample PS1). The extent of each remedial excavation and sample collection locations are shown on Figures 14 through 17.

In August 2019, personnel from Robinson Noble, working with Langseth, completed the above described remedial excavations. Remedial excavation was specifically conducted in late summer when conditions in the wetlands area of the site were at their driest. During the completion of all remedial excavations, no surface water was present at the site. This included the wetlands area, Hopkins Ditch, and the small pond to the north of Hopkins Ditch. Prior to conducting the remedial excavation, Havens had the west end of the easternmost building in AOC-10 (the area of TP14; see Section 4.2.1) razed and the underlying concrete slab removed so that the underling soils could be accessed.

Remediation began with the North Remedial Excavation (Figure 14), then proceeded to the two South Remedial Excavations (Figures 15 and 16), and concluded at the Pond-area Remedial Excavation (Figure 17). Excavation in each area generally began near the location of the initial investigative samples and then worked outward. Field screening, as described above in Section 4.1, was conducted during all remedial excavations. Field screening did not indicate any signs of impact in any of the excavated soils. However, considering that the primary COC in most of the remediated areas was metals (specifically lead), field screening was not expected to be effective for assessing potential impacts. In the two areas where PAHs were possibly present (South Remedial Excavation #2 and the Pond-area Remedial Excavation), field screening was expected to be at least somewhat effective if impacts were present. Field screening, again however, did not indicate any signs of impact in any of the remediated areas, including those with possible PAH impacts.

Because field screening is generally not effective at identifying metal impacts (the primary COC in most of the remediated areas), remedial excavation proceeded well beyond the anticipated areas of impact to make sure that sufficient materials were removed during the initial remediation effort. Confirmation soil samples were then obtained from the margins of each remedial excavation for subsequent laboratory analysis. The approximate collection locations of final soil confirmation samples are shown on the respective diagrams for each of the four remediated areas (Figures 14 through 17).

In the case of the North Excavation and South Excavations #1 and #2 (see Figures 14, 15, and 16), following the collection of the final confirmation samples, each excavation was expanded laterally several additional feet in all directions and vertically approximately an additional foot to make sure that all potentially impacted materials were adequately removed. The final North Excavation covered an area of approximately 350 square feet and was excavated to a final depth of three feet. This equates to a volume of just under 39 cubic yards. South Excavation #1 covered an area of approximately 340 square feet and was excavated to a final depth of three feet, which equates to a volume of just under 38 cubic yards. For South Excavation #2 (Figure 16), the final excavation covered an area of 280 cubic feet and extended to a depth of three feet. This equates to a volume of approximately 31 cubic yards. The materials encountered in these three excavations consisted primarily of brown silt and sand, consistent with the materials encountered in previously excavated test pits (see Figure 11). No groundwater was encountered in any of these three excavations.

During the remedial excavation of the pond area (Figure 17), no surface water was present. The materials lining the base and sides of the pond-depression consisted of a ½- to one-foot thick layer of loose sediment and organic materials (sticks, leaves, and other decomposed vegetation). This is consistent with the material that was previously dredged and sampled during the preliminary assessment of the wetlands area (Section 5.1). This material was underlain by brown and gray sandy silts. During remedial excavation, the upper layer of loose organic material was removed, along with approximately another ½- to one-foot of the underlying materials. In total, two single-bed dump truck loads of material, which equates to approximately 30 cubic yards, was excavated from this area and removed from the site. No groundwater was observed in the pond-area excavation.

Soil confirmation samples from each of the excavated areas were collected following the sampling procedures described above in Section 4.1. The confirmation samples were then submitted to Libby for analysis of lead and/or cPAHs, as applicable. The analytical results for all confirmation samples are summarized below in Table 12. The complete laboratory reports are provided in Appendix K.

As shown in Table 12, analyses did not indicate the presence of lead or cPAHs above applicable laboratory detection limits in any of the confirmation samples from the four remediation areas. These data demonstrate that remedial excavation was successful at removing the impacted soils from these four areas.

Following remedial excavation, the North Excavation and South Excavation #1 and #2 were backfilled with clean, imported sand and gravel, per Ecology's recommendations. No backfill was placed in the pond area. All of the BMPs (i.e. silt fences) were then removed from the site, and a request to terminate coverage under the States CSWGP was submitted to Ecology. A copy of Ecology's CSWGP Notice of Termination is provided in Appendix J.

Table 12. Soil Analytical Results for Remedial Excavation Confirmation Samples

Sample #[1]	Lead (mg/kg)	cPAHs
North Remedial Excavation		
NEX1-2	<5	-
NEX2—2	<5	-
NEX3-2	<5	-
South Remedial Excavation #1		
S-EX#1-1-2	<5	-
S-EX#1-2-2	<5	-
South Remedial Excavation #2		
S-EX#2-1-2	<5	nd
S-EX#2-2-2	<5	nd
Pond-area Remedial Excavation		
PS-2-1	-	nd
PS-3-1	-	nd
MTCA	**250[2]**	**variable**

1: Sample # indicates sample location and sample depth (i.e. NEX1-2 is the first sample collected from the North Excavation at a depth of 2')
2: MTCA Method A soil cleanup level for unrestricted land uses
"-" indicates analyte was not analyzed for specified compound
"nd" indicates the analyte was not detected above applicable laboratory detection limits

5.3.2 Final Site-Specific Terrestrial Ecological Evaluation

Following the completion of the remedial excavations discussed above in Section 5.3.1, Coho proceeded to complete the final site-specific TEE. Coho's final TEE included both pre- and post-remediation screening of various chemicals of ecological concern (COEC) based on the entirety of the soil chemistry data that has been collected to date for the site. This screening did not find any post-remediation COECs. Coho concluded that, although there may be potential exposure pathways and ecological receptors (based on Normandeau's wetland delineation; see Section 5.2 and Appendix H), no toxicological assessment or additional TEE analysis is warranted based on the lack of COECs at the site. A copy of the final TEE is provided in Appendix I.

6.0 EIM Preparation and Submission (Task 7)

For VCP projects, Ecology requires that all analytical data be submitted via their Electronic Information Management (EIM) portal prior to issuance of any closure determination. All analytical data collected during this project was uploaded to Ecology via the EIM portal at the time it was generated.

7.0 Summary and Findings

The former John's Auto Wrecking yard (site) is located at 411 93rd Avenue Southeast in unincorporated Thurston County, Washington and occupies an area of just over 16 acres (Figure 1). The site was previously occupied by an extensive auto-wrecking business (John's Auto Wrecking) that operated up until the owner's death (John Havens) in 2001. Most of the equipment and materials associated with the auto-wrecking business (Figure 2) were removed in around 2008 and the majority of the site now consists of undeveloped woodlands (Figure 3). The site is currently listed as having confirmed or suspected soil and/or groundwater contamination (arsenic, lead, other priority pollutant metals, unspecified petroleum products, and polycyclic aromatic hydrocarbons) associated with the former auto-wrecking business and is identified by Ecology Facility/Site No. 57665495. The site is currently enrolled in Ecology's VCP under VCP Project No. SW1613, and the current owner (Havens Estate Investments, LLC) is seeking a NFA determination through this program.

The supplemental remedial investigation/cleanup action documented in this report represents the culmination of cleanup work that has been ongoing at the site since 2008. The cleanup work documented in this report was specifically conducted to address discrepancies and data gaps noted in our earlier remedial investigation (RI), completed in 2013, and additional issues noted by Ecology following their review of the 2013 RI (see Section 3.2). The specific cleanup tasks for this project were formalized with Ecology's review and comment in our 2013 work plan, and include the following:

- Task 2: Final debris removal and associated soil sampling
- Task 3: Investigation of possible polychlorinated biphenyl (PCB) containing transformers
- Task 4: Investigation of possible imported fill
- Task 5: Quarterly groundwater sampling of monitoring well MW-1
- Task 6: Wetland delineation and site-specific terrestrial ecological evaluation (TEE)

Through the completion of the 2013 RI and Tasks 2, 3, and 4 of the current investigation (see Section 4.2), shallow soils in four limited areas of the site were identified that contained lead and/or PAH concentrations above applicable cleanup levels. These four areas, which are shown on Figure 13 as the North Excavation, South Excavation #1, South Excavation #2, and the Pond Excavation, were successfully remediated by excavating impacted soil and removing it from the site (see Section 5.3.1). The investigations associated with Tasks 2, 3, and 4 did not identify any other areas of concern.

Task 5 (Section 4.3) included four consecutive quarters of groundwater monitoring for metals (lead, cadmium, chromium, arsenic, mercury, copper, zinc, and nickel) at MW-1 (Figure 8). With the exception of lead during the fourth quarter of monitoring, groundwater analyses did not detect any metals above applicable laboratory detection limits. During the fourth quarter, analysis indicated a total lead concentration of 16 μg/L (15 μg/L for the duplicate sample), which just above (and at) the 15 μg/L cleanup level. The fourth quarter sample, however, had high turbidity and subsequent analysis for dissolved lead indicated a concentration of 7 μg/L. Considering there have been no previous metal detections in this or the other wells at the site (during this or any of the previous investigations) and the fact that the sample was turbid and the dissolved lead result was below the cleanup level, the fourth quarter lead detection does not appear to represent a significant issue. Additional groundwater monitoring is not warranted.

Following the remedial excavation of shallow soil impacts at the site (Section 5.3.1), Coho Environmental, Inc., completed a site-specific TEE (Task 6). Coho's post-remediation screening did not identify any chemicals of ecological concern (COEC) and no toxicological assessment or additional TEE analysis is warranted for the site (Section 5.3.2).

8.0 Recommendations

The cleanup work completed to date at the John's Auto Wrecking site and documented in Robinson Noble's 2013 Remedial Investigation (Appendix B) and this Supplemental Remedial Investigation/Cleanup Action report, meet the substantive requirements of MTCA. Based on the information provided in our 2013 RI and this report, and our first-hand involvement with the remedial actions that have been completed to date at the site, it is our opinion that the issuance of a no-further-action (NFA) determination for the John's Auto Wrecking site (Facility/Site No. 57665495; VCP Project No. SW1613) is appropriate at this time.

9.0 References

Drost, B.W., Turney, G.L, Dion, N.P., and Jones, M.A., 1998; *Hydrology and quality of ground water in northern Thurston County, Washington*; U.S. Geological Survey Water-Resources Investigation Report: 92-4109 (Revised), 230 p.

Drost, B.W., Ely, D.M., and Lum II, W.E., 1999; *Conceptual model and numerical simulation of the ground-water-flow system in the unconsolidated sediments of Thurston County, Washington*: U.S. Geological Survey Water-Resources Investigations Report 99-4165, 254 p.

Noble, J.B. and Wallace. E.F., 1966; *Geology and ground-water resources of Thurston County, Washington, Volume 2*; U.S. Geological Survey Water-Resources Water-Supply Bulletin 10, 141 p.

Robinson, Noble, & Saltbush, Inc., letter report April 21, 2009; *Site investigation/Characterization, Havens Property (aka) Johns Auto Wrecking, 411 93rd Avenue SE, Olympia, Washington*

Robinson, Noble, & Saltbush, Inc., letter report December 10, 2009; *Site remediation of the Havens Property (aka Johns Auto Wrecking) 411 93rd Avenue SE, Olympia, Washington*

Robinson Noble, July 2013; *John's Auto Wrecking, 411 93rd Avenue Southeast, Olympia, Washington, Facility/Site No. 57665495, VCP Project No. SW1127, Remedial Investigation*

Thurston County Assessor-Treasure's GIS data base available online at http://www.geodata.org/website/cadastral/viewer.htm

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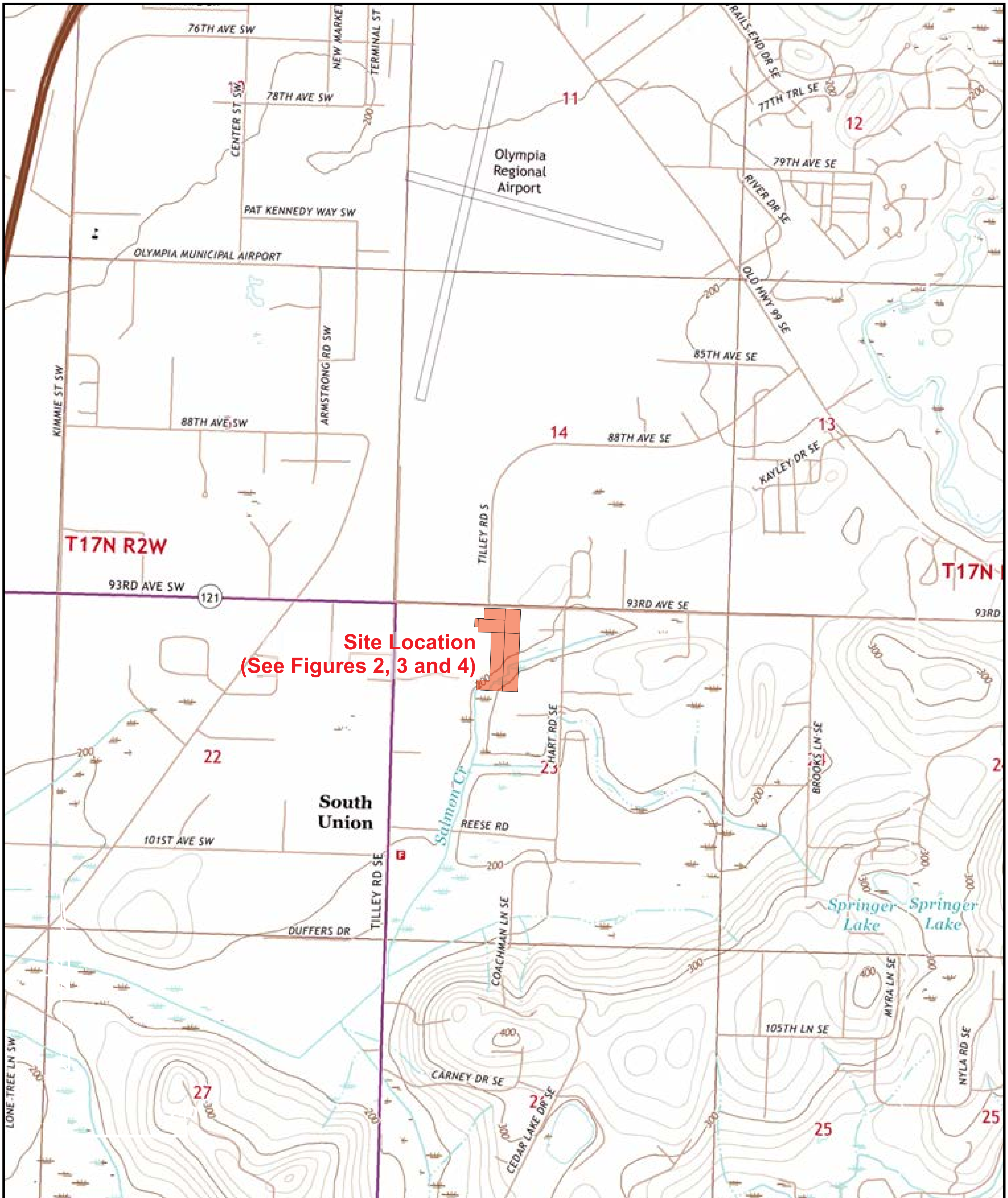
Washington State Department of Ecology, 2013, *Model Toxics Control Act statute and regulation*, compiled by the Washington State Department of Ecology Toxics Cleanup Program, Publication No. 94-06

Washington State Department of Ecology, Cleanup levels and risk calculations–database of cleanup levels for chemicals and respective media, available online at https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx

Washington State Department of Ecology, Water well log database, available online at http://apps.ecy.wa.gov/welllog/

The statements, conclusions, and recommendations provided in this report are to be exclusively used within the context of this document. They are based upon generally accepted hydrogeologic and environmental practices and are the result of analysis by Robinson Noble, Inc. staff. This report, and any attachments to it, is for the exclusive use of Havens Estate Investments, LLC. Unless specifically stated in the document, no warranty, expressed or implied, is made.

FIGURES



ROBINSON NOBLE

Note: Basemap taken from USGS Maytown Quadrangle

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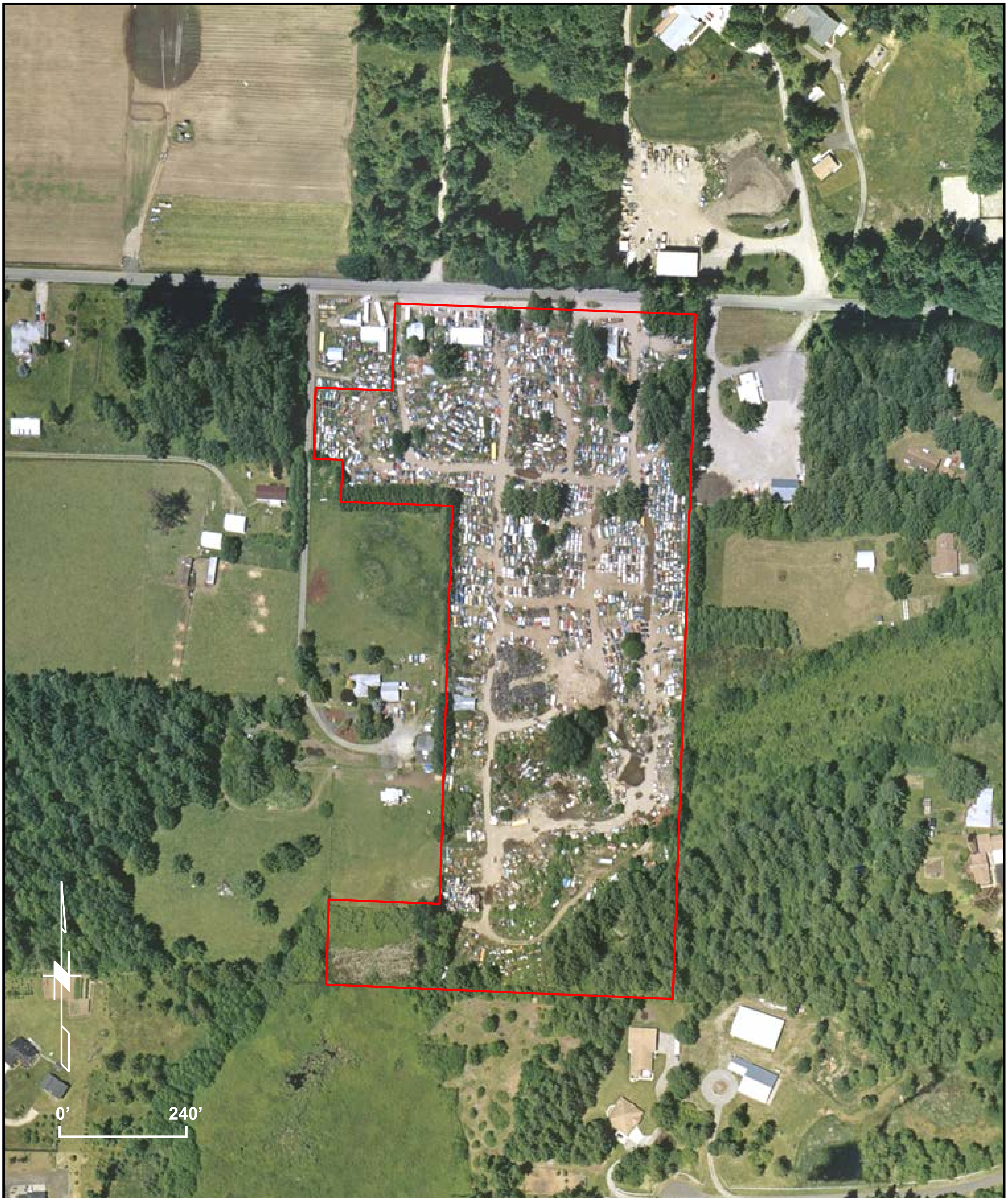
May 2020
2491-001G

Thurston County
T 17 N/R 02 W - 23
Scale 1" = 2000'

Figure 1

Vicinity Map

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



ROBINSON NOBLE

Note: Image from Thurston County GIS 2000 Aerials

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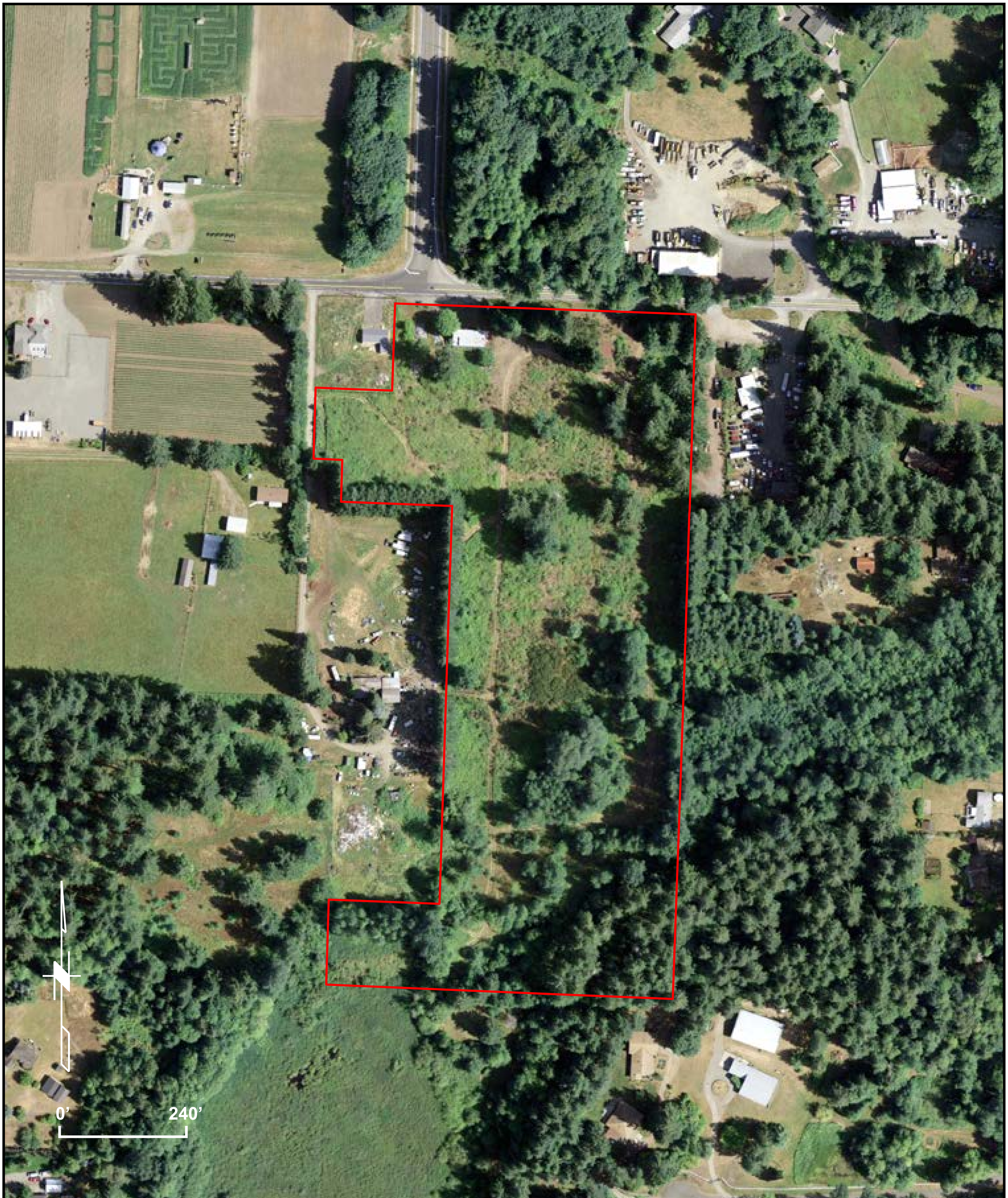
May 2020
2491-001G

Thurston County
T 17 N/R 02 W - 23
Scale 1" = 240'

Figure 2
2000 Aerial Map of the Site

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



Note: Image from Thurston County GIS 2018 Aerials

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May 2020
2491-001G

Thurston County
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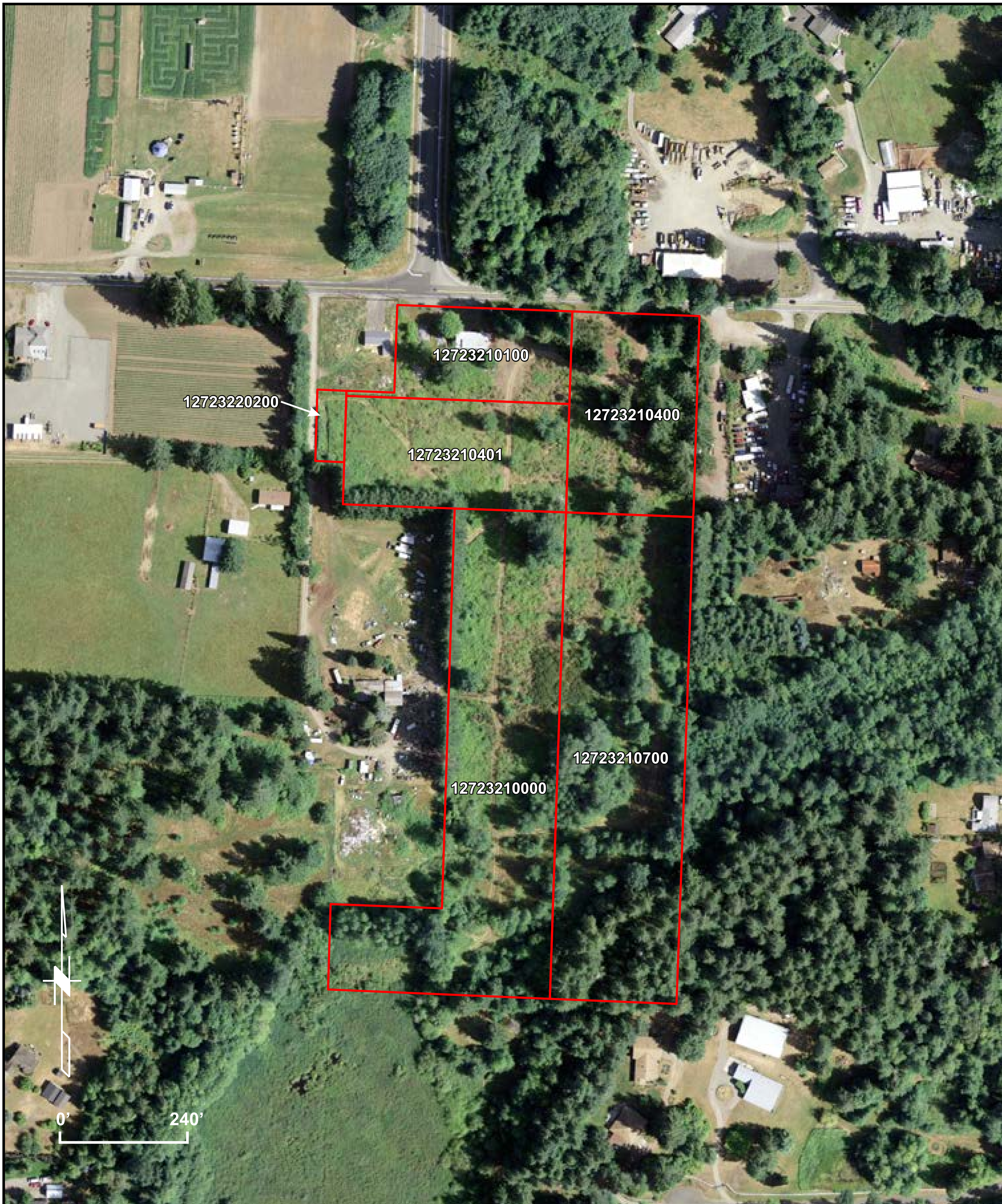
Scale 1" = 240'

ROBINSON NOBLE

Figure 3
2018 Aerial Map of the Site

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



ROBINSON NOBLE

Note: Image from Thurston County GIS 2018 Aerials

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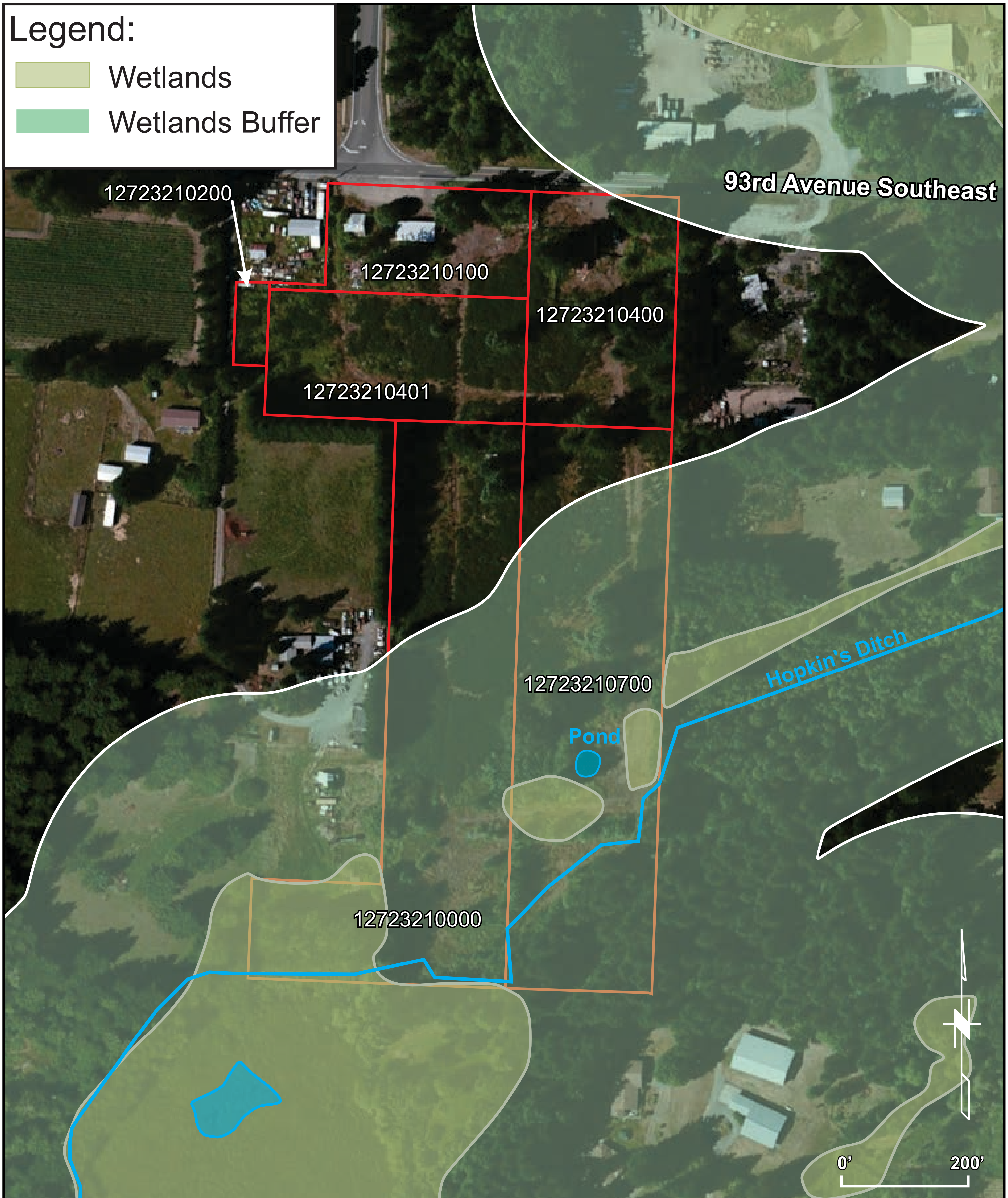
May 2020
2491-001G

Thurston County
T 17 N/R 02 W - 23
Scale 1" = 240'

Figure 4
Parcel Map

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



ROBINSON NOBLE

Note:
Image from
ESRI ArcGIS

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2491-001G

Thurston County
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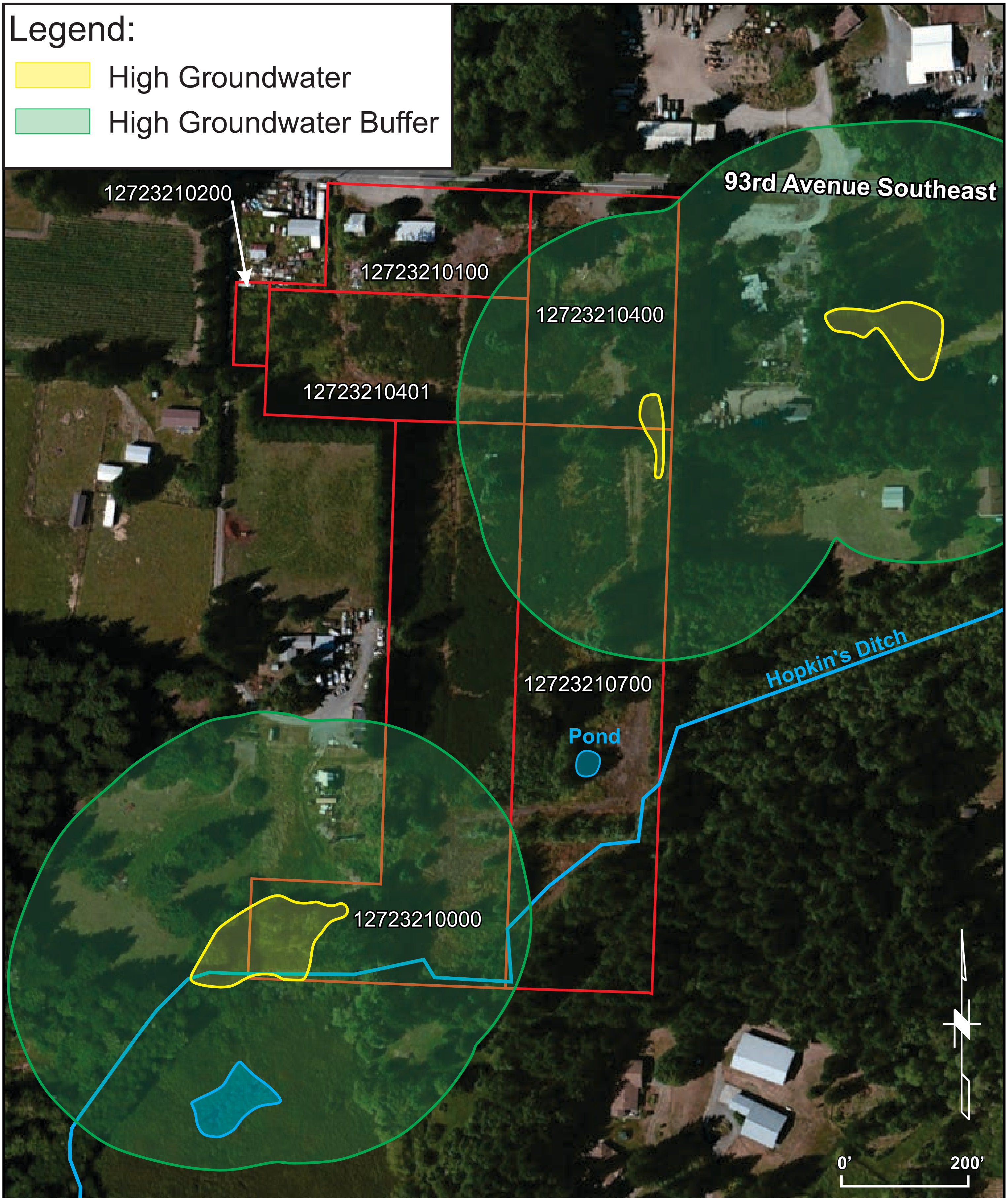
Scale 1" = 200'

Figure 5
Wetlands Map

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



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Note:
Image from
ESRI ArcGIS

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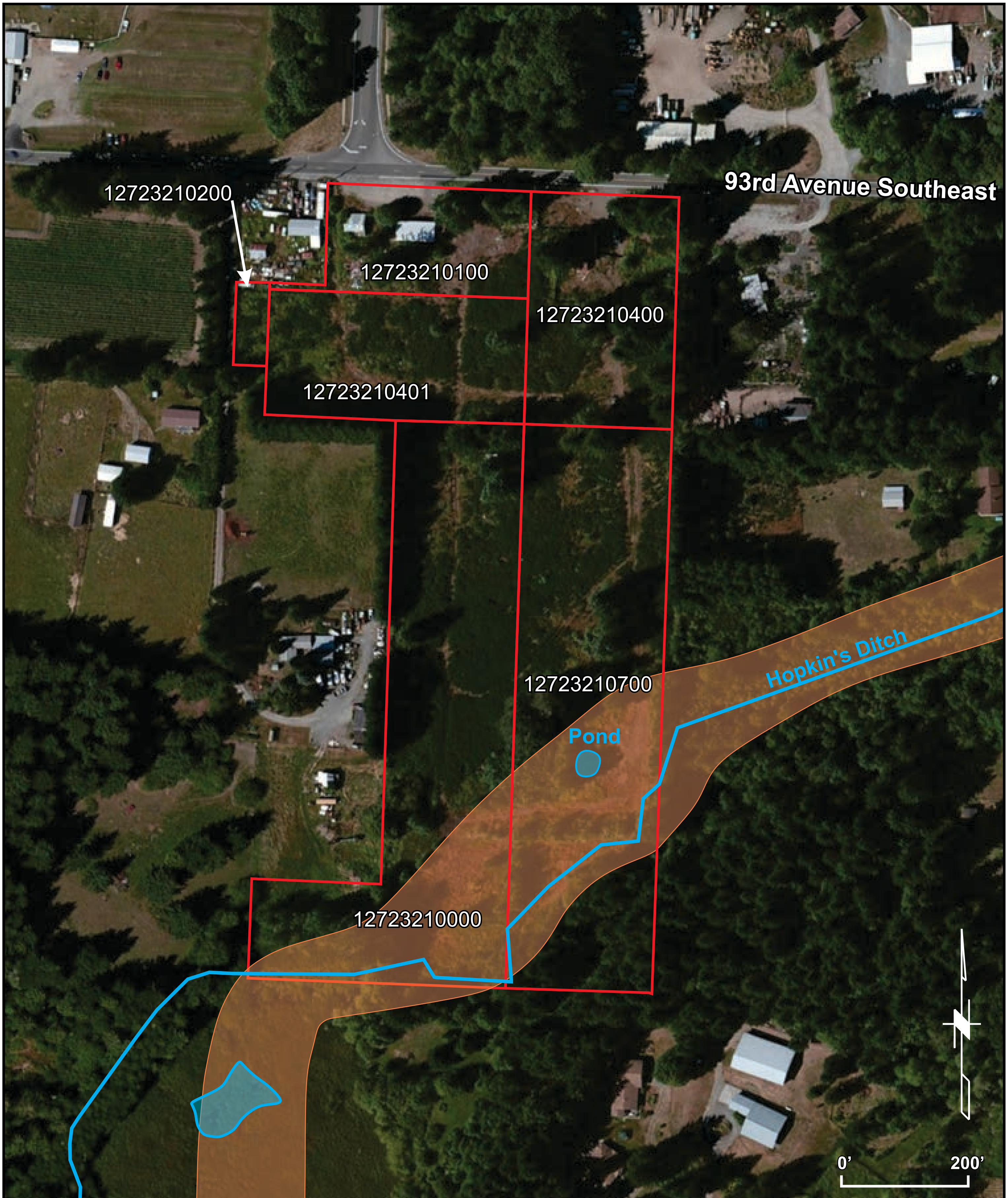
2491-001G

Thurston County
T 17 N/R 02 W - 23
Scale 1" = 200'

Figure 6
High Groundwater Hazard Map

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



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Note:
Image from
ESRI ArcGIS

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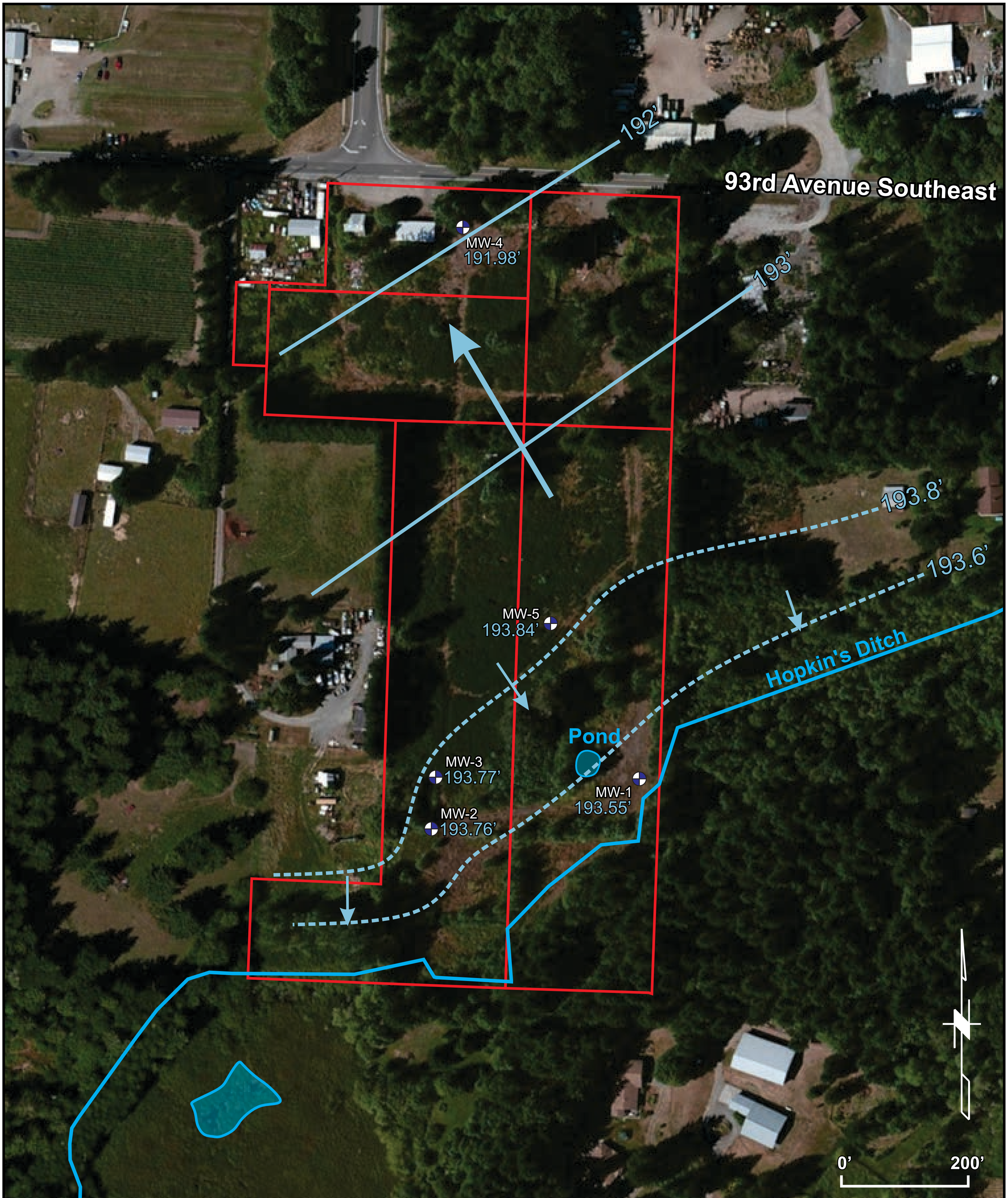
May 2020
2491-001G

Thurston County
T 17 N/R 02 W - 23
Scale 1" = 200'

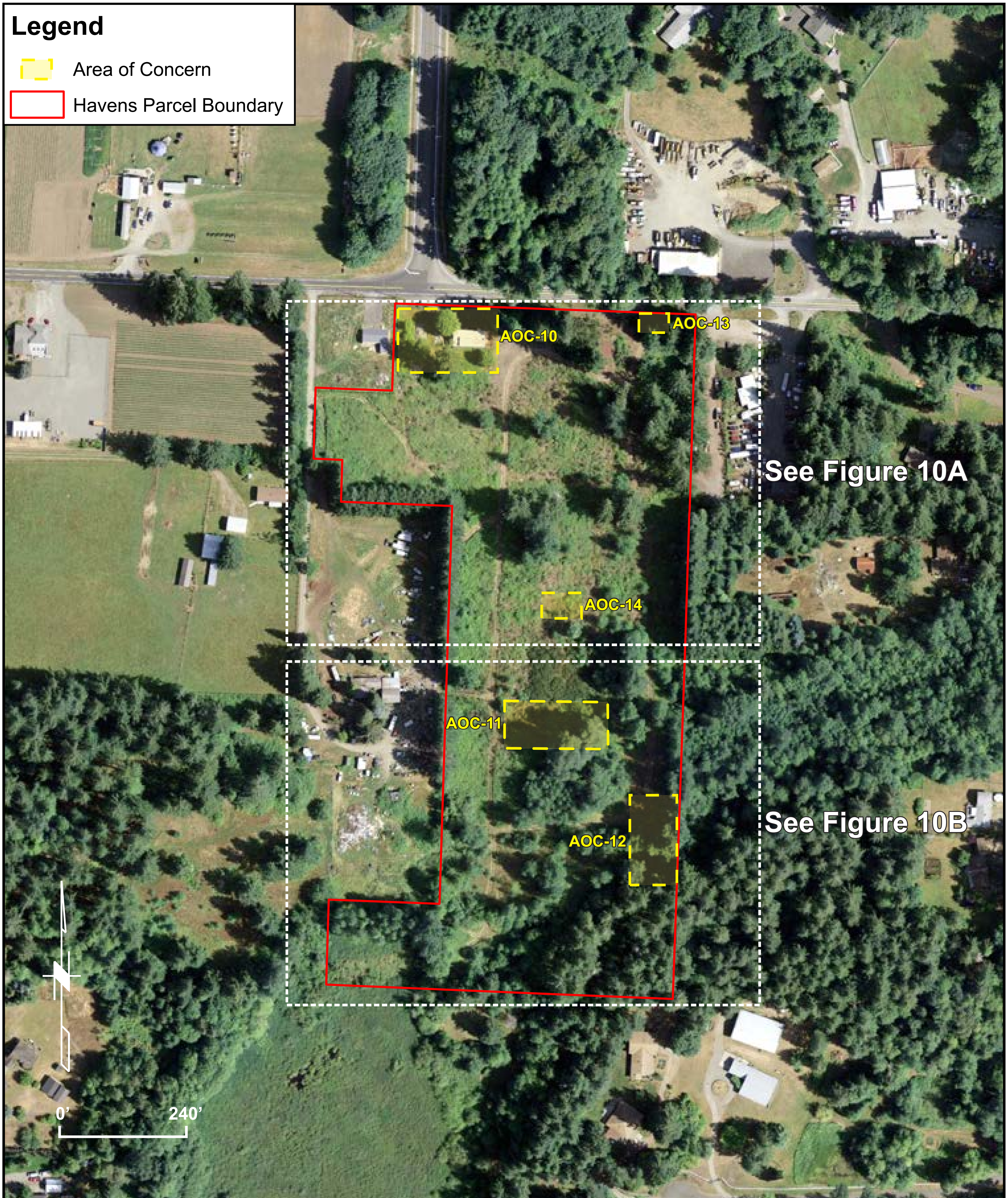
Figure 7
Flood Zones Map

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



ROBINSON NOBLE	Note: Image from ESRI ArcGIS	PM: MTW May 2020 2491-001G	Thurston County T 17 N/R 02 W - 23 Scale 1" = 200'	Water Levels Measured: 02/28/2013

Figure 8
Potentiometric Surface Map
John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



ROBINSON NOBLE

Note: Image from Thurston County GIS 2018 Aerials

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May 2020
2491-001G

Thurston County
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Scale 1" = 240'

Figure 9
Area of Concern (AOC) Location Map

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action

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Note: Image from Thurston County GIS 2018 Aerials

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2491-001G

Thurston County
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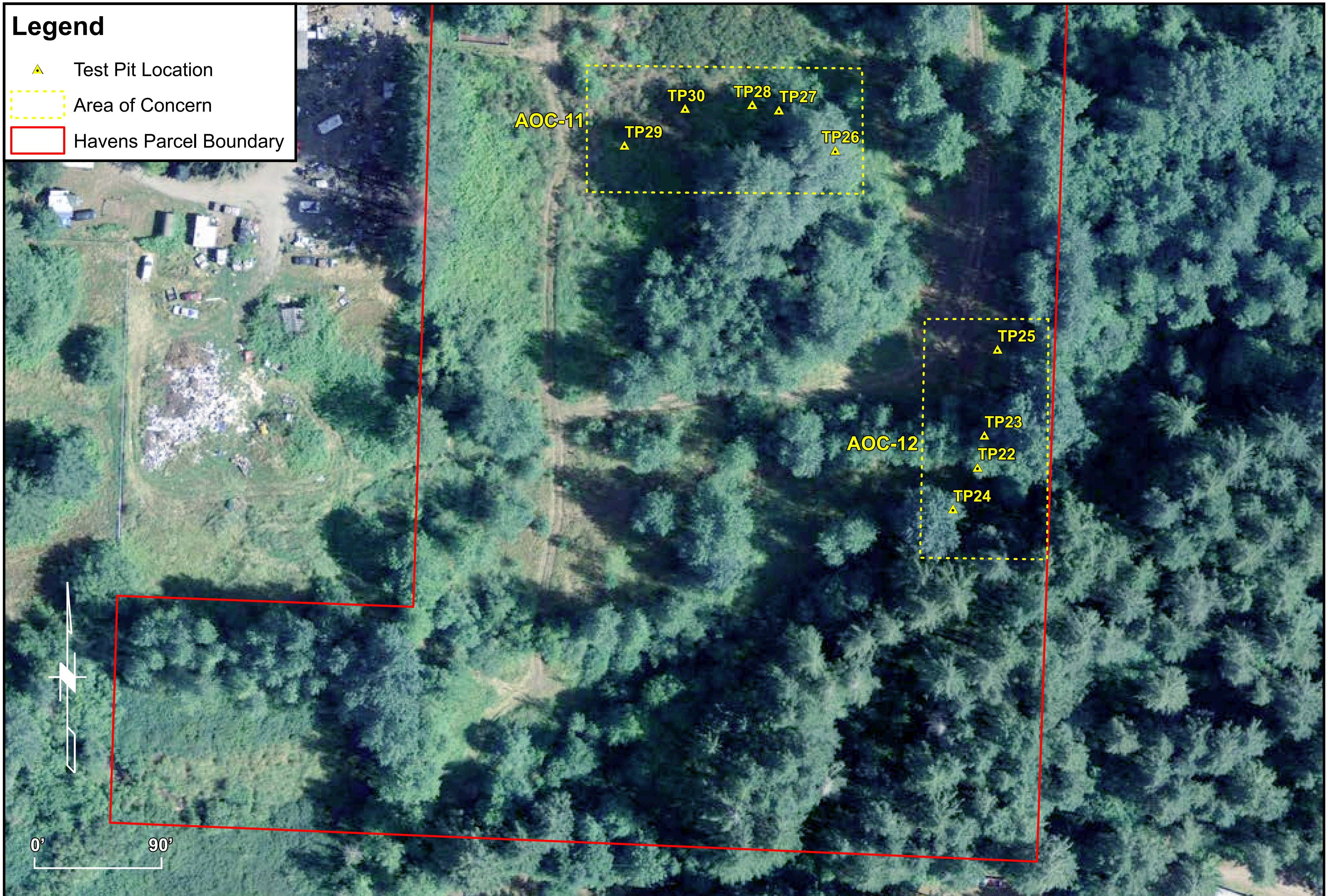
Scale 1" = 90'

Figure 10A

Test Pit Location Map (North)

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



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Note: Image from Thurston County GIS 2018 Aerials

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Thurston County
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Scale 1" = 90'

Figure 10B

Test Pit Location Map (South)

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action

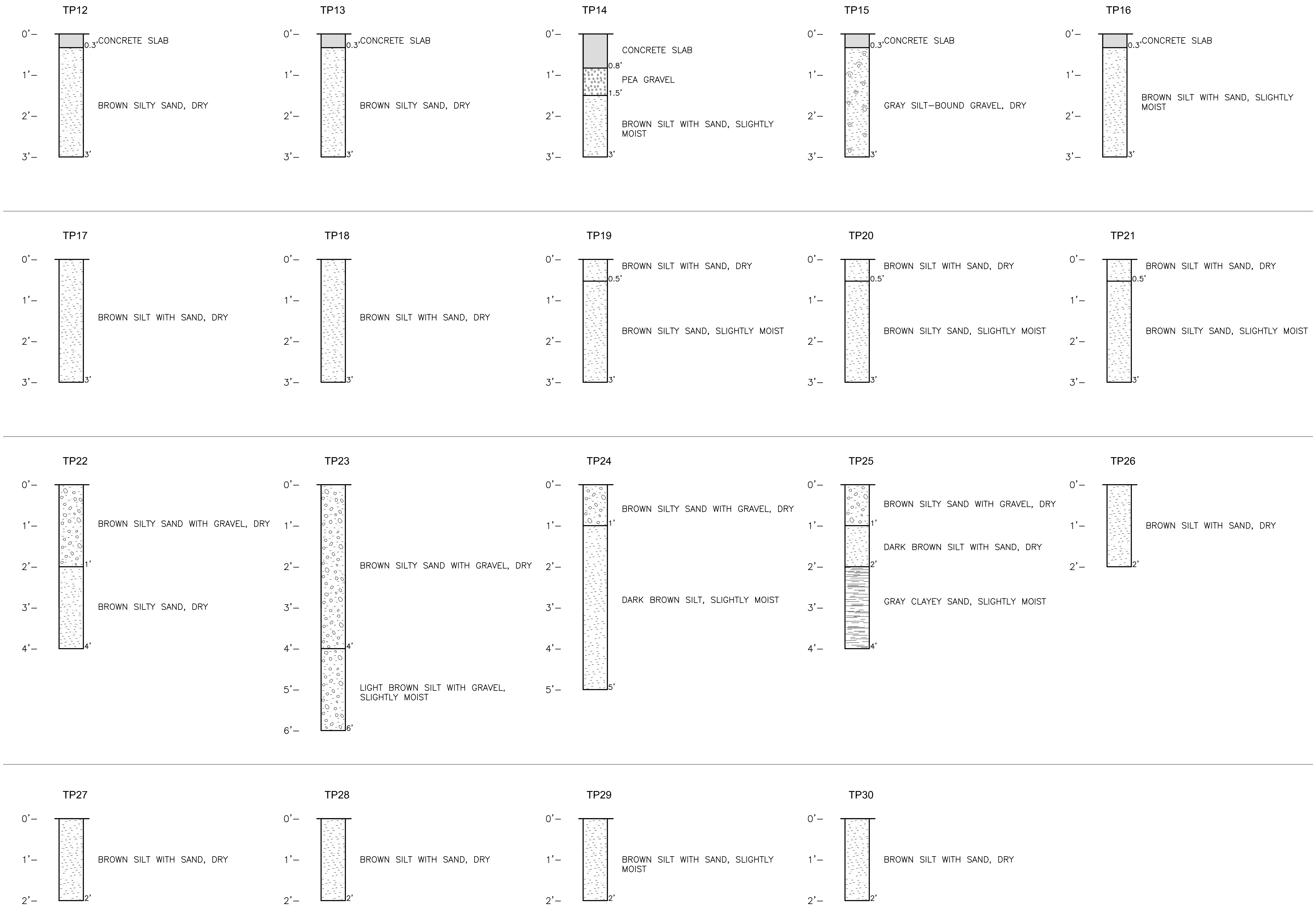

Figure 11

Geologic Logs for TP12 through TP30

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action

Thurston County
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May 2020
2491-001G

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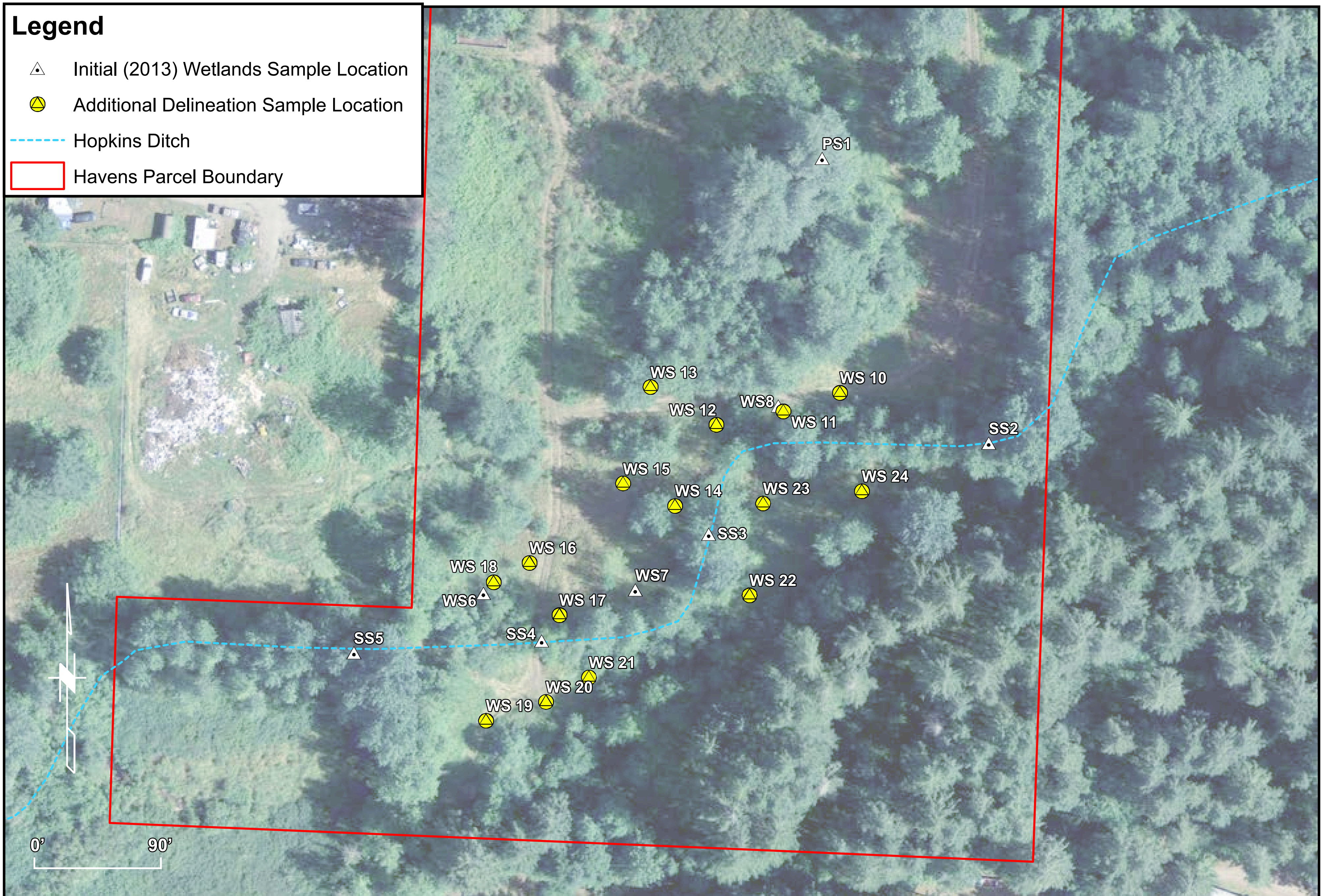

ROBINSON NOBLE

Note: Image from Thurston County GIS 2018 Aerials

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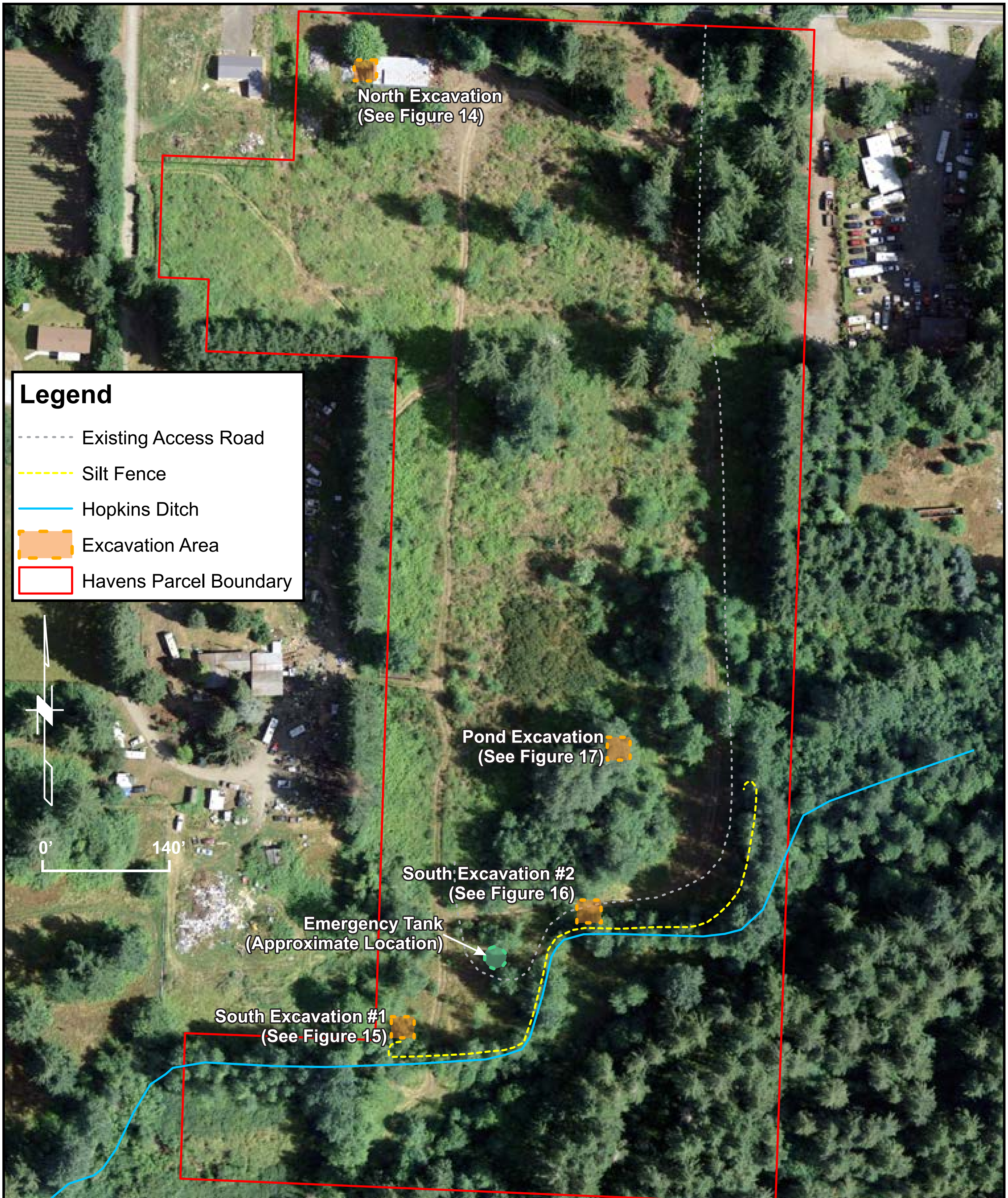
May 2020
2491-001G

Thurston County
T 17 N/R 02 W - 23
Scale 1" = 90'

Figure 12

Wetlands Sample Location Map

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



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Note: Image from Thurston County GIS 2018 Aerials

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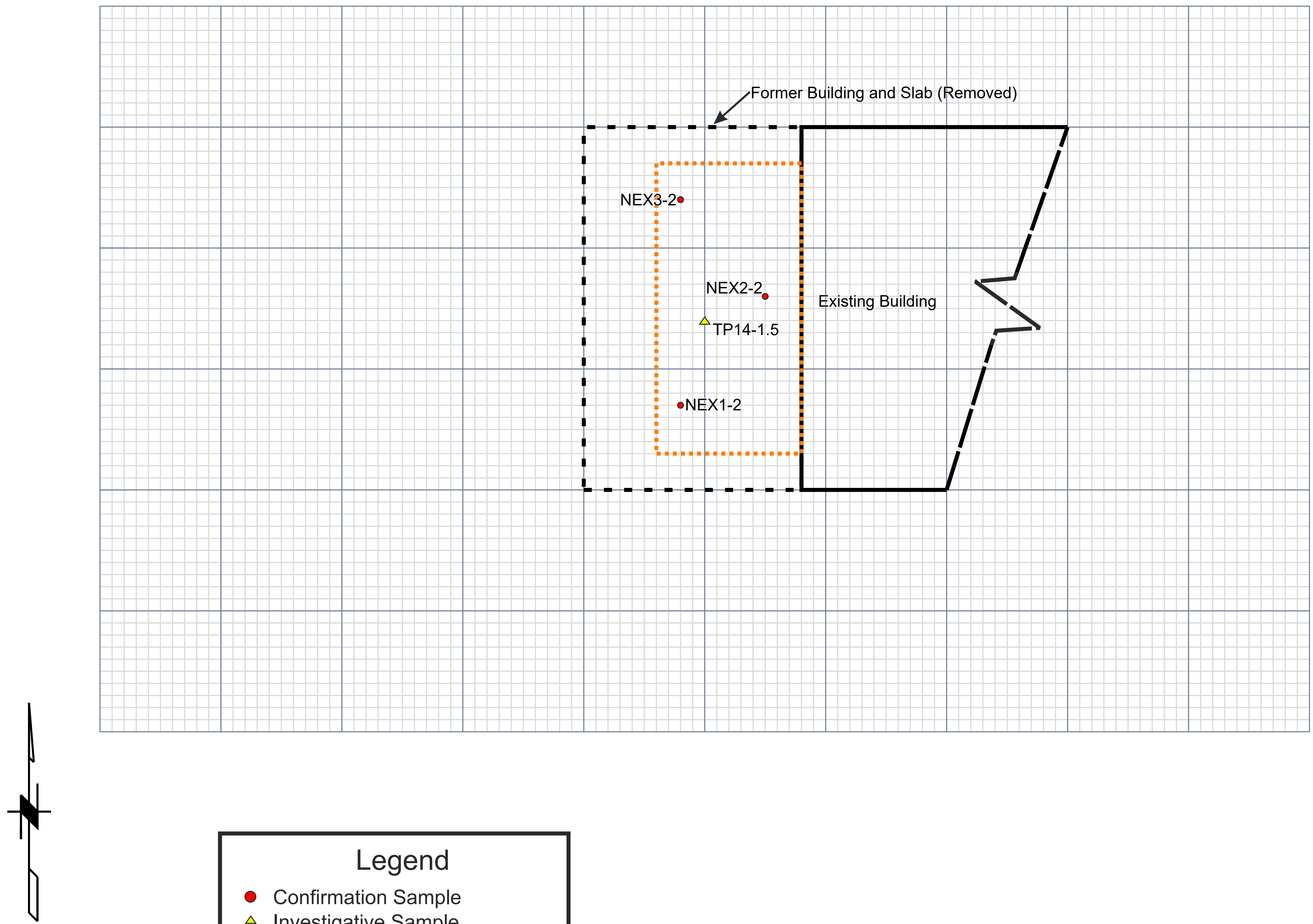
May 2020
2491-001G

Thurston County
T 17 N/R 02 W - 23
Scale 1" = 140'

Figure 13
Remedial Excavation Location Map

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



Grid squares = 1 ft.

Legend
- Confirmation Sample
- Investigative Sample
- Extent of Remedial Excavation

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PM: MTW
May 2020
2491-001G

Thurston County
T 17 N/R 02 W - 23

Figure 14

North Remedial Excavation

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action

Grid squares = 1 ft.

Legend

- Confirmation Sample
- Investigative Sample
- Extent of Remedial Excavation

ROBINSON NOBLE

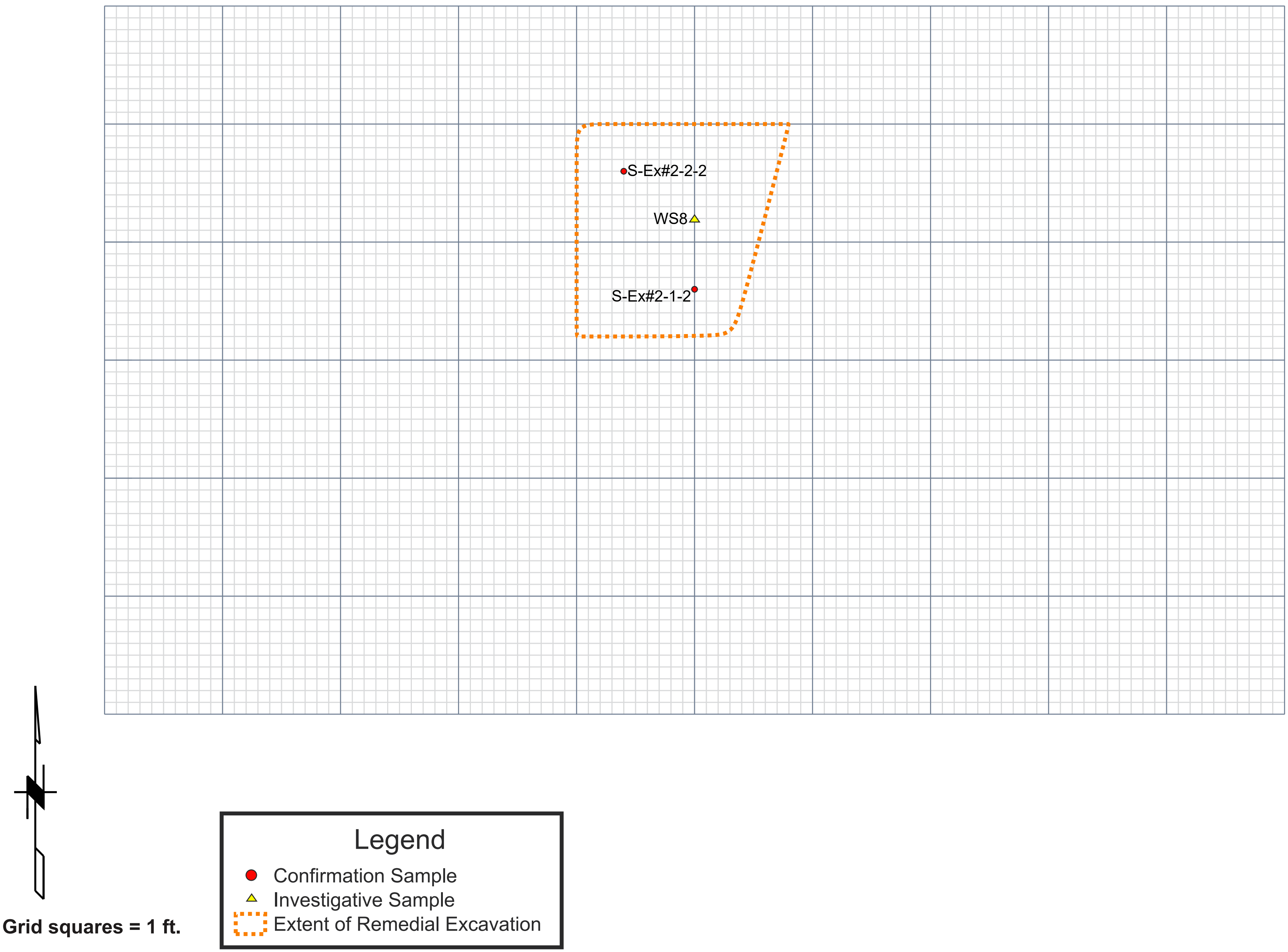
PM: MTW
May 2020
2491-001G

Thurston County
T 17 N/R 02 W - 23

Figure 15

South Remedial Excavation #1

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



ROBINSON NOBLE

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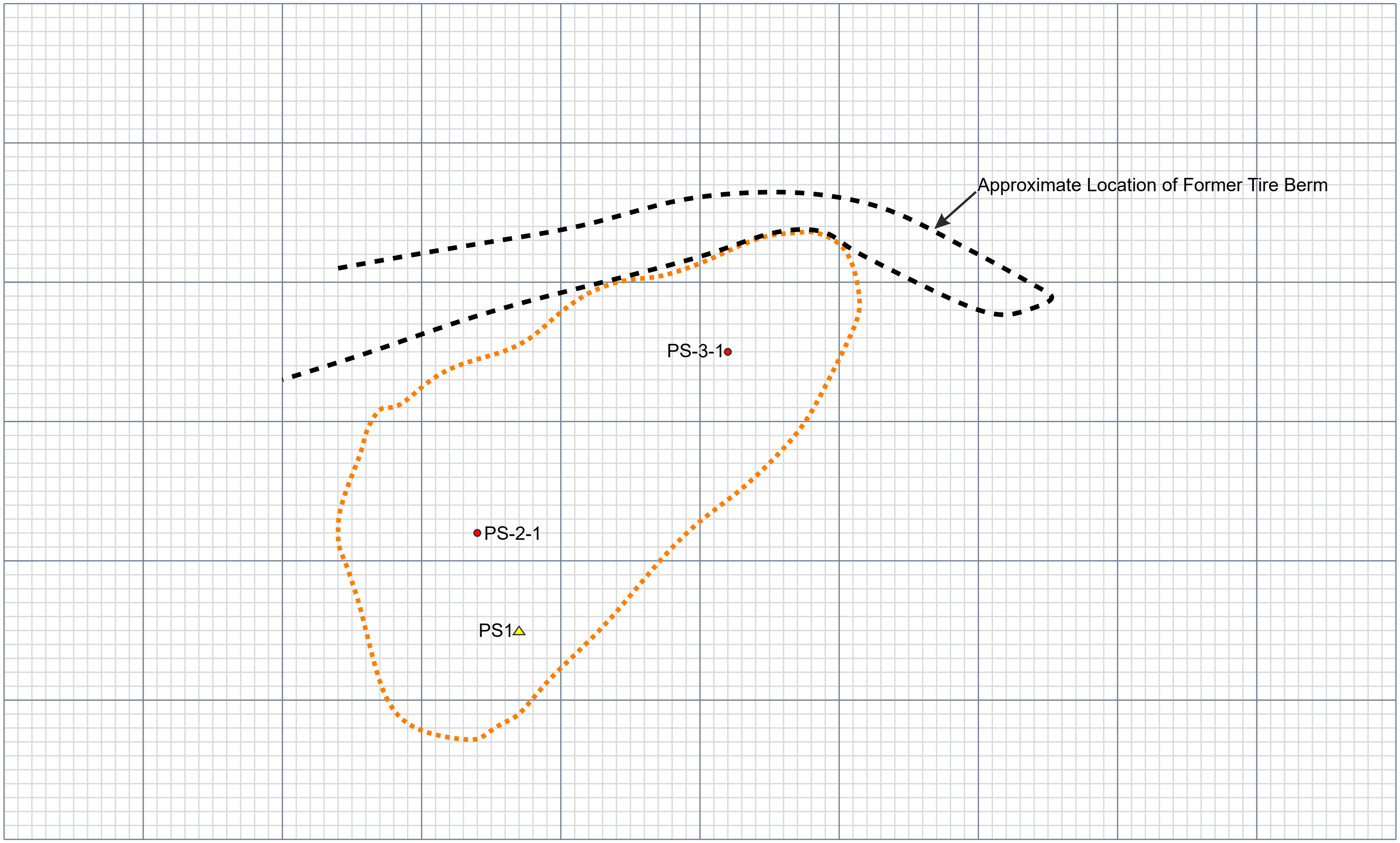
May 2020
2491-001G

Thurston County
T 17 N/R 02 W - 23

Figure 16

South Remedial Excavation #2

John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action



Grid squares = 1 ft.

Legend

- Confirmation Sample
- Investigative Sample
- Extent of Man-Made Pond

ROBINSON NOBLE	PM: MTW May 2020 2491-001G	Thurston County T 17 N/R 02 W - 23	Figure 17 Pond-Area Remedial Excavation John's Auto Wrecking, Supplemental Remedial Investigation/Cleanup Action

APPENDIX A

CSID 2120

WORKSHEET 1
SUMMARY SCORE SHEET

Site Name/Location (Street, City, County, Section/Township/Range, TCP ID Number): 57665495

John's Auto Wrecking
411 93rd Ave SE
Olympia, WA 98501

Thurston County, 23S/17TN/2RW
Tax Parcel #: 12723210000
Facility ID: 57665495
Date scored: January 27, 2004

Site Description (Include management areas, substances of concern, and quantities):

John's Auto Wrecking has been operating as a wrecking yard supporting towing operations and related businesses for approximately 22 years. Years of vehicle crushing operations and the improper handling and storage of wrecked cars have been the source of suspected contamination. The business encompasses approximately 15 acres located south of Tumwater, Washington. The site is situated at an elevation of between 188 and 194 feet above mean sea level. The ground surface of the property is essentially flat, though it slopes slightly to the southwest. Shallow groundwater is anticipated to fluctuate seasonally between periods above the surface from November to April, to as much as eight feet below ground surface during August and September. There is a ditch (Hopkins Ditch) that runs through the south end of the property, where the areas of concern (AOC) are located. The groundwater flow is to the southwest into Salmon Creek.

On October 18, 2001 the Thurston County Environmental Health Department conducted a technical assistance visit to this facility. The county identified several waste streams associated with the auto recycling facility. The facility was out of compliance for hazardous waste storage. The owner was given a reasonable timeline to bring the facility into compliance.

On February 6, 2002, officers of the Thurston County Environmental Health Department, the Washington State Patrol and other agencies inspected the property. During this inspection the Health Department discovered other improper storage practices, located in the south end of the property, which had resulted in the release of gasoline and other petroleum products to the soil and surface water. A notice of violation - Order to Correct was issued to the owner on March 1, 2002.

A contractor was retained in May by the owner to identify the AOC's. During a preliminary site investigation by the contractor, four AOC's were located on the southern part of the property near the ditch. Area 1 was the site where a previous gasoline release had occurred. Areas 2, 3 and 4 are sites where past automobile crushers had been placed.

In June, 2002 a soil sample was obtained from area 1 for a preliminary assessment of contamination. The results showed gasoline and xylenes above MTCA method A cleanup levels. Further sampling in August of 2002 showed elevated levels of Trimethylbenzene and Naphthalene. These levels did not exceed MTCA cleanup standards. Some limited work was conducted on the site, but no report was ever filed. The owner has not paid the contractor and the contractor left the project. The site was listed on August 16, 2002.

Special Considerations (Include limitations in site file data or data which cannot be accommodated in the model, but which are important in evaluating the risk associated with the site, or any other factor(s) over-riding a decision of no further action for the site):

The site has been closed down by the Washington State Patrol. There has been no official cleanup at this site. It cannot be easily determined at the present time the lateral or vertical extent of contamination. Many vehicles are still present on site.

ROUTE SCORES:

Surface Water/Human Health: 36.3   Surface Water/Environ.: 23.8

Air/Human Health:15.5   Air/Environmental: 32.4

Ground Water/Human Health: 56.6   **OVERALL RANK: 1**

WORKSHEET 2
ROUTE DOCUMENTATION

1. SURFACE WATER ROUTE

List those substances to be considered for scoring. Source: 1,2
Naphthalene, Xylenes, WTPH-Gas and Trimethylbenzene

Explain basis for choice of substance(s) to be used in scoring.
Analytical results show WTPH-Gas and Xylene above Method A cleanup levels and the rest of the compounds nearing Method A cleanup levels.

List those management units to be considered for scoring. Source: 1,2
Contaminated on-site surface and subsurface soils.

Explain basis for choice of unit to be used in scoring.
Chemical analyses of on-site soils.

2. AIR ROUTE

List those substances to be considered for scoring. Source: 1,2
Naphthalene, Xylenes, WTPH-Gas and Trimethylbenzene

Explain basis for choice of substance(s) to be used in scoring.
Analytical results show WTPH-Gas and Xylene above Method A cleanup levels and the rest of the compounds nearing Method A cleanup levels.

List those management units to be considered for scoring. Source: 1,2
Contaminated on-site surface and subsurface soils.

Explain basis for choice of unit to be used in scoring.
Chemical analyses of on-site soils with no vapor collection system.

3. GROUND WATER ROUTE

List those substances to be considered for scoring. Source: 1,2
Naphthalene, Xylenes, WTPH-Gas and Trimethylbenzene

Explain basis for choice of substance(s) to be used in scoring.
Analytical results show WTPH-Gas and Xylene above Method A cleanup levels and the rest of the compounds nearing Method A cleanup levels.

List those management units to be considered for scoring. Source: 1,2
Contaminated on-site surface and subsurface soils.

Explain basis for choice of unit to be used in scoring.
Analytical Results of on-site soils.

WORKSHEET 3 (If Required)
SUBSTANCE CHARACTERISTICS WORKSHEET
FOR MULTIPLE UNIT/SUBSTANCE SITES

Unit:

	Combination 1	Combination 2	Combination 3
1. SURFACE WATER ROUTE Substance(s):			
Human Toxicity Value:			
Environ. Toxicity Value:			
Containment Value:			
Rationale:			
Surface Water Human Subscore:	(+3) (+1) = ( ) ( ) =	(+3) (+1) = ( ) ( ) =	(+3) (+1) = ( ) ( ) =
Surface Water Environ. Subscore:	(+3) (+1) = ( ) ( ) =	(+3) (+1) = ( ) ( ) =	(+3) (+1) = ( ) ( ) =
2. AIR ROUTE Substance(s):			
Human Toxicity/Mobility Value:			
Containment Value:			
Rationale:			
Air Human Subscore:	(+3) (+1) = ( ) ( ) =	(+3) (+1) = ( ) ( ) =	(+3) (+1) = ( ) ( ) =
Air Environ. Subscore:	(+3) (+1) = ( ) ( ) =	(+3) (+1) = ( ) ( ) =	(+3) (+1) = ( ) ( ) =
3. GROUND WATER ROUTE Substance(s):			
Human Toxicity Value:			
Containment Value:			
Rationale:			
Ground Water Subscore:	(+3) (+1) = ( ) ( ) =	(+3) (+1) = ( ) ( ) =	(+3) (+1) = ( ) ( ) =

Based on their respective highest scoring toxicity/containment combinations, the following management units will be used for route scoring:

Surface Water -
Air -
Ground Water -

WORKSHEET 4
SURFACE WATER ROUTE

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

	Drinking Water Standard		Acute Toxicity		Chronic Toxicity		Carcinogenicity		
Substance	μg/L	Val.	mg/kg-bw	Val.	Mg/kg/day	Val.	WOE	PF*	Val.
1. WTPH-Gas	5	8	3306	3	-	-	A	1	5
2. Xylenes	10,000	2	50	10	2	3	-	-	-
3. Trimethylbenzene	-	-	8970	1	-	-	-	-	-
4. Naphthalene	20	6	490	5	0.004	5	-	-	-
5.									

PF*= Potency Factor **Source:** 1,2,3

Highest Value: 10 (Max.=10) +2 Bonus Points? ______ **Final Toxicity Value: 12**

1.2 Environmental Toxicity

Substance	**(X) Freshwater ( ) Marine Acute Water Quality Criteria**		**Non-human Mammalian Acute Toxicity**	
	(ug/1)	**Value**	**(mg/kg)**	**Value**
1. WTPH-Gas	5300	2	-	-
2. Xylenes	-	-	-	-
3. Trimethylbenzene	-	-	-	-
4. Naphtalene	2300	2	-	-
5.				

Source: 1,2,3 Value: 2 (Max. =10)

1.3 Substance Quantity: **Source: 1 Value: 1 (Max. =10)**

Explain basis: unknown

2.0 MIGRATION POTENTIAL

2.1 Containment : Spill, discharge or contamianted soil at the surface with no run-on/runoff control **Source: 1 Value: 10 (Max. =10)**

2.2 Surface Soil Permeability **Source: 1,5 Value: 3 (Max. =7)**
Nisqually loamy fine sand

2.3 Total Annual Precipitation (inches) **Source: 6 Value: 4 (Max. =5)**
51 inches

2.4 Max. 2-yr/24-hr precipitation (inches) **Source: 4 Value: 3 (Max. =5)**
2.5 inches

2.5 Flood Plain **Source: 5 Value: 2 (Max. =2)**
100 year flood

2.6 Terrain Slope (%) 0 to 3% slope **Source: 5 Value: 2 (Max. =5)**

3.0 TARGETS

3.1 Distance to Surface Water **Source: 5 Value: 10 (Max. =10)**
< 1000 feet

3.2 Population Served within 2 miles **Source: 5 Value: 0 (Max. =75)**
See WARM Scoring Manual Regarding Direction
pop. = x = n None

3.3 Area Irrigated within 2 miles **Source: 5 Value: 3 (Max. =30)**
See WARM Scoring Manual Regarding Direction
0.75 # of acres = n 20 acres
0.75 x = 0.75(y) = n .75/20= 3

3.4 Distance to Nearest Fishery Resource **Source: 1,5 Value: 0 (Max. =12)**
ephermal stream not fishery resource

3.5 Distance to and Names of Nearest Sensitive Environments
200 feet to wetland **Source: 1,5 Value: 12 (Max. =12)**

4.0 RELEASE
Explain the basis for scoring a release to surface water
Photographs showing discolored plume/Sheen **Source: 7 Value: 5 (Max.=5)**

WORKSHEET 5
AIR ROUTE

1.0 SUBSTANCE CHARACTERISTICS

1.1 Introduction (WARM Scoring Manual) - Please review before scoring

1.2 Human Toxicity

Substance	Air Standard		Acute Toxicity		Chronic Toxicity		Carcinogenicity		
	(ug/m^3)	Val.	(mg/m^3)	Val.	(mg/kg/day)	Val.	WOE	PF	Val.
1. WTPH-Gas	0.12	10	31947	3	-	-	A	.029	5
2. Xylene	1448.6	1	21714	3	0.085	1	-	-	-
3. Trimethylbenzene	416.3	4	-	-	-	-	-	-	-
4. Naphthalene	166.5	4	-	-	-	-	-	-	-
5.									

Source: 1,3 Value: 10 **(Max. =10)**
+2 Bonus Points?
Final Toxicity Value: **10**

1.3 Mobility
(Use numbers to refer to above listed substances)

1.3.1 Gaseous Mobility
Vapor Pressures (mmHg) **Source: 3 Value: 4 (Max. =4)**
1. 9.5E+01 = 4
2. 1.0E+01 = 4
3. ------
4. 8.2E-02 = 3
5.

1.3.2 Particulate Mobility **Source:_____ Value: NS (Max. =4)**
Soil Type:
Erodibility:
Climactic Factor:

1.4 Highest Human Health Toxicity/Mobility Matrix Value (from Table A-7)
Equals Final Matrix Value **Source: 3 Value: 20 (Max. =24)**

1.5 Environmental Toxicity/Mobility **Source: 3 Value: 6 (Max. =24)**

Non-human Mammalian Acute (Table A-7)

Substance	Inhalation Toxicity (mg/m^3)	Value	Mobility (mmHg)	Value	Matrix Value
1. WTPH-Gas	31947 rat	3	9.5E+01	4	6
2. Xylenes	21714 rat	3	1.0E+01	3	5
3.	-	-	-	-	-
4.	-	-	-	-	-
5.					

Highest Environmental Toxicity/Mobility Matrix Value (From Table A-7) equals
Final Matrix Value: 6

1.6 Substance Quantity: **Source: 1 Value: 1 (Max. =10)**

Explain basis: unknown

2.0 MIGRATION POTENTIAL

2.1 Containment: **Source: 4 Value: 10 (Max. =10)**
Cover <2 feet thick or suface spill/dischare and no vapor collection system

3.0 TARGETS

3.1 Nearest Population **Source: 5 Value: 10 (Max. =10)**
$\leq$ 1000 feet

3.2 Distance to and Names of Nearest Sensitive Environments
Wetlands surrounding Hopkins Ditch <1000 feet **Source: 1,5 Value: 7 (Max. =7)**

3.3 Population within 0.5 miles: **Source: 5 Value: 8 (Max. =75)**
pop. = 70 = n

4.0 RELEASE
Explain basis for scoring a release to air:
No documented release **Source: 1 Value: 0 (Max. =5)**

WORKSHEET 6
GROUND WATER ROUTE

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

Substance	Drinking Water Standard		Acute Toxicity		Chronic Toxicity		Carcinogenicity		
	(ug/m³)	Val	(mg/kg/bw)	Val	(mg/kg/day)	Val	WOE	PF	Val
1. TPH-Gasoline	5	8	3306	3	-	-	A	.029	5
2. Trimethylbenzene	-	-	8970	1	-	-	-	-	-
3. Xylenes	10,000	2	50	10	2	3	-	-	-
4. Naphthalene	20	6	490	5	0.004	5	-	-	-
5.									

Source: 1,2,3 Value: 10 **(Max. =10)**
+2 Bonus Points? 2
Final Toxicity Value: 12

1.2 Mobility
(Use numbers to refer to above listed substances)
Cations/Anions **Source:** __ **Value:** ___ **(Max. =12)**
1.
2.
3.
4.
5.

OR Solubility **Source: 3 Value:** 3 **(Max. =3)**
1. 1800 = 3
2. -
3. 200 = 2
4. 30 = 1
5.

1.3 Substance Quantity **Source: 1 Value:** 1 **(Max. =10)**
Unknown
Explain basis:

2.0 MIGRATION POTENTIAL

2.1 Containment **Source: 1 Value:** 10 **(Max. =10)**
Explain Basis: Spills

2.2 Net Precipitation (inches): **Source: 6 Value:** 3 **(Max. =5)**
27.06"

2.3 Subsurface Hydraulic Conductivity: **Source: 1 Value:** 4 **(Max. =4)**
$1.4x10^{-3}$

2.4 Vertical Depth to Ground Water: **Source: 1 Value:** 8 **(Max. =8)**
8 feet

3.0 Targets

3.1 Ground Water Usage: **Source: 5 Value:** 5 **(Max. =10)**
Private supply, no alt. Source available

3.2 Distance to Nearest Drinking Well (ft): **Source: 1,5 Value: 3 (Max. =5)**
1,340 feet

3.3 Population Served within 2 miles: **Source: 5 Value: 62 (Max. =100)**
3,800 people
pop. = x = n

3.4 Area irrigated by Wells within 2 miles: **Source: 5 Value: 8 (Max. =50)**
100 acres
0.75 100 of acres = n
0.75 x = 0.75(y) = n

4.0 RELEASE **Source: 1 Value: 0 (Max. =5)**
Explain basis for scoring a release to ground water:
No documented release

SOURCES USED IN SCORING

1. Remedial Investigation and cleanup Workplan, John's Auto Wrecking & Towing, Olympia, Washington, July 2002.
2. Soil Sampling Summary, John's Auto Wrecking, Olympia, Washington, August 2002.
3. Washington Department of Ecology, Toxicology Database for Use in Washington, Ranking Method Scoring, January 1992.
4. Washington Department of Ecology, WARM Scoring Manual, April 1992.
5. Thurston County Geodata Center, maps and figures 2004.
6. Thurston County Climatic Data, National Weather Service, Olympia Station, January 1983 through December 1997.
7. Numerous site visits by Patrick Soderberg, TCHD, October 2001 to present.

Cleanup Site Details

Cleanup Site ID: 2120

Cleanup Site ID: 2120 **Facility/Site ID:** 57665495 **UST ID:** N/A Site Page Site Documents View Map

Cleanup Site Name: JOHNS AUTO WRECKING aka Havens Estate Investments, LLC Glossary

Alternate Names: Havens Estate Investments, LLC, JOHNS AUTO WRECKING, JOHNS AUTO WRECKING aka Havens Estate Investments, LLC

LOCATION

Address: 411 93RD AVE SE **City:** OLYMPIA **Zip Code:** 98501 **County:** Thurston

Latitude: 46.95249 **Longitude:** -122.90180 **WRIA:** 23 **Legislative District:** 35 **Congressional District:** 10 **TRS:** 17N 2W 23

DETAIL

Status:	Cleanup Started	**NFA Received?**	No	**Is PSI site?**	No		
Statute:	MTCA	**NFA Date:**	N/A	**Current VCP?**	Yes	**Past VCP?**	Yes
Site Rank:	1 - Highest Assessed Risk	**NFA Reason:**	N/A	**Brownfield?**	No		
Site Manager:	Mullin, Tim	**Responsible Unit:**	Southwest	**Active Institutional Control?**	No		

CLEANUP UNITS

Cleanup Unit Name	Unit Type	Unit Status	Resp Unit	Unit Manager	Current Process
JOHNS AUTO WRECKING aka Havens Estate Investments, Inc.	Upland	Cleanup Started	SW	Mullin, Tim	Voluntary Cleanup Program
Johns Auto Wrecking Sediments	Sediment	Awaiting Cleanup	SW	Mullin, Tim	No Process

ACTIVE INSTITUTIONAL CONTROLS

Instrument Type	Restriction Media	Restrictions/Requirements	Date	Recording Number	Recording County	Tax Parcel
There are no current Institutional Controls in effect for this site.						

AFFECTED MEDIA & CONTAMINANTS

	MEDIA					
Contaminant	**Soil**	**Groundwater**	**Surface Water**	**Sediment**	**Air**	**Bedrock**
Arsenic		C				
Lead			C	S		
Metals - Other		C				
Metals Priority Pollutants	S	S				
Petroleum Products-Unspecified	C	S				
Polycyclic Aromatic Hydrocarbons	C	S				

Key:
B - Below Cleanup Level C - Confirmed Above Cleanup Level RA - Remediated-Above
S - Suspected R - Remediated RB - Remediated-Below

SITE ACTIVITIES

Activity	Status	Start Date	End Date/ Completion Date
Initial Investigation / Federal Preliminary Assessment	Completed		3/11/2002
Early Notice Letter(s)	Completed		8/19/2002
Site Hazard Assessment/Federal Site Inspection	Completed	6/25/2003	2/4/2006

Cleanup Site Details

Cleanup Site ID: 2120

SITE ACTIVITIES			
Activity	**Status**	**Start Date**	**End Date/ Completion Date**
Hazardous Sites Listing/NPL	Completed		2/4/2004
VCP Opinion on Remedial Investigation	Completed	11/28/2005	2/23/2006
VCP Receipt of Plan or Report	Completed		8/27/2010
VCP Opinion on Remedial Investigation	Completed	8/27/2010	8/23/2011
VCP Opinion on Remedial Investigation Work Plan	Completed	4/16/2012	6/28/2012
VCP Opinion on Site Cleanup	Completed	9/3/2013	9/25/2013

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

November 16, 2017

Electronic Copy

Judith M. Wirth
LLC Member
Havens Estate Investments, LLC
5023 8th Avenue NE
Seattle, WA 98105

Re: Acceptance of VCP Application for the following Contaminated Site:

- **Site Name:** Johns Auto Wrecking aka Havens Estate Investments, LLC
- **Site Address:** 411 93rd Ave SE Olympia, 98501-9701 Thurston
- **Cleanup Site ID:** 2120
- **Facility/Site ID:** 57665495
- **VCP Project ID:** SW1613

Dear Ms. Wirth:

The Department of Ecology (Ecology) has accepted your Voluntary Cleanup Program (VCP) application for Havens Estate Investments facility (Site). We applaud your initiative and welcome your interest in the VCP. This letter confirms your entry into the VCP and provides important information on how we will manage the VCP Cleanup Project (Project) and the Site.

Agreement

Ecology has completed and signed the VCP Agreement governing the Project on **September 13, 2017**. This is the effective date of the Agreement. **Enclosure A** includes a copy of the Agreement. Please review it carefully.

Identification

Ecology has assigned a unique name and number to the **Site**. We have also assigned a unique number to your **Project** at the Site. You can find this information in the box at the bottom of the first page of the Agreement. When contacting us, please use this information to identify your Project.

Designated Managers
Please direct communications between Ecology and Havens Estate Investments, LLC through the designated managers to the maximum extent possible.

- **Ecology**

We have designated the following site manager to respond to your requests:

Timothy Mullin
Department of Ecology
Toxic Cleanup Program,
Southwest Regional Office
300 Desmond Drive SE
Lacey, WA 98504
Phone: 360-407-6265
E-mail: Timothy.Mullin@ecy.wa.gov

- **Havens Estate Investments, LLC**

  The application designated you, Judith Wirth as the project manager for Havens Estate Investments, LLC. We will therefore respond only to your requests. If someone replaces you as the project manager or your contact information changes, please submit a Change of Contact Form. You can download the Form from our VCP web site: www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm.

Requests for Written Opinions

As the cleanup of the Site progresses, you may request written opinions on your planned or completed remedial actions by submitting to Ecology the following:

- Request for Opinion Form, which you can download from our VCP web site: www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm.

- Plans or reports documenting the remedial action

Reporting Requirements

When requesting written opinions on planned or completed remedial actions, please comply with the following reporting requirements:

- **Licensing.** You must submit documents containing geologic, hydrologic, or engineering work under the seal of an appropriately licensed professional, as required by Chapters 18.43 and 18.220 RCW.

- **Data Submittal.** You must submit environmental sampling data in both a printed form and an electronic form capable of being transferred into our Environmental Information Management (EIM) system. For an overview of data submittal requirements, please refer to **Enclosure B**, which includes a copy of Toxics Cleanup Program Policy 840. For instructions on how to submit data, please refer to the following web site: www.ecy.wa.gov/programs/tcp/data_submittal/data_requirements.htm.

Failure to comply with these requirements may result in unnecessary delays.

Payment

Ecology will send monthly invoices to the billing contact designated in the Application Form. If someone replaces the billing contact or their contact information changes, please submit a Change of Contact Form. You can find the Form on the VCP web site.

The invoice will include a summary of the costs incurred, payments received, identity of staff involved, and the amount of time spent on the Project during the previous month. Payment is due within thirty days of the invoice date. For more information on the billing system, please refer to the VCP web site.

Contact Information

We are committed to working with you to accomplish the prompt and effective cleanup of the Site. Again, if you have any questions about the VCP or your Project, please contact Timothy Mullin at 360-407-6265.

Sincerely,

Nicholas M. Acklam

Nicholas Acklam
VCP Unit Manager
Toxics Cleanup Program, Southwest Regional Office

NA: kb

Enclosures (2): A – Copy of VCP Agreement
B – Toxics Cleanup Program Policy 840: Data Submittal Requirements

By certified mail: [91 7199 9991 7037 7462 2156]

cc: Max Wills, Robinson-Noble, Inc.
Nicholas Acklam, Ecology
Stephanie Bussell, Ecology
Tim Mullin, Ecology

Enclosure A

VCP Agreement

VCP AGREEMENT

DEPARTMENT OF ECOLOGY
State of Washington

INSTRUCTIONS: Submit this Agreement (original) to Ecology as part of your Application. Before submitting, enter the Customer's name and the Site's address on the first page and sign the Agreement on the second page. If your Application is accepted, then Ecology will do the following: 1) identify the Site and VCP project in the box below; 2) sign the Agreement; and 3) send you a copy of the completed Agreement.

This document constitutes an Agreement between the State of Washington Department of Ecology (Ecology) and Havens Estate Investments, LLC (Customer) to provide informal site-specific technical consultations under the Voluntary Cleanup Program (VCP) for the Site identified below and associated with the following address: 411 - 93rd Ave SE, Olympia, WA 98501.

The purpose of this Agreement is to facilitate independent remedial action at the Site. Ecology is entering into this Agreement under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC. If a term in this Agreement is defined in MTCA or Chapter 173-340 WAC, then that definition shall govern.

Services Provided by Ecology

Upon request, Ecology agrees to provide the Customer informal site-specific technical consultations on the independent remedial actions proposed for or performed at the Site consistent with WAC 173-340-515(5). Those consultations may include assistance in identifying applicable regulatory requirements and opinions on whether the remedial actions proposed for or conducted at the Site meet those requirements.

Ecology may use any appropriate resource to provide the Customer with the requested consultative services. Those resources may include, but shall not be limited to, those of Ecology and the Office of the Attorney General. However, Ecology shall not use independent contractors unless the Customer provides Ecology with prior written authorization.

In accordance with RCW 70.105D.030(1)(i), any opinions provided by Ecology under this Agreement are advisory only and not binding on Ecology. Ecology, the state, and officers and employees of the state are immune from all liability. Furthermore, no cause of action of any nature may arise from any act or omission in providing, or failing to provide, informal advice and assistance under the VCP.

Payment for Services by Customer

The Customer agrees to pay all costs incurred by Ecology in providing the informal site-specific technical consultations requested by the Customer consistent with WAC 173-340-515(6) and 173-340-550(6). Those costs may include the costs incurred by attorneys or independent contractors used by Ecology to provide the requested consultative services. Ecology's hourly costs shall be determined based on the method in WAC 173-340-550(2).

Ecology shall mail the Customer a monthly itemized statement of costs (invoice) by the tenth day of each month (invoice date) that there is a balance on the account. The invoice shall include a summary of the costs incurred, payments received, identity of staff involved, and amount of time staff spent on the project.

The Customer shall pay the required amount by the due date, which shall be thirty (30) calendar days after the invoice date. If payment has not been received by the due date, then Ecology shall withhold

FOR COMPLETION BY ECOLOGY ONLY	Facility / Site Name: Havens Estate Investments, LLC
	Facility / Site No.: 57665495
	VCP Project No.: SW1613

RECEIVED
SEP 13 2017
WA State Department of Ecology (SWRO)

any requested opinions and notify the Customer by certified mail that the debt is past due. If payment has not been received within sixty (60) calendar days of the invoice date, then Ecology shall stop all work under the Agreement and may, as appropriate, assign the debt to a collection agency under Chapter 19.16 RCW. The Customer agrees to pay the collection agency fee incurred by Ecology in the course of debt collection.

Reservation of Rights / No Settlement

This Agreement does not constitute a settlement of liability to the state under MTCA. This Agreement also does not protect a liable person from contribution claims by third parties for matters addressed by the Agreement. The state does not have the authority to settle with any person potentially liable under MTCA except in accordance with RCW 70.105D.040(4). Ecology's signature on this Agreement in no way constitutes a covenant not to sue or a compromise of any Ecology rights or authority.

Ecology reserves all rights under MTCA, including the right to require additional or different remedial actions at the Site should it deem such actions necessary to protect human health and the environment, and to issue orders requiring such remedial actions. Ecology also reserves all rights regarding the injury to, destruction of, or loss of natural resources resulting from the release or threatened release of hazardous substances at the Site.

Effective Date, Modifications, and Severability

The effective date of this Agreement shall be the date on which this Agreement is signed by the Toxics Cleanup Program's Section Manager or delegated representative. This Agreement may be amended by mutual agreement of Ecology and the Customer. Amendments shall be in writing and shall be effective when signed by the Toxics Cleanup Program's Section Manager or delegated representative. If any provision of this Agreement proves to be void, it shall in no way invalidate any other provision of this Agreement.

Termination of Agreement

Either party may terminate this Agreement without cause by sending written notice by U.S. mail to the other party. The effective date of termination shall be the date Ecology sends notice to the Customer or the date Ecology receives notice from the Customer, whichever occurs first. Unless otherwise directed, issuance of a No Further Action opinion, either for the Site as a whole or for a portion of the real property located within the Site, shall constitute notice of termination by Ecology.

Under this Agreement, the Customer is only responsible for costs incurred by Ecology before the effective date of termination. However, termination of this Agreement shall not affect any right Ecology may have to recover its costs under MTCA or any other provision of law.

Representations and Signatures

The undersigned representative of the Customer hereby certifies that he or she is fully authorized to enter into this Agreement and to execute and legally bind the Customer to comply with the Agreement.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Rebecca S. Lawson
Signature

REBECCA S. LAWSON
Printed Name

Section Manager, SWRO
Toxics Cleanup Program *Section*

Date: 9/13/2017

Havens Estate Investments, LLC
Name of Customer

Judith M. Wirth
Signature

Judith M. Wirth, Personal Representative
Printed Name of Signatory

Member
Title of Signatory

Date: 9/13/2017

If you need this document in an alternative format, please call the Toxics Cleanup Program at 360-407-7170. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Enclosure B

Toxics Cleanup Program Policy 840
Data Submittal Requirements

DEPARTMENT OF ECOLOGY
State of Washington

Toxics Cleanup Program

Policy 840: Data Submittal Requirements

Established: August 1, 2005

Revised: April 12, 2016

Contact: Policy & Technical Support Unit, Headquarters

Purpose: This Policy provides guidance on the submission of environmental monitoring data generated or collected during the investigation or cleanup of contaminated sites under the Model Toxics Control Act.

References: WAC 173-340-840 (5)
Chapter 173-204 WAC
Environmental Information Management System Database
Sediment Cleanup Users Manual II

Attachments: A - Model Grant and Permit Condition

Disclaimer: This Policy is intended solely for the guidance of Ecology staff. It is not intended, and cannot be relied on, to create rights, substantive or procedural, enforceable by any party in litigation with the state of Washington. Ecology may act at variance with this Policy depending on site-specific circumstances, or modify or withdraw this Policy at any time.

Approved by:

James J. Pendowski, Program Manager
Toxics Cleanup Program

Accommodation Requests: To request ADA accommodation, including materials in a format for the visually impaired, call Ecology's Toxics Cleanup Program at 360-407-7170. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Purpose and Applicability

The investigation and cleanup of contaminated sites generate a large volume of environmental monitoring data that need to be properly managed to facilitate regulatory decisions. The data also need to be accessible by Ecology staff, site owners, consultants, and the general public.

This Policy describes the requirements for submitting environmental monitoring data generated or collected during the investigation and cleanup of contaminated sites under Chapter 70.105D RCW, Model Toxics Control Act (MTCA).

This Policy applies to Ecology staff and any person who investigates or cleans up contaminated sites and submits related environmental sampling data to Ecology, including potentially liable persons, Voluntary Cleanup Program (VCP) customers, prospective purchasers, government agencies, and Ecology contractors.

1. **Unless otherwise specified by Ecology, all environmental monitoring data generated during contaminated site investigations and cleanups are required to be submitted to Ecology in both written format and electronically through EIM.**

Environmental monitoring data include biological, chemical, physical, and radiological data generated during site investigations and cleanups under the Model Toxics Control Act Cleanup Regulation (Chapter 173-340 WAC) and the Sediment Management Standards (Chapter 173-204 WAC).

The Environmental Information Management System (EIM) is a searchable database that contains data collected by Ecology (or by environmental contractors on behalf of Ecology), and by Ecology grant recipients, local governments, the regulated community, and volunteers.

Under this Policy, data are considered to be "environmental monitoring data" if generated or collected during:

a. Site investigations and cleanups conducted under an order, agreed order or consent decree, permit, grant, loan, contract, interagency agreement, memorandum of understanding; or
b. An independent remedial action.

Under this Policy, data are not considered to be environmental monitoring data if generated or collected for the following studies. This means that entering data into EIM, while encouraged, is optional for:

a. Non site-specific studies;
b. Site hazard assessments that result in no further action; and
c. All initial site investigations.

2. Orders, agreed orders, consent decrees, or permits must include a condition that site-specific environmental sampling data be submitted in compliance with this Policy.

For those reports prepared and submitted for review under an order, agreed order, consent decree, or permit, the environmental sampling data must be entered into EIM at the time of report submittal. If reports for such work do not include documentation that data was submitted in compliance with this Policy, the reports shall be deemed incomplete and a notice will be provided to the submitter.

Generally, Ecology should not review such reports until that documentation is provided. The assistant attorney general assigned to the site should be consulted for an appropriate response when Ecology's review is delayed due to failure of data entry into EIM.

3. Site-specific environmental sampling data must be entered into EIM before Ecology will review independent remedial action reports under the Voluntary Cleanup Program.

For independent remedial action reports prepared and submitted under Ecology's Voluntary Cleanup Program (VCP), environmental sampling data must be entered into EIM at the time any report is submitted requesting an opinion on the sufficiency of the action under the VCP.

However, Ecology may establish an alternate deadline for entering data into EIM if this Policy creates undue hardship on the VCP customer and Ecology does not need the data in EIM to begin the review.[1] But in no case will Ecology issue a No Further Action (NFA) opinion letter under the VCP—either for the whole site or a property located within the site—until the data has been entered into EIM.

If sampling data has not been entered into EIM, Ecology may still review the report for the limited purpose of determining whether it contains sufficient information to provide an opinion. If the report is incomplete, Ecology may also respond to the VCP customer's request for an opinion by issuing an administrative letter rejecting the report and requesting additional information.

---

[1] For example, when a site has multiple groundwater sampling events over time, it may be more efficient to enter the data into EIM at one time after monitoring is completed, rather than for each monitoring event. Another example would be where a VCP consultant is using EIM for the first time and needs additional time to learn how to use the system.

4. **Grants, contracts, interagency agreements or memoranda of understanding issued after the effective date of this Policy must include a condition that site-specific data be submitted in compliance with this Policy.**

Reports on such work will not be accepted as complete until the data have been submitted in compliance with this Policy. If a payment or transfer of funds is involved in the transaction, the relevant payment or transfer shall be withheld until this requirement has been met. Attachment A contains example language to include in these documents.

5. **Data generated during upland investigations and cleanups must be submitted electronically using Ecology's EIM.**

The Environmental Information Management System is Ecology's main database for environmental monitoring data. Proper submission of data through this system meets the requirement of submitting such data in an electronic format.

Additional information about EIM, including instructions for data submittal, can be found on Ecology's EIM website at http://www.ecy.wa.gov/eim/. The Toxic Cleanup Program's (TCP) EIM Coordinator can also provide technical assistance to site managers and consultants who use EIM.

6. **Data generated during sediment investigations and cleanups must be submitted electronically using Ecology's EIM.**

Effective March 1, 2008, EIM is Ecology's data management system for sediment-related data. Proper submission of data through EIM meets the requirement of submitting such data in an electronic format. Electronic data must be submitted to Ecology simultaneously with the accompanying report.

For additional information on sediment sampling and analysis plan requirements, see Ecology's *Sediment Cleanup Users Manual (SCUM II)* Publication No. 12-09-057, available at: https://fortress.wa.gov/ecy/publications/summarypages/1209057.html

The Sediment Data Coordinator in TCP's Aquatic Land Cleanup Unit (ALCU) can also provide technical assistance with EIM.

7. **Data submitted electronically using EIM must be checked by the Toxics Cleanup Program's EIM Coordinator before the data will be officially loaded into EIM.**

Normally, TCP's EIM Coordinator will receive a notice that data have been submitted through EIM. Upon receipt of the notice, the EIM Coordinator should notify the Cleanup Project Manager. The EIM Coordinator then reviews the submittal for quality control and officially loads the data into the system.

Attachment A

Model Grant and Permit Condition

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Model Grant and Permit Condition

The following condition is to be inserted in grants, loans, contracts, interagency agreements, and memoranda of understandings where site-specific environmental monitoring data is expected to be generated:

> All sampling data shall be submitted to Ecology in both printed and electronic formats in accordance with WAC 173-340-840(5) and Ecology Toxics Cleanup Program Policy 840: Data Submittal Requirements. Electronic submittal of data is not required for site hazard assessments that result in no further action and initial site investigations. (FOR GRANTS, AND LOANS ADD: Failure to properly submit sampling data will result in Ecology withholding payment and could jeopardize future funding.)

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 · Olympia, Washington 98504-7775 · (360) 407-6300
711 for Washington Relay Service · Persons with a speech disability can call 877-833-6341

November 15, 2017

Electronic Copy

Mr. Alan J. Wertjes, Attorney at Law
Personal Representative of the Estate of John Havens
1800 Cooper Point Rd, SW Ste 3
Olympia, WA 98502

Re: Termination of VCP Agreement for the following Site:

- **Site Name:** John's Auto Wrecking
- **Site Address:** 411 93rd Ave SE, Olympia, Thurston County, WA 98501
- **Facility/Site No.:** 57665495
- **Cleanup Site No.:** 2120
- **VCP Project No.:** SW1127

Dear Mr. Wertjes:

The Department of Ecology (Ecology) is terminating the Voluntary Cleanup Program (VCP) Agreement governing project No. SW1127, John's Auto Wrecking (Site). The effective date of termination is the date of this letter. We are providing this notice in accordance with the terms of the VCP Agreement (attached as Enclosure A).

Per Thurston County Quit Claim Deed (Enclosure B) as recorded on September 13, 2017, parcels comprising the Property located at 411 93rd Ave SE, Olympia, Thurston County, Washington, have transferred to Havens Estate Investments, LLC. It is Ecology's understanding that Havens Estate Investments, LLC, has assumed responsibility for the cleanup related to the John's Auto Wrecking Site.

Termination from VCP does not constitute a determination of substantial equivalence. Though SW1127 is terminated from VCP, Ecology does not give up any of its powers, as listed in Chapter 70.105D.030 RCW. The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this termination.

Contact Information

If you have any questions about this notice, please contact me at 360-407-6241.

Sincerely,

Rebecca S. Lawson

Rebecca S. Lawson, P.E., LHG
Section Manager
Toxics Cleanup Program, SWRO

Enclosures (2): A – Signed VCP Agreement
B – Copy of Thurston County Quit Claim Deed

By Certified Mail: [91 7199 9991 7037 7462 2125]

cc: Judith Wirth, Havens Estate Investments, LLC
Max Wills, Robinson-Noble
Patrick Soderberg, Thurston County Environmental Health
Stephanie Bussell, Ecology
Tim Mullin, Ecology

Enclosure A

Signed VCP Agreement

RECEIVED

AUG 10 2010

WA State Department of Ecology (SWRO)

VCP AGREEMENT

DEPARTMENT OF ECOLOGY State of Washington

INSTRUCTIONS: Submit this Agreement (original) to Ecology as part of your Application. Before submitting, enter the Customer's name and the Site's address on the first page and sign the Agreement on the second page. If your Application is accepted, then Ecology will do the following: 1) identify the Site and VCP project in the box below; 2) sign the Agreement; and 3) send you a copy of the completed Agreement.

This document constitutes an Agreement between the State of Washington Department of Ecology (Ecology) and Alan J. Wertjes, Personal Representative of the Estate of John Havens Sr. (Customer) to provide informal site-specific technical consultations under the Voluntary Cleanup Program (VCP) for the Site identified below and associated with the following address: 411 93rd Ave SE, Olympia, WA 98501-9701.

The purpose of this Agreement is to facilitate independent remedial action at the Site. Ecology is entering into this Agreement under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC. If a term in this Agreement is defined in MTCA or Chapter 173-340 WAC, then that definition shall govern.

Services Provided by Ecology

Upon request, Ecology agrees to provide the Customer informal site-specific technical consultations on the independent remedial actions proposed for or performed at the Site consistent with WAC 173-340-515(5). Those consultations may include assistance in identifying applicable regulatory requirements and opinions on whether the remedial actions proposed for or conducted at the Site meet those requirements.

Ecology may use any appropriate resource to provide the Customer with the requested consultative services. Those resources may include, but shall not be limited to, those of Ecology and the Office of the Attorney General. However, Ecology shall not use independent contractors unless the Customer provides Ecology with prior written authorization.

In accordance with RCW 70.105D.030(1)(i), any opinions provided by Ecology under this Agreement are advisory only and not binding on Ecology. Ecology, the state, and officers and employees of the state are immune from all liability. Furthermore, no cause of action of any nature may arise from any act or omission in providing, or failing to provide, informal advice and assistance under the VCP.

Payment for Services by Customer

The Customer agrees to pay all costs incurred by Ecology in providing the informal site-specific technical consultations requested by the Customer consistent with WAC 173-340-515(6) and 173-340-550(6). Those costs may include the costs incurred by attorneys or independent contractors used by Ecology to provide the requested consultative services. Ecology's hourly costs shall be determined based on the method in WAC 173-340-550(2).

Ecology shall mail the Customer a monthly itemized statement of costs (invoice) by the tenth day of each month (invoice date) that there is a balance on the account. The invoice shall include a summary of the costs incurred, payments received, identity of staff involved, and amount of time staff spent on the project.

The Customer shall pay the required amount by the due date, which shall be thirty (30) calendar days after the invoice date. If payment has not been received by the due date, then Ecology shall withhold

FOR COMPLETION BY ECOLOGY ONLY	Facility / Site Name:	57665495 Johns Auto Wrecking
	Facility / Site No.:	
	VCP Project No.:	SW1127

ECY 070-324 (revised July 2008)

any requested opinions and notify the Customer by certified mail that the debt is past due. If payment has not been received within sixty (60) calendar days of the invoice date, then Ecology shall stop all work under the Agreement and may, as appropriate, assign the debt to a collection agency under Chapter 19.16 RCW. The Customer agrees to pay the collection agency fee incurred by Ecology in the course of debt collection.

Reservation of Rights / No Settlement

This Agreement does not constitute a settlement of liability to the state under MTCA. This Agreement also does not protect a liable person from contribution claims by third parties for matters addressed by the Agreement. The state does not have the authority to settle with any person potentially liable under MTCA except in accordance with RCW 70.105D.040(4). Ecology's signature on this Agreement in no way constitutes a covenant not to sue or a compromise of any Ecology rights or authority.

Ecology reserves all rights under MTCA, including the right to require additional or different remedial actions at the Site should it deem such actions necessary to protect human health and the environment, and to issue orders requiring such remedial actions. Ecology also reserves all rights regarding the injury to, destruction of, or loss of natural resources resulting from the release or threatened release of hazardous substances at the Site.

Effective Date, Modifications, and Severability

The effective date of this Agreement shall be the date on which this Agreement is signed by the Toxics Cleanup Program's Section Manager or delegated representative. This Agreement may be amended by mutual agreement of Ecology and the Customer. Amendments shall be in writing and shall be effective when signed by the Toxics Cleanup Program's Section Manager or delegated representative. If any provision of this Agreement proves to be void, it shall in no way invalidate any other provision of this Agreement.

Termination of Agreement

Either party may terminate this Agreement without cause by sending written notice by U.S. mail to the other party. The effective date of termination shall be the date Ecology sends notice to the Customer or the date Ecology receives notice from the Customer, whichever occurs first. Unless otherwise directed, issuance of a No Further Action opinion, either for the Site as a whole or for a portion of the real property located within the Site, shall constitute notice of termination by Ecology.

Under this Agreement, the Customer is only responsible for costs incurred by Ecology before the effective date of termination. However, termination of this Agreement shall not affect any right Ecology may have to recover its costs under MTCA or any other provision of law.

Representations and Signatures

The undersigned representative of the Customer hereby certifies that he or she is fully authorized to enter into this Agreement and to execute and legally bind the Customer to comply with the Agreement.

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY	Alan J. Wertjes *Name of Customer*
Rebecca Lawson *Signature*	*Signature*
REBECCA LAWSON *Printed Name*	Alan J. Wertjes *Printed Name of Signatory*
Section Manager, SWRO Toxics Cleanup Program *Section*	Customer/Personal Representative/Attorney *Title of Signatory*
Date: 8/27/10	Date: August 18, 2010

If you need this document in an alternative format, please call the Toxics Cleanup Program at 360-407-7170. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Enclosure B

Copy of Thurston County Quit Claim Deed

SEP 13 '17 534706

When Recorded Return to:

William L. Fleming
Keller Rohrback L.L.P.
1201 Third Avenue, Suite 3200
Seattle, WA 98101

Thurston County Treasurer

Real Estate Excise Tax Paid *none*
By *[signature]* Deputy

QUIT CLAIM DEED

Grantor: (1) Wertjes, Alan J., Personal Representative of Estate of John J. Havens, Sr., Deceased
(2) Wirth, Judith M., Personal Representative of Estate of Sarah K. Havens, Deceased

Grantee: Havens Estate Investments, LLC, a Washington limited liability company

Abbreviated Legal: Pors. 23-17-2W

Complete legal description on pgs. 1-2

APN: 12723210000, 12723210100, 12723210400, 12723210401, 12723210700, 12723220200

THE GRANTORS, ALAN J. WERTJES, Personal Representative of the Estate of John J. Havens, Sr., Deceased, acting with nonintervention powers granted by orders entered on October 20, 2006, and June 26, 2007, in the Superior Court of the State of Washington for Thurston County, Case No. 06-4-00444-7, and JUDITH M. WIRTH, Personal Representative of the Estate of SARAH K. HAVENS, Deceased, acting with nonintervention powers granted by order entered on December 29, 2011, in the Superior Court of the State of Washington for Thurston County, Case No. 11-4-00753-1, and not in their individual capacities, in consideration of transfer to a limited liability company of which the Grantors are all of the members, and for no monetary consideration, hereby convey and quit claim to HAVENS ESTATE INVESTMENTS, LLC, a Washington limited liability company, all right, title and interest of the Grantors in the following described real estate, situated in Thurston County, State of Washington, together with all after-acquired title of the Grantors therein:

Parcel A

The North 208.5 feet of the West 417.5 feet of the West half of the Northeast quarter of the Northwest quarter of Section 23, Township 17 North, Range 2 West, W.M.;

EXCEPT the West 90.75 feet;

4585799 Pages: 3
09/13/2017 10:51 AM Deed
Thurston County Washington
ROHRBACK, KELLER LLP

AND EXCEPT county road known as 93rd Avenue on the North.

Parcel B

The South 195.5 feet of the North 405 feet of the West 417.5 feet of the West half of the Northeast quarter of the Northwest quarter of Section 23, Township 17 North, Range 2 West, W.M.

Parcel C

The East 54.25 feet of the North 330 feet of the Northwest quarter of the Northwest quarter of Section 23, Township 17 North, Range 2 West, W.M.;

EXCEPT the North 200 feet thereof.

Parcel D

The West half of the Northeast quarter of the Northwest quarter of Section 23, Township 17 North, Range 2 West, W.M.;

EXCEPT the North 405 feet;

AND EXCEPT that portion of the West 210 feet of the above described property lying Northerly of the South 150 feet thereof;

AND EXCEPT the East 238 feet.

DATED: Sept 13, 2017.

ALAN J. WERTJES
Personal Representative of the
Estate of John J. Havens, Sr., Deceased

DATED Sept 13, 2017.

Judith M. Wirth

JUDITH M. WIRTH
Personal Representative of the
Estate of Sarah K. Havens, Deceased

STATE OF WASHINGTON)
) ss.
COUNTY OF THURSTON)

I certify that I know or have satisfactory evidence that ALAN J. WERTJES is the person who appeared before me, and said person acknowledged that he signed this instrument and acknowledged it to be his free and voluntary act as Personal Representative of the Estate of John J. Havens, Sr., Deceased, in the Superior Court of the State of Washington for Thurston County, Case No. 06-4-00444-7, for the uses and purposes mentioned in the instrument, and on oath stated that he was authorized to execute the instrument as such Personal Representative.

DATED September 13, 2017.

ERIC N. GELLERT NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 11-11-19

SEAL OR STAMP

Notary Public
Print Name: Eric N. Gellert
My appointment expires: 11-11-2019

STATE OF WASHINGTON)
THURSTON) ss.
COUNTY OF ~~KING~~)

I certify that I know or have satisfactory evidence that JUDITH M. WIRTH is the person who appeared before me, and said person acknowledged that she signed this instrument and acknowledged it to be her free and voluntary act as Personal Representative of the Estate of Sarah K. Havens, Deceased, in the Superior Court of the State of Washington for Thurston County, Case No. 11-4-00753-1, for the uses and purposes mentioned in the instrument, and on oath stated that she was authorized to execute the instrument as such Personal Representative.

DATED September 13, 2017.

ERIC N. GELLERT NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 11-11-19

SEAL OR STAMP

Notary Public
Print Name: Eric N. Gellert
My appointment expires: 11-11-2019

4849-7147-7836.V1

APPENDIX B

Max Wills

From: Radcliff, Eugene (ECY) <erad461@ECY.WA.GOV>
Sent: Friday, January 31, 2014 1:42 PM
To: Max Wills
Cc: Alan Wertjes; Rose, Scott (ECY)
Subject: John's Auto Wrecking: Draft work plan for supplemental remedial investigation and limited soil remediation - SW1127
Attachments: FW: Ecology Submittal Requirements

Max:

I have had a chance to review the draft work plan for a supplemental remedial investigation (RI) and limited soil remediation for the John's Auto Wrecking facility (Site), located at 411 93rd Avenue Southeast in Olympia, Washington. The draft work plan appears to be based on the findings and recommendations presented in the July 2013 remedial investigation report and as well as issues we discussed in our meeting of September 24, 2013.

The draft work plan was is divided into eight separate tasks and I will add my comments as a separate sub-bullet to the bulleted task.

- Task 1: Completion of the final work plan following Ecology review - will incorporate any recommended changes into a final work.
  - *On-going.*
- Task 2: Final debris removal and associated soil sampling.
  - *This plan appears to have identified areas of concern and sufficient to the task.*
- Task 3: Investigation of possible PCB-containing transformers.
  - *This plan appears to have identified areas of concern and sufficient to the task.*
- Task 4: Investigation of possible imported fill.
  - *This plan appears to have identified areas of concern and sufficient to the task.*
- Task 5: Quarterly groundwater sampling at MW-1.
  - *This plan appears to have identified areas of concern and sufficient to the task.*
  - *If total metals analysis remains problematic and TDS is remains high, dissolved metals may help resolve this is, but should be used only after discussion with Ecology.*
- Task 6: Wetland delineation and site-specific terrestrial ecologic evaluation (TEE).
  - *This plan appears to have identified areas of concern and sufficient to the task.*
  - *Please include the actual wetland delineation report in an appendix.*
- Task 7: EIM preparation and upload.
  - *This plan appears to have identified areas of concern and sufficient to the task.*
- Task 8: Report preparation.
  - *This plan appears to have identified areas of concern and sufficient to the task.*
  - *Please review the attached enclosure for report and submittal requirements.*

If you have any questions or comments please contact me.

Thanks you,

Eugene

Eugene Radcliff, L.G.
Toxic Cleanup Program-Voluntary Cleanup Program
Washington Department of Ecology
(360) 407-7404
erad461@ecy.wa.gov

Max Wills

From: Radcliff, Eugene (ECY) [erad461@ECY.WA.GOV]
Sent: Wednesday, June 26, 2013 4:50 PM
To: Max Wills
Cc: Alan Wertjes; Callender, Alexander (ECY); Gerald Tousley; Rose, Scott (ECY)
Subject: John's Auto Wrecking - SW1127: Site Visit

Max:

Thank you for meeting with us (Eugene Radcliff - VCP and Alex Callender (WQ)) at the Havens Auto Wrecking facility (Site) in Tumwater yesterday. My general impression was that the Site's appearance had dramatically improved in some areas (northeast corner of the Site), while observing little progress in other areas (pond and upper building area). Based on my Site visit yesterday, Ecology has some recommendations for you to consider when conducting further evaluation of the Site:

- Evaluate sediments and surface water samples in pond southern pond along property line. Sediment COCs: TPH-HCID*, metals, PAHs, PCBs, VOCs, semi-VOCs.
- Remove tires, wheels, and all other debris from water bodies. Removal of material should by least invasive, least destructive methods (e.g. by hand)
- Evaluate the pond banks to ascertain whether tires have been buried into the bank along north shoreline of pond.
- Review the electric pole transformer history; sample soils beneath the transformer for PCBs as warranted.
- Remove large "creosote" timber near southern property line (and any other treated lumber found) and sample soil for PAHs, pentachlorophenol, and metals.
- Segregate/remove debris pile from the northern portion of the Site and transport to appropriate off-Site disposal facilities, do not store debris piles on Site for extended periods of time. Ecology views the debris piles as a potential pollutant source, it may necessitate additional sample analyses as well as added cleanup costs if these piles remain on-Site. Items identified in the debris pile included fluorescent light ballasts, insulation, treated wood, a portion of a chimney, galvanized metals, and oil storage containers.
- BMPs should be used when storing debris piles on the Site. The county has primacy on solid waste storage issues and there may be permitting requirements for this type of storage activity. Please contact the Thurston County Health Department for additional guidance on solid waste issues
- Further investigation, based on historic maps and aerial imagery plus the appearance of the area soils being reworked south of the Hopkins Ditch, may be warranted.
- Small collections of metal, tires, and other debris remain scattered throughout the Site and should be removed.
- A Terrestrial Ecological Evaluation (TEE) should be conducted for the Site.
- We discussed the value of having a wetland delineation completed for the Site, this could be useful to help you complete a TEE.

The County has zoned the Site, consisting of five parcels, with two zoning classifications:

Zoned LIGHT INDUSTRIAL DISTRICT (LI)* (northern three parcels)
Subject to the provisions of this title, the following uses are permitted in the light industrial district:

3.Processing and Storage.

g.Junk, rags, paper, or metal salvage, storage, recycling or processing;

Zoned RURAL—ONE DWELLING UNIT PER TEN ACRES (R 1/10) (southern two parcels)

Primary uses.

Subject to the provisions of this title, the following uses are permitted in this district:

1.Single-family dwellings (limited to one primary residential structure per lot);

2.Agriculture;

3.Forest practices and forest management activities; and

4.Outdoor recreation.

Any additional investigation/feasibility study should take these zoning criteria into consideration as potential future uses.

Per our discussion at the Site, Ecology would not be receptive to providing a No Further Action Opinion fort a Site where re-contamination was possible. That is why the removal of any potential Site contamination, and its sources, is essential to moving forward in any future cleanup activities.

Ecology's Southwest Regional Office Water Quality Section may have some additional comments for you at a later date. I will forward to you if I receive any comments.

I would be happy to meet with you and your client to discuss future remedial actions at the Site if you would like.

If you have any questions or comments, please contact me.

Sincerely,

Eugene

Eugene Radcliff, L.G.
Toxic Cleanup Program-Voluntary Cleanup Program
Washington Department of Ecology
(360) 407-7404
erad461@ecy.wa.gov

* TPH-HCID should be collected at selected locations, if the analysis indicated TPH-D or TPH-O then the samples should be NWTPH-Dx using without the silica gel/acid cleanup preparation.

ROBINSON
NOBLE

JOHN'S AUTO WRECKING
411 93RD AVENUE SOUTHEAST
OLYMPIA, WASHINGTON
FACILITY/SITE NO. 57665495
VCP PROJECT NO. SW1127
REMEDIAL INVESTIGATION

JULY 2013

by

Max T. Wills, LHG
Senior Hydrogeologist

State of Washington
Hydrogeologist
783
Licensed Geologist
MAX T. WILLS

3011 South Huson Street, Suite A
Tacoma, Washington 98409
P: 253.475.7711 | F: 253.472.5846

www.robinson-noble.com

17625 130th Avenue NE, Suite 102
Woodinville, Washington 98072
P: 425.488.0599 | F: 425.488.2330

JOHN'S AUTO WRECKING
411 93rd Avenue Southeast, Olympia, Washington
Facility/Site No. 57665495; VCP Project No. SW1127
Remedial Investigation
July 2013

TABLES

Figures

Appendices

JOHN'S AUTO WRECKING
411 93rd Avenue Southeast, Olympia, Washington
Facility/Site No. 57665495; VCP Project No. SW1127
Remedial Investigation
July 2013

1.0 Introduction

The John's Auto Wrecking site (site) is located at 411 93rd Avenue Southeast in Olympia, Washington. Figure 1 shows the location of the site, and Figures 2 and 3 show its general configuration. The site is currently enrolled in the Washington State Department of Ecology's (Ecology) Voluntary Cleanup Program (VCP) and is being investigated and/or remediated under the auspices of the same. The site is assigned Facility/Site No. 57665495 and VCP Project No. SW1127. The owner of the site, John Havens, is deceased, and the site is in probate pending final regulatory closure. Table 1, below, summarizes the project contacts for the site.

Table 1. Project Contacts

Law Office of Alan Wertjes	Estate Representative	Alan Wertjes, Attorney at Law	(360) 570-7488
Robinson Noble, Inc.	Consultant Representative	Max Wills, LHG, Senior Hydrogeologist, Project Manager	(425) 488-0599
Department of Ecology, Southwest Regional Office	VCP Site Manager	Eugene Radcliff, LG, Toxic Cleanup Program-Voluntary Cleanup Program	(360) 407-7404

The site is not currently being utilized for any specific purpose. When it was active, the site was occupied by a fairly extensive automobile wrecking-yard operation. Figure 2 shows an aerial of the site prior to the removal of most of the old cars and generally reflects conditions when the site was an active wrecking yard. Most of the wrecked cars, miscellaneous auto parts, and equipment associated with the wrecking-yard operation have been removed from the site. Many of the buildings and shacks have also been dismantled and much of the associated debris removed. However, there are still a few vacant buildings and shacks present, primarily at the north end of the site, along with piles of wood and other debris from demolished structures. There are also minor amounts of automobile debris (i.e., tires, auto-body parts, etc.) scattered across various areas of the site, but the preponderance has been removed. Over the past several years, a fence with a locking gate was also erected around the site, which has helped to dissuade illegal dumping. Much of the site is overgrown with Scotch broom and other invasive vegetation. The current conditions of the site are generally reflected in Figure 3, which is presented using a more recent aerial photograph.

1.1 Purpose

The purpose of this Remedial Investigation (RI) report is to present a summary of previous investigation and remediation work completed at the site. This RI report also provides a compilation of our recent investigative data and a discussion based on our professional interpretation of these data. Finally, this RI presents a summary of findings made during a recent site visit with personnel from Ecology and a discussion of work that will still need to be completed to achieve eventual regulatory closure for the site.

1.2 Site Description and Physical Setting

The address of the site is 411 93rd Avenue Southeast, and it is specifically located within Section 23 of Township 17 north, Range 2 west, relative to the Willamette Meridian. Figure 1 shows the location of the site. As shown on Figures 2 and 3, the site is comprised of six contiguous parcels identified by Thurston County Assessor-Treasurer records as parcel numbers 12723210100, 12723220200, 12723210400, 12723210401, 12723210700, and 12723210000. Thurston County Assessor-Treasurer records indicate these six parcels cover an area of approximately 15 acres. The topography at the site is relatively flat with a gentle slope to the south toward Hopkins Ditch (see Figures 2 and 3). Land surface elevations range from 202 feet above mean sea level (MSL) at the northern end of the site, to 195 feet MSL near the south end of the site along Hopkins Ditch.

The site and surrounding area are located on a broad glacial outwash plain. Noble and Wallace (1966) and Drost and others (1998) both map the surface geology in this area as Vashon recessional outwash (Qvr). They describe the Qvr as consisting of a mix of poorly sorted silt, sand, and gravel, and note that the average thickness in the area of the site is approximately 25 feet. The standard sequence of Vashon glacial deposits is Qvr, underlain by till (Qvt), which is in turn underlain by advance outwash from the Vashon glaciation (Qva). The Qvt generally consists of a random mixture of clay, silt, sand, and gravel. This unit is also typically compact and has a relatively low permeability, at least as compared with that of the Qvr and Qva deposits. The Qva deposits, similar to the Qvr, are generally comprised of silty sands and gravels, but are often better sorted than the Qvr. Qvr and Qva deposits, when saturated generally form aquifers. Qvt deposits tend to form an aquitard. Mapping by Drost and others (1998) indicates that both the Qvt and Qva are present below the Qvr in the area of the site. Their maps indicate that the thickness of the Qvt is probably at least 25 feet in the area around the site and would, therefore, provide a relatively competent confining unit between the Qvr and Qva.

Drilling and excavation activities associated with our investigation of the site reached a maximum depth of 20 feet. The materials encountered were consistent with the descriptions of the Qvr provided by Noble and Wallace (1966) and Drost and others (1998). None of the borings or excavations completed during this project extended deep enough to penetrate the Qvt.

Soils in the area of the site have been classified by the United States Department of Agriculture (Soil Survey for the Thurston County Washington Area, 1990) as Nisqually loamy, fine sand (covering approximately the northern three quarters of the site) and Norma fine, sandy loam (covering approximately the southern quarter of the site). These soils are described as having developed on glacial outwash plains and on alluvial deposits, respectively. Both of these soils are described as having relatively high infiltration rates ranging from 1.98 to 5.98 inches per hour.

Surface water present on the site includes Hopkins Ditch, which is a small seasonal stream that traverses the southern portion of the site from east to west. There is also a small pond present on the southern half of parcel 12723210700, just north of Hopkins Ditch (Figures 2 and 3). Hopkins Ditch typically only has water in it during the wetter portions of the year and is often nearly dry in the late summer. When there is water in the ditch it does not appear to flow and the ditch is, in fact, more akin to a linear series of small disconnected ponds. The head of Hopkins Ditch is located just east of the site, and the site itself lies within the headwater-area of the Salmon Creek drainage basin. Maps of this area show that Hopkins Ditch becomes Salmon Creek approximately two miles west of the site (near Little Creek Road). Salmon Creek then flows into the Black River approximately three miles further west. The Black River eventually flows into the Chehalis River, which then flows to the sea at Grays Harbor.

Groundwater at the site is relatively shallow, ranging from approximately ten feet below ground surface (bgs) at the northern end of the site, to near land surface at the southern end of the site. Figure 4 shows the locations of designated wetlands and wetland buffer zones at the site. These data, which were obtained from the geographic information system (GIS) database on the Thurston County Assessor-Treasurer's website, show that wetland areas are prominent across the southern part of the site where groundwater is highest. These wetland areas also generally correspond with the area along Hopkins Ditch. GIS data obtained from the Thurston County Assessor-Treasurer's website also shows that several areas of the site are classified as both high groundwater hazard areas and flood zones. Figure 5 shows the designated high groundwater hazard areas on the site and the adjoining buffer zones. Figure 6 shows the designated flood zones, which again occur primarily on the southern portion of the site and generally parallel the corridor of Hopkins Ditch.

Noble and Wallace (1966) determined that the regional flow direction of the water table in the area of the site is to the northwest. The water table is presumed to reflect conditions within the Qvr aquifer. Similarly, the numerical groundwater model of Northern Thurston County compiled by Drost and others (1999) indicates that the regional groundwater flow direction within the Qva and deeper aquifers is also to the northwest. Drost and others (1999) did not specifically model flow directions within the Qvr, but based on Noble and Wallace (1966) and observations made during our investigation, flow directions within the Qvr aquifer appear to be consistent with those in deeper systems.

Figure 7 presents a potentiometric (water table) surface map for the Qvr aquifer, constructed from the water levels measured in shallow monitoring wells at the site. As shown, shallow groundwater below the site (the Qvr aquifer) flows primarily toward the northwest, consistent with the regional flow direction determined by other workers. The potentiometric surface map, however, also shows that there is localized flow toward Hopkins Ditch. The potentiometric surface map presented in Figure 7 reflects conditions during the wetter portion of the year (late February) and this apparent draw of groundwater toward the ditch suggest that there is at least a minor amount of flow through the ditch during this period. It is presumed that this localized effect is diminished or absent during warmer periods of the year when water in the ditch is lower or absent.

A query of the GIS data compiled on the Thurston County Assessor-Treasurer's website indicates that there is one PUD-owned water system located approximately 1,800 feet west of the site (on parcel 12722110801). However, no specific information for this water system was available, and parcel information indicates it is located on private land. A further review of Ecology's well log database did not reveal any additional information for this particular system. Our review of Ecology's well log database found a number of logs for single domestic-type wells in the area around the site, but no logs for larger water systems (Group A or B). Additionally, GIS data on the Thurston County Assessor-Treasurer's website did not indicate any other PUD-owned water systems located within one mile of the site.

2.0 Background

2.1 Site History

As described above in Section 1.0, the site was formally occupied by a relatively large auto-wrecking operation, which involved the majority of the 15-acre site (see Figure 2). There are no records indicating that the site was previously developed for any other purposes. The site has been inactive since the death of the former owner, John Havens, and most of the material associated with the former wrecking yard (old automobiles, various machinery, and several structures) was cleared from the site between 2008 and 2009 (see Figure 3).

2.2 Previous Work

Robinson Noble first became involved with the site in 2008. At that time, Robinson Noble (dba Robinson, Noble, & Saltbush, Inc.) completed a review of available records and documents on file with Ecology and the Thurston County Health Department (TCHD). This review found that the site was listed on Ecology's Hazardous Site List with a Site Hazard Assessment (SHA) ranking of "1." Sites with SHA rankings of "1" or "2" are loosely defined by Ecology as posing a risk to human health and the environment and as having the highest priority for cleanup. Our review also found that the owners of the site had previously enrolled the site in Ecology's VCP to address the SHA ranking. However, the site was subsequently removed from the VCP due to inactivity.

Limited investigations completed while the site was previously enrolled in the VCP (prior to Robinson Noble's involvement at the site) identified nine areas of concern (AOCs). These AOCs were based on observations made at that time by a representative of TCHD (Mr. Patrick Soderberg), as well as specific types of reported past uses in these areas when the site was an active wrecking yard. Upon Robinson Noble becoming involved at the site, it was reenrolled in the VCP, and much of the subsequent investigation and remediation work completed has been focused on addressing the specific issues within each of the previously designated AOCs. Figure 8 presents a map that shows the location of each AOC, along with a description of previous uses associated with each. Figure 8 also shows the locations of various borings, wells, and test pits previously completed by Robinson Noble to investigate the various AOCs.

Previous work completed by Robinson Noble is documented in the following listed letter reports. Copies of the complete letter reports are included in Appendix A of this report.

2.2.1 Site Investigation/characterization letter report, Havens Property (aka) Johns Auto Wrecking, 411 93rd Avenue SE, Olympia, Washington, April 21, 2009

In February 2009, Robinson Noble conducted a subsurface investigation to evaluate the presence of potential contaminants associated with the former wrecking yard. This investigation included an evaluation of both soil and groundwater in the nine AOCs and was accomplished through the sampling of numerous borings and test pits (see Figure 8). In general, analytical results identified oil-range petroleum hydrocarbons and metals in excess of applicable Model Toxic Control Act (MTCA) Method A cleanup levels in several surface and near surface soil samples. These samples were all collected in areas with visible ground staining. Soil analyses did not detect any contamination at depth. Analyses of groundwater indicated several samples contained metal concentrations in excess of applicable MTCA Method A cleanup levels. However, groundwater samples during this phase of work were obtained through temporary wells set in direct-push soil borings, and the groundwater samples with higher detected levels were notably turbid. As such, the elevated metal concentrations in these samples were attributed to the sampled water having high amounts of suspended solids.

2.2.2 Site Remediation of the Havens Property (aka Johns Auto Wrecking) 411 93rd Avenue SE letter report, Olympia, Washington, December 10, 2009

In August 2009, Robinson Noble conducted further investigations and remediation based on the results of our previous site investigation/characterization. During this second effort, impacted soils identified during our earlier characterization were excavated and removed from the site for disposal. At this time, additional sources of contamination (i.e., drums and tanks containing oil, automotive batteries, etc.) were also removed and transported to an appropriate disposal facility. Confirmation sampling conducted at the conclusion of this effort did not indicate the presence of any remaining contamination and verified that the remediated impacts were constrained to the near surface.

Three monitoring wells, MW-1, MW-2, and MW-3 (see Figure 8), were also installed during this second effort. These wells, which were completed in the shallowest groundwater system (Qvr), were used to establish a groundwater gradient for the site and to reevaluate potential metal impacts to the groundwater. The groundwater gradient was determined from these wells to be westerly to northwesterly across the site. Metal analyses of groundwater samples obtained from these wells did not detect the presence of metals in any of the samples, verifying our previous conclusion that metal detections in the groundwater samples collected from direct-push borings were an artifact of the samples having high turbidity.

3.0 Current Work

Following the completion of our initial investigation and remediation work (described above in Section 2.0), Ecology conducted a review of the work and provided a formal opinion. Ecology's formal opinion is presented in their letter dated August 23, 2011 (see Appendix B). As noted in the letter, Ecology identified several areas it felt required additional efforts to fully characterize potential contamination at the site.

Subsequently, Robinson Noble prepared a draft work plan to address the site characterization issues noted by Ecology in their opinion letter. The draft work plan is dated February 2012, and a copy is also provided in Appendix B. In our work plan, we contested some of the issues raised by Ecology and provided clarification and/or alternative investigative approaches to fully characterize the site. The work plan was then submitted to Ecology for review. Ecology responded via an email (dated June 28, 2012) and either accepted each of the Tasks outlined in the work plan or offered suggestions on how to modify or approach addressing specific issues of concern. A copy of Ecology's email response is also provided in Appendix B. Our draft work plan, together with Ecology's suggested modifications were then used as the basis for executing the current phase of work.

3.1 General Procedures

Field work for the current phase of work was completed in February and March 2013. Field work included soil and groundwater sampling from direct-push borings (groundwater samples were collected through temporary screens set in each boring), soil samples from hand borings, installation and sampling of new monitoring wells, collection of near surface grab samples from the wetland area at the south end of the site, and sediment sampling of Hopkins Ditch and the nearby pond. Figure 9 shows the locations where various borings and monitoring wells were installed and where samples were collected. Figures 10 through 14 present geologic logs of the direct-push borings. Figures 15 and 16 show geologic logs and construction details for monitoring wells MW-4 and MW-5, respectively. Geologic logs of previously completed borings and monitoring wells (i.e., MW-1 through MW-3) are presented in our previous reports (see Appendix A).

During field work, a Robinson Noble geologist was on site to field screen soils from each of the borings for signs of potential contamination. Field screening was accomplished using visual and olfactory cues and a hand-held photo ionization detector (PID). Field screening, as applicable, was used in a general way to guide the collection of soil samples to try to insure that worst-case soil samples were collected and subsequently analyzed. An on-site mobile laboratory was also utilized during most of the field work for analysis of petroleum hydrocarbons. On-site petroleum hydrocarbon analysis was, in effect, used as an additional screening tool. Analyses were performed using Ecology analytical method NWTPH-HCID to determine the presence or absence of gasoline- through heavy oil-range petroleum hydrocarbons. In the event that petroleum hydrocarbons were detected, monitoring wells were set to better assess conditions, and additional analyses performed to quantify the detected petroleum hydrocarbon and/or to assess other potential analytes such as polycyclic aromatic hydrocarbons (PAHs).

All other analyses completed during this project were conducted at fixed-site laboratories. All samples were collected in appropriate laboratory supplied containers and, in most cases, delivered directly to the on-site mobile laboratory for proper storage and preservation pending final analysis. On other occasions when the mobile laboratory was not on site, collected samples were immediately placed in a cooler containing blue ice® and maintained at temperatures below 4° Celsius pending delivery to the laboratory. Appropriate chain-of-custody procedures were adhered to throughout this project and no discrepancies were noted. Additionally, all samples were submitted and analyzed within prescribed holding times for the particular analyses being performed. The various laboratories used during this project are each accredited for the particular analyses that they performed, and each laboratory provided results for required QA/QC analyses. A review of these QA/QC analyses did not reveal any discrepancies.

Table 2. Analytes and Analytical Methods

Analyte	Analytical Method	AOC(s)
Petroleum hydrocarbons	NWTPH-HCID	1, 2, 3, 5, 6, 7&8, 9A, 9B, Stream and wetland
Volatile organic compounds (VOCs)	EPA Method 8260C	1, 3, 6
Polycyclic aromatic hydrocarbons (PAHs)	EPA Method 8270 (SIM)	Stream and wetland
Arsenic, cadmium, chromium, lead, zinc, copper	EPA Method 7010 Series	2, 3, 5, 6, 7&8, 9A, 9B, Stream and wetland
Mercury	EPA Method 7471	2, 3, 6, 7&8, 9A, 9B, Stream and wetland
Total nickel	EPA Method SW846 6010B	2, 3, 6, 7&8, 9A, 9B, Stream and wetland
Dissolved nickel	EPA Method 200.7	2, 3, 6, 7&8, 9A, 9B, Stream and wetland
TCLP lead	EPA Method SW846 6010B	Stream and wetland
Ethylene and propylene glycols	GC-FID	3
Polychlorinated biphenyls (PCBs)	EPA Method 8082	5, 6

The complete laboratory reports for all of the analyses performed during this project are provided in Appendix C. Table 2 lists all of the various analytical methods used during this project and provides a list of the various areas where each analysis was employed. A detailed discussion of the work completed for each AOC or area, along with a discussion of the pertinent analytical results, is provided in the following sections.

3.2 AOC 1 (Body Shop and Auto Repair)

When the site was active, this AOC was reportedly used for limited body-shop work and general auto repair. There are currently two structures located within this AOC: a garage-like structure with an attached office and smaller outbuilding located approximately 50 feet to the west of the larger building. Both of these buildings are locked and boarded shut and were not accessible during site work. There is also a large pile of building and other debris (lumber, glass, brick, metal, etc.) located approximately 50 feet south of the two structures where a third structure appears to have been demolished. Although unsightly, only minor hazardous (source) materials were observed in this debris pile (i.e., lumber preserved with creosote, florescent light fixtures, etc.).

During our previous investigations, we observed numerous five-gallon buckets containing waste oil in the area between the two existing structures. We also observed a small area of surface staining and distressed vegetation in this same area. Limited surface staining was also observed in the area south of the two structures (in the area of the current debris pile). Following the removal of the oil buckets and excavating the soils in the areas of observed surface staining, we collected both soil and groundwater samples and analyzed them for volatile organic compounds (VOCs), gasoline- through oil-range hydrocarbons, and metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel). Laboratory analyses did not indicate the presence of any of the analytes above applicable cleanup levels (see previous reports in Appendix A and draft work plan in Appendix B).

For the current investigation, and with Ecology's concurrence, three additional borings were completed in this AOC. As shown on Figure 9, borings B12, B13, and B14 were completed respectively on the south side of the small outbuilding, in the area between the two structures, and in the area just south of the building-material debris pile. Geologic logs of the material encountered in each of these borings are presented in Figure 10. Field screening did not indicate the presence of contamination in any of these borings. Soil and groundwater samples collected from each of these three borings were initially analyzed for petroleum-hydrocarbon identification via the mobile laboratory. This initial laboratory screening did not indicate the presence of petroleum hydrocarbons in any of the samples. Therefore, no additional analyses for petroleum-hydrocarbon related compounds (i.e., PAHs) were conducted, and monitoring wells were not completed.

Additional analyses for VOCs were conducted for both the soil and groundwater samples. VOC analysis indicated the presence of tetrachloroethen (PCE) at a concentration of 1.90 μg/L in the groundwater sample collected from B13 (sample number B13-W, see Appendix C). This is below the MTCA Method A cleanup level for PCE of 5.0 μg/L. VOC analyses did not detect the presence of any other VOCs in any of the other samples collected from AOC 1.

3.3 AOC 2 (Battery Storage and Repair)

This AOC was reportedly used as a battery storage and repair area. The specific location where batteries were stored within this AOC has never been definitively determined. Our initial investigations in this area focused primarily on areas with distressed vegetation. Initial soil and groundwater samples collected from one boring (B2), along with soil samples collected from a test pit (TP2A) southeast of the current AOC (see Figure 8), were analyzed for VOCs, gasoline- through oil-range hydrocarbons, and metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel). Laboratory analyses of a near-surface soil sample indicated low levels of nickel (well below applicable cleanup levels). Laboratory analyses did not detect the presence of any other analytes above applicable laboratory detection limits in any of the other samples. Further assessment of this AOC using aerial photographs shows that the areas of distressed vegetation were previously covered with piles of cars, and therefore, may not have been the actual battery storage location. The only place near this AOC not previously covered with cars is a small, tree-covered area located slightly to the northwest (see Figures 2, 8, and 9, and previous reports in Appendix A).

To better characterize this AOC, again with Ecology's concurrence, we completed two hand borings (HB1 and HB2) and installed a new monitoring well (MW-4). As shown in Figure 9, the borings and monitoring well were completed in the northwestern portion of the previously defined AOC, in the area below the large trees. A geologic log and construction details for MW-4 are presented in Figure 15. Standard field screening did not indicate the presence of contamination in either of the hand borings or the boring for the monitoring well. Because this area is a suspected storage area for batteries, additional field screening for pH was also conducted. The pH levels measured in this area were all within a reasonably normal range (i.e., 6.5 to 7.5). Soil samples collected from the two hand borings and the boring for MW-4 were initially analyzed for petroleum hydrocarbon identification via the mobile laboratory. This initial laboratory screening did not indicate the presence of petroleum hydrocarbons in any of the soil samples. Subsequent laboratory analysis of a water sample collected from MW-4 also did not indicate the presence of petroleum hydrocarbons. Therefore, no additional analyses for petroleum-hydrocarbon related compounds were conducted in this AOC.

Analyses of metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel) were conducted for both soil and groundwater samples collected from this AOC. As shown in Table 3 below, laboratory analyses indicated the presence of specific metals in a shallow soil sample collected from the boring for MW-4 (sample MW4-3) and the shallow soil samples collected from the two hand borings (samples HB1-3 and HB2-3). All of these detections, however, were below applicable cleanup levels. Additionally, zinc was detected at a concentration of 6 µg/L in the groundwater sample collected from MW-4, which is well below the applicable cleanup level of 4,800 µg/L. Laboratory analyses did not detect the presence of any other metals in any of the samples collected from AOC 2 (see Appendix C).

Table 3. Select Analytical Results for Metals in Soil Samples from AOC 2

Sample Number	Arsenic *(mg/Kg)*	Chromium[2] *(mg/Kg)*	Zinc *(mg/Kg)*	Copper *(mg/Kg)*	Nickel *(mg/Kg)*
MW4-3	8	7	nd	12	21
HB1-3	9	8	25	12	20
HB2-3	8	8	nd	13	19
MTCA	**20[1]**	**19/2,000[3]**	**24,000[4]**	**3,200[4]**	**1,600[4]**

Notes: "nd" indicates not detected above applicable laboratory detection limits
1 - MTCA Method A soil cleanup level for unrestricted land use
2 - Total concentration of hexavalent chromium (chromium VI) and chromium III
3 - MTCA Method A cleanup level for chromium VI and III, respectively
4 - MTCA Method B non-carcinogenic cleanup level

3.4 AOC 3 (Radiator Shop and Auto Repair)

A garage structure within this AOC was reportedly used as a radiator shop and for general auto repair. This was also reported as the entry point for cars entering the wrecking yard. During our previous investigations, surface staining was observed on the gravel area east of the garage. Analyses of grab samples from this area detected oil-range petroleum hydrocarbons at a concentration of 500 mg/Kg (below the MTCA Method A cleanup level of 2,000 mg/Kg) and lead at a concentration of 230 mg/Kg (just below the MTCA Method A cleanup level of 250 mg/Kg). Minor detections (below applicable cleanup levels) of zinc, copper, and nickel were also detected in the shallow soils. Deeper soil samples and a groundwater samples collected from a boring placed in this AOC (see Figure 8) were analyzed for gasoline- through oil-range hydrocarbons, VOCs, and metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel). The groundwater sample was also analyzed for glycols. Laboratory analyses did not detect any of these analytes in any of the deeper soil samples or the groundwater sample. During subsequent field work, areas of surface staining were excavated and removed from the site. Additionally, two trenches were excavated along the southern and western edges of the garage, and soils from the trenches were field screened for signs of possible contamination. Field screening did not indicate that soils were impacted (see previous reports in Appendix A and our draft work plan in Appendix B).

The garage structure has since been removed from this area, and currently all that remains is the concrete slab. During the current investigation, with Ecology's concurrence, three additional borings were completed in AOC 3. As shown on Figure 9, borings B15 and B16 were completed respectively on the western and southern edges of the slab. Boring B17 was installed through a seam in the center of the slab area. Geologic logs of the material encountered in each of these borings are presented in Figure 11. Field screening did not indicate the presence of contamination in any of these borings. Soil and groundwater samples collected from each of these three borings were initially analyzed for petroleum-hydrocarbon identification via the mobile laboratory. This initial laboratory screening did not indicate the presence of petroleum hydrocarbons in any of the samples. Therefore, no additional analyses for petroleum hydrocarbon-related compounds were conducted, and monitoring wells were not completed.

Soil and groundwater samples from the three borings were submitted to the laboratory for VOC and glycol analyses. Laboratory analyses did not detect VOCs or glycols in any of the samples. Soil and groundwater samples were also submitted for analysis of metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel). As shown in Table 4, laboratory analyses indicated the presence of specific metals in the shallow soil samples collected from each of the three borings and metals in a deeper sample collected from boring B17. All of these detections, however, are below applicable cleanup levels. Laboratory analyses did not detect the presence of any other metals in any of the soil samples collected from AOC 3 (Appendix C).

Table 4. Select Analytical Results for Metals in Soil Samples from AOC 3

Sample Number	Arsenic *(mg/Kg)*	Chromium[2] *(mg/Kg)*	Zinc *(mg/Kg)*	Copper *(mg/Kg)*	Nickel *(mg/Kg)*
B15-3	9	nd	nd	13	21
B16-3	9	8	5	14	22
B17-3	10	nd	nd	12	20
B17-9	nd	14	16	20	22
MTCA	**20[1]**	**19/2,000[3]**	**24,000[4]**	**3,200[4]**	**1,600[4]**

Notes: "nd" indicates not detected above applicable laboratory detection limits
1 - MTCA Method A soil cleanup level for unrestricted land use
2 - Total concentration of hexavalent chromium (chromium VI) and chromium III
3 - MTCA Method A cleanup level for chromium VI and III, respectively
4 - MTCA Method B non-carcinogenic cleanup level

As shown below in Table 5, laboratory analyses also indicated the presence of specific metals in the groundwater samples collected from each of the three borings installed at AOC 3. The results presented in Table 5 represent total metal concentrations for each analyte, and as shown, exceed applicable cleanup levels for arsenic, chromium, lead, copper, and nickel. However, each of these samples was collected through a temporary well set in a direct-push boring, and the groundwater in these wells at the time of collection was notably turbid. As discussed previously in Section 2.2, the elevated metal concentrations in each of these groundwater samples are likely attributable to the sample containing high amounts of suspended solids. Following the initial analyses for total metals, each groundwater sample found to exceed cleanup levels was reanalyzed for dissolved metals. These subsequent analyses did not detect the presence of any dissolved metals above laboratory detection limits in any of the groundwater samples (Appendix C).

Table 5. Select Analytical Results for Metals in Groundwater Samples from AOC 3

Sample Number	Arsenic *(µg/L)*	Cadmium *(µg/L)*	Chromium *(µg/L)*	Lead *(µg/L)*	Zinc *(µg/L)*	Copper *(µg/L)*	Nickel *(µg/L)*
B15-W	**136**	2	**65**	**30**	90	**1,160**	**852**
B16-W	**59**	1	**79**	**20**	81	297	**789**
B17-W	**17**	nd	**60**	14	115	126	**382**
MTCA	5[1]	5[1]	50[1]	15[1]	4,800[2]	640[2]	320[2]

Notes: "nd" indicates not detected above applicable laboratory detection limits
Bolded values indicate concentrations exceed applicable cleanup levels
1 - MTCA Method A cleanup level for groundwater
2 - MTCA Method B non-carcinogenic cleanup level

3.5 AOC 4 (Hazardous Material Storage)

This AOC is relatively small, covering the area where a small shed was previously located. Personnel from TCHD reported that this shed covered an area approximately 8 feet by 12 feet and was used to store various hazardous materials. During our previous investigation, a test pit was excavated in the area of the former shed (see Figure 8). Soil samples from near surface to a depth of approximately four feet were collected and submitted for analyses of gasoline-through oil-range hydrocarbons, VOCs, and metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel). The only analyte detected was nickel in one of the shallow samples at a concentration of 20 mg/Kg, well below the cleanup level of 1,600 mg/Kg (see previous reports in Appendix A and the draft work plan in Appendix B).

Considering the size of this AOC and the work that has already been accomplished in this area, our draft work plan did not recommend any additional work for this AOC. Ecology conceded to this on the condition that other work being accomplished down gradient from AOC 4 did not suggest potential groundwater concerns (see Appendix B). As described previously in Section 1.2, shallow groundwater below the site flows toward the northwest, and therefore, other work completed down gradient from AOC 4 includes the work previously described for AOCs 1, 2, and 3 in Sections 3.2, 3.3, and 3.4, respectively. As described for each of these three AOCs, no impacts to either soil or groundwater were found, and therefore, no additional work was accomplished for AOC 4. As noted by Ecology, and as shown on Figure 5, AOC 4 lies within a designated high groundwater hazard area. However, because no contamination has been found in this AOC, this is not considered a major concern.

3.6 AOC 5 (Battery Repair and Storage Shed)

This AOC is similar to AOC 4 in that most of the original source materials were contained within a small wooden shed. This shed is still present at the site, but all the original source materials have been removed. Personnel from TCHD reported that the shed was previously used primarily for storage and repair of automotive batteries. The current structure has three walls (is open to the east) and has an exposed dirt floor.

Previous work in this AOC included the excavation of test pits and the installation of a direct-push boring (see Figure 8). Soil samples collected from the test pits and the boring and an additional groundwater sample collected from the boring, were each analyzed for VOCs, gasoline-through oil-range hydrocarbons, metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel), and polychlorinated biphenyls (PCBs). Laboratory analyses found low-level oil-range hydrocarbons and select metals in one near-surface soil sample and low levels of lead and copper in the groundwater sample. The laboratory analyses did not indicate the presence of any analyte above applicable cleanup levels in any of the samples (see previous reports in Appendix A and draft work plan in Appendix B).

Following their review of our draft work plan, Ecology concurred with our recommendation to install an additional direct-push boring in this AOC but recommended that it be completed on the down-gradient side of the shed (see Appendix B). As such, boring B18 was completed adjacent to the west side of the shed, approximately midway along the west wall so that it was located just slightly south of the boring installed during our previous work (see Figures 8 and 9). A geologic log of the materials encountered in B18 is presented in Figure 12. Standard field screening did not indicate the presence of any contamination. Additional field screening for pH was also conducted (because the area was used for battery storage) but found that all levels were within a reasonably normal range (6.5 to 7.5). The soil and groundwater samples collected from B18 were also initially analyzed for petroleum hydrocarbon identification via the mobile laboratory. This initial screening did not indicate the presence of petroleum hydrocarbons in any of the samples. Therefore, no additional analyses for petroleum hydrocarbon related compounds were conducted in this AOC, and a monitoring well was not completed.

Additional laboratory analyses of both soil and groundwater were conducted for lead and PCBs. These analyses did not detect the presence of lead in any of the soil samples or PCBs in the groundwater sample. However, lead was detected in the groundwater sample at a concentration of 18 μg/L, which is just above the cleanup level of 15 μg/L. As discussed previously (Sections 2.2 and 3.4), the elevated lead concentration found in the groundwater sample from B15 is likely attributable to the fact that it was obtained through a temporary well set in a direct-push boring (and therefore had high turbidity). Subsequent analysis for dissolved lead did not detect lead above laboratory detection limits in this sample (Appendix C).

3.7 AOC 6 (Hazardous Material Storage Bunker)

This AOC is the site of a former storage building/bunker reportedly used for the storage of various hazardous materials. Currently, the only portion of the structure that is remaining is the concrete base which consists of a fairly massive floor slab with partial concrete walls. All previously stored source materials have been removed. Previous work in this area included remedial excavations to remove observed petroleum staining on the east side of the structure and a make-shift sump (reportedly constructed with a cut-down 55-gallon drum) on the northwest side of the structure. A direct-push boring with a temporary well for groundwater sampling was also completed on the east side of the structure (see boring B6 on Figure 8). Confirmation soil samples collected from the margins of the remedial excavations and soil and groundwater samples collected from the boring were analyzed for a variety of analytes including VOCs, gasoline- through oil-range hydrocarbons, metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel), PCBs, and carcinogenic polycyclic aromatic hydrocarbons (cPAHs). Copper and zinc were detected in several of the soil samples at concentrations well below applicable cleanup levels. Laboratory analyses did not detect any of the other analytes in any of the other samples (see previous reports in Appendix A and the draft work plan in Appendix B).

Ecology concluded in their formal opinion letter (Appendix B) that the soil boring (B6) was not located appropriately to evaluate potential groundwater impacts in this AOC. With Ecology's concurrence, our draft work plan proposed installation of an additional soil boring to collect a groundwater sample in the area of the former sump (see TP6C on Figure 8). A boring at this location would also be located on the down-gradient side of the AOC, in a good position to evaluate potential groundwater impacts within the AOC as a whole.

For the current phase of work, boring B19 was installed near the northwest end of the bunker (Figure 9). A geologic log of the materials encountered in this boring are presented in Figure 12. Field screening of the soils from B19 did not indicate the presence of contamination. The groundwater sample collected from B19 was initially analyzed for petroleum-hydrocarbon identification via the mobile laboratory, which did not indicate the presence of petroleum hydrocarbons. Therefore, no additional analyses for petroleum hydrocarbon-related compounds were conducted, and a monitoring well was not completed.

The groundwater sample was submitted to the laboratory for additional analyses, which included VOCs, metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel), and PCBs. Laboratory analyses did not detect the presence of any VOCs or PCBs. However, as shown below in Table 6, select metals were detected in the groundwater sample, and the analyses indicated that arsenic, chromium, and lead were present at concentrations in excess of the applicable cleanup levels. However, as with previous metal analyses (see Sections 2.2, 3.4, and 3.6), the elevated metal concentrations are likely the result of high turbidity in the groundwater sample. Subsequent analyses of dissolved arsenic, chromium, and lead did not detect the presence of any of these analytes above the applicable laboratory detection limits (see Appendix C).

Table 6. Select Analytical Results for Metals in the Groundwater Sample from AOC 6

Sample Number	Arsenic *(μg/L)*	Cadmium *(μg/L)*	Chromium *(μg/L)*	Lead *(μg/L)*	Zinc *(μg/L)*	Copper *(μg/L)*	Nickel *(μg/L)*
B19-W	**111**	nd	**83**	**33**	119	285	199
MTCA	5[1]	5[1]	50[1]	15[1]	4,800[2]	640[2]	320[2]

Notes: "nd" indicates not detected above applicable laboratory detection limits
Bolded values indicate concentrations exceed applicable cleanup levels
1 - MTCA Method A cleanup level for groundwater
2 - MTCA Method B non-carcinogenic cleanup level

3.8 AOC 7&8 (Petroleum Storage, Car Crushing Area)

AOC 7&8 is the consolidated area of two formerly separated but adjacent AOCs. This AOC was reportedly the site of ongoing car-crushing activities, and TCHD suggested that previous soil sampling in this area identified petroleum contamination. However, official documentation substantiating these findings has never been located. Work completed during our previous investigations focused primarily on areas where car crushing was reported to have occurred and in areas with distressed vegetation.

Our previous investigations involved the excavation of several test pits and the drilling of one direct-push boring (see Figure 8). Soil and groundwater samples collected from the test pits and the boring were analyzed for VOCs, gasoline- through oil-range hydrocarbons, and metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel). Laboratory analyses indicated low levels of oil-range hydrocarbons and various metals in several of the near surface soil samples, but none of the analytes detected exceeded applicable cleanup levels and no other analytes (i.e., VOCs, gasoline-range hydrocarbons) were detected in any of the samples. Laboratory analyses of the groundwater sample collected from the direct-push boring detected concentrations of several metals above cleanup levels, but as discussed previously, these detections were attributed to high turbidity in the sample. A monitoring well (MW-1) was subsequently installed in this AOC specifically for assessing potential metals in the shallow groundwater. Laboratory analyses of a groundwater sample from this monitoring well did not detect any metals above laboratory detection limits (see previous reports in Appendix A).

In their formal opinion letter, Ecology concluded (Appendix B) that, given the size of this AOC, an insufficient number of borings had been completed to properly characterize the area. With Ecology's concurrence, our draft work plan proposed completion and sampling of three additional direct-push borings and four hand borings. These were completed as borings B20 through B22 and HB3 through HB6 (see Figure 9). Figures 12 and 13 present logs of the materials encountered in B20 through B22. Field screening conducted during the completion of these borings did not indicate the presence of any contamination. Soil and groundwater samples collected from each of the new borings were also analyzed for petroleum-hydrocarbon identification via the mobile laboratory. This initial screening did not indicate the presence of petroleum hydrocarbons in any of the samples, so no additional analyses for petroleum hydrocarbon-related compounds were conducted.

Soil and groundwater samples from each of the new borings were also analyzed for metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel). As shown below in Table 7, laboratory analyses indicated the presence of low levels of specific metals in soils from all of the borings, except HB6. All of these detections, however, are below applicable cleanup levels.

Table 7. Select Analytical Results for Metals in Soil Samples from AOC 7&8

Sample Number	Arsenic *(mg/Kg)*	Chromium[2] *(mg/Kg)*	Lead *(mg/Kg)*	Zinc *(mg/Kg)*	Copper *(mg/Kg)*	Nickel *(mg/Kg)*
B20-6	nd	nd	nd	nd	6	16
B21-2	8	9	6	6	6	20
B21-5	nd	13	nd	12	6	8
B22-6	7	7	nd	nd	7	12
HB3-3	6	8	nd	nd	11	20
HB4-3	nd	8	nd	nd	nd	10
HB5-1	nd	nd	nd	nd	nd	16
HB6-1	nd	nd	nd	nd	nd	nd
MTCA	**20[1]**	**19/2,000[3]**	**250[1]**	**24,000[4]**	**3,200[4]**	**1,600[4]**

Notes: "nd" indicates not detected above applicable laboratory detection limits
1 - MTCA Method A soil cleanup level for unrestricted land use
2 - Total concentration of hexavalent chromium (chromium VI) and chromium III
3 - MTCA Method A cleanup level for chromium VI and III, respectively
4 - MTCA Method B non-carcinogenic cleanup level

As shown below in Table 8, laboratory analyses also indicated the presence of specific metals in the groundwater samples collected from each of the three direct-push borings. Initial analyses indicate that total metal concentrations from these borings exceed applicable cleanup levels for arsenic, cadmium, chromium, lead, copper, and nickel. However, each of these samples was notably turbid, and elevated metal concentrations in the majority of these samples are attributable to the sampled groundwater containing high amounts of suspended solids. With the exception of the groundwater sample from boring B22 (sample number B22-W), subsequent analyses for dissolved metals did not indicate the presence of any metals above laboratory detection limits in the remaining samples (Appendix C). Dissolved lead was detected in sample B22-W at a concentration of 6 μg/L, which is below the cleanup level of 15 μg/L. However, dissolved arsenic was detected in this same sample at a concentration of 8 μg/L, which is just above the cleanup level of 5 μg/L (see Appendix C). To try to verify this result, an additional groundwater sample collected at MW-1 (which is near B22) was submitted for analysis of total and dissolved arsenic. Laboratory analyses of this sample indicated a total arsenic concentration of 5 μg/L, which is the same as the cleanup level. The laboratory analysis did not detect dissolved arsenic in this sample. These results, together with the results from our previous investigations, suggest that there may be intermediate issues with low levels of arsenic in the groundwater in this area.

Table 8. Select Analytical Results for Metals in Groundwater Samples from AOC 7&8

Sample Number	Arsenic *(μg/L)*	Cadmium *(μg/L)*	Chromium *(μg/L)*	Lead *(μg/L)*	Zinc *(μg/L)*	Copper *(μg/L)*	Nickel *(μg/L)*
B20-W	**9**	nd	**105**	**24**	64	233	201
B21-W	**114**	1	**93**	**106**	110	136	**422**
B22-W	**112**	**6**	**116**	**158**	28	**4,450**	**1,270**
MW-1	**5**	-	-	-	-	-	-
MTCA	5[1]	5[1]	50[1]	15[1]	4,800[2]	640[2]	320[2]

Notes: "nd" indicates not detected above applicable laboratory detection limits
Bolded values indicate concentrations exceed applicable cleanup levels
1 - MTCA Method A cleanup level for groundwater
"-" indicates the sample was not analyzed for this analyte
2 - MTCA Method B non-carcinogenic cleanup level

3.9 AOC 9A (Car Crushing Area)

AOC 9A (previously AOC 9) was originally thought to be the site of car-crushing activities. However, additional information provided by TCHD and Ecology suggests that car-crushing activities thought to have occurred in this area actually took place further to the south in the area designated as AOC 9B (see Figure 9). AOC 9B is discussed below in Section 3.10.

Our previous investigations in AOC 9A included the excavation of one test pit and the drilling of one direct-push boring (see Figure 8). Soil and groundwater samples collected from the test pit and boring were analyzed for VOCs, gasoline- through oil-range hydrocarbons, and metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel). Laboratory analyses indicated low levels of nickel in both the soil and groundwater samples, but each well below the applicable cleanup levels. Analyses did not detect any other analytes above laboratory detection limits in any of the samples (see previous reports in Appendix A).

In their formal opinion letter, Ecology concluded (Appendix B) that, given the size of this AOC, an insufficient number of borings had been completed to properly characterize the area. With Ecology's concurrence, our draft work plan proposed completion and sampling of one additional direct-push boring, two hand borings, and an additional monitoring well. These were completed as boring B23, HB7 and HB8, and MW-5, respectively (see Figure 9). Figure 13 presents a log of the materials encountered in B23, and Figure 16 presents a log of the materials and construction details for MW-5. Field screening conducted during the completion of the new borings did not indicate the presence of any contamination. Soil and groundwater samples collected from each of the new borings were also analyzed for petroleum-hydrocarbon identification via the mobile laboratory. This initial screening did not indicate the presence of petroleum hydrocarbons in any of the samples, so no additional analyses for petroleum-hydrocarbon related compounds were conducted.

Soil and groundwater samples from each of the borings and monitoring well were also analyzed for metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel). As shown below in Table 9, laboratory analyses indicated the presence of low levels of specific metals in the soils from each of the borings. All of the detections, however, are below applicable cleanup levels.

Table 9. Select Analytical Results for Metals in Soil Samples from AOC 9A

Sample Number	Arsenic *(mg/Kg)*	Chromium² *(mg/Kg)*	Lead *(mg/Kg)*	Zinc *(mg/Kg)*	Copper *(mg/Kg)*	Nickel *(mg/Kg)*
MW5-3	9	13	nd	20	23	22
MW5-6	7	17	nd	20	34	21
B23-2	8	7	nd	nd	10	7
HB7-2	7	9	nd	nd	10	15
HB8-3	6	8	nd	nd	13	22
MTCA	**20[1]**	**19/2,000[3]**	**250[1]**	**24,000[4]**	**3,200[4]**	**1,600[4]**

Notes: "nd" indicates not detected above applicable laboratory detection limits
1 - MTCA Method A soil cleanup level for unrestricted land use
2 - Total concentration of hexavalent chromium (chromium VI) and chromium III
3 - MTCA Method A cleanup level for chromium VI and III, respectively
4 - MTCA Method B non-carcinogenic cleanup level

As shown below in Table 10, laboratory analyses also indicated the presence of specific metals in the groundwater samples collected from the direct-push boring and MW-5. Although none of the analyses indicate total metal concentrations above applicable cleanup levels, the higher metal concentrations indicated for B23 (in comparison to those in MW-5) are again likely attributable to the sampled groundwater containing high amounts of suspended solids.

Table 10. Select Analytical Results for Metals in Groundwater Samples from AOC 9A

Sample Number	Arsenic *(μg/L)*	Cadmium *(μg/L)*	Chromium *(μg/L)*	Lead *(μg/L)*	Zinc *(μg/L)*	Copper *(μg/L)*	Nickel *(μg/L)*
MW-5 (w)	nd	nd	nd	11	8	5	nd
B23-W	nd	nd	20	13	70	23	54
MTCA	**5[1]**	**5[1]**	**50[1]**	**15[1]**	**4,800[2]**	**640[2]**	**320[2]**

Notes: "nd" indicates not detected above applicable laboratory detection limits
1 - MTCA Method A cleanup level for groundwater
2 - MTCA Method B non-carcinogenic cleanup level

3.10 AOC 9B (Car Crushing Area)

As described above in Section 3.9, AOC 9B is an expansion of the original AOC 9 and is intended to cover a second potential area were car-crushing activities may have occurred. Our previous investigations in this AOC included the excavation of two test pits and drilling of two direct-push borings. Two monitoring wells (MW-2 and MW-3) were also installed in this general area (see Figure 8). Soil and groundwater samples collected from the test pit and borings were analyzed for VOCs, gasoline- through oil-range hydrocarbons, and metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel). Laboratory analyses indicated low levels of zinc and nickel in the soil samples, but well below applicable cleanup levels. Analyses indicated metal concentrations above cleanup levels in the groundwater sample from the direct-push boring, but as before, this was attributed to high-turbidity levels in the sample. Subsequent analyses of groundwater samples collected from the two nearby monitoring wells did not detect any metals in either of samples. Analyses also did not detect any other analytes (i.e., VOCs, petroleum hydrocarbons, etc.) in any of the other soil or groundwater samples (see previous reports in Appendix A).

Similar to AOC 9A, Ecology concluded in their formal opinion letter (Appendix B) that, given the size of AOC 9B, an insufficient number of borings had been completed to properly characterize the area. With Ecology's concurrence, our draft work plan proposed completing and sampling of two additional direct-push borings and two hand borings. These were completed as borings B24 and B25 and HB9 and HB10 (see Figure 9). Figure 14 presents logs of the material encountered in B24 and B25. Field screening conducted during the completion of the new borings did not indicate the presence of any contamination. Soil and groundwater samples collected from each of the new borings were also analyzed for petroleum-hydrocarbon identification via the mobile laboratory. This initial screening did not indicate the presence of petroleum hydrocarbons in any of the samples, so no additional analyses for petroleum hydrocarbon-related compounds were conducted.

Soil and groundwater samples from each of the borings were also analyzed for metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel). As shown below in Table 11, laboratory analyses indicated the presence of low levels of specific metals in the soils from each of the borings. All of the detections, however, are below applicable cleanup levels.

Table 11. Select Analytical Results for Metals in Soil Samples from AOC 9B

Sample Number	Arsenic *(mg/Kg)*	Chromium[2] *(mg/Kg)*	Lead *(mg/Kg)*	Zinc *(mg/Kg)*	Copper *(mg/Kg)*	Nickel *(mg/Kg)*
B24-1	7	9	nd	6	6	15
B25-2	nd	8	nd	6	nd	nd
HB9-1	nd	nd	nd	nd	nd	209
HB10-1	6	6	43	nd	6	nd
MTCA	**20[1]**	**19/2,000[3]**	**250[1]**	**24,000[4]**	**3,200[4]**	**1,600[4]**

Notes: "nd" indicates not detected above applicable laboratory detection limits
1 - MTCA Method A soil cleanup level for unrestricted land use
2 - Total concentration of hexavalent chromium (chromium VI) and chromium III
3 - MTCA Method A cleanup level for chromium VI and III, respectively
4 - MTCA Method B non-carcinogenic cleanup level

As shown below in Table 12, laboratory analyses also indicated the presence of specific metals in the groundwater samples collected from both of the direct-push borings. Initial analyses indicate that total metal concentrations from these borings exceed applicable cleanup levels for arsenic, chromium, lead, copper, and nickel. However, each of these samples was notably turbid, and elevated metal concentrations are attributable to the sampled groundwater containing high levels of suspended solids. Subsequent analyses for dissolved metals did not indicate the presence of any metals above laboratory detection limits in the either sample (Appendix C).

Table 12. Select Analytical Results for Metals in Groundwater Samples from AOC 9B

Sample Number	Arsenic *(μg/L)*	Cadmium *(μg/L)*	Chromium *(μg/L)*	Lead *(μg/L)*	Zinc *(μg/L)*	Copper *(μg/L)*	Nickel *(μg/L)*
B24-W	**24**	2	42	**98**	106	**868**	**639**
B25-W	nd	nd	**50**	**17**	124	89	174
MTCA	**5[1]**	**5[1]**	**50[1]**	**15[1]**	**4,800[2]**	**640[2]**	**320[2]**

Notes: "nd" indicates not detected above applicable laboratory detection limits
Bolded values indicate concentrations exceed applicable cleanup levels
1 - MTCA Method A cleanup level for groundwater
2 - MTCA Method B non-carcinogenic cleanup level

3.11 Hopkins Ditch, Pond, and Wetland Areas

The southern portion of the site is occupied by wetlands (see Figure 4) that currently support a variety of wildlife and plant species (see Section 4.1 below). No exclusionary criteria listed under MTCA (WAC 173-340-7491) apply to the site, so MTCA (WAC 173-340-7490) requires that either a simplified or site-specific terrestrial ecological evaluation (TEE) be completed. To better evaluate the need for either a simplified TEE (as defined in WAC 173-340-7492) or a site-specific TEE (as defined in WAC 173-340-7493), sediment samples were collected in the areas of Hopkins Ditch and the adjacent wetlands and submitted to a laboratory for various chemical analyses. As requested by Ecology in their email response following their review of our draft work plan (see Appendix B), we also collected and analyzed a sediment sample from the bed of the small pond located just north of Hopkins Ditch on the southern portion of parcel 12723210700 (Figure 3).

Sediment sample locations for the area of Hopkins Ditch and the adjacent wetlands are shown on Figure 9 as white triangles with a red circle. These samples are numbered 1 through 8 and are designated as either samples of pond sediments (PS), stream sediments (SS), or wetland sediments (WS). Sediment samples from the base of the pond (PS1) and the base of Hopkins Ditch (SS2 through SS5) were collected using a dredge tool attached to the end of pole and then transferred into laboratory-supplied containers. This dredge tool was appropriately decontaminated between each use. Sediment samples from the wetland areas (WS6 through WS8) were collected directly into laboratory-supplied containers as surface grab samples. All of the sediment samples were submitted to a laboratory for analysis of gasoline- through oil-range petroleum hydrocarbon identification, metals (arsenic, cadmium, chromium, lead, zinc, copper, mercury, and nickel), and PAHs.

Laboratory analyses did not indicate the presence of gasoline- through oil-range hydrocarbons or the presence of cadmium, arsenic, or mercury in any of the samples (Appendix C). A number of metals were detected in various samples and are summarized below in Table 13. As shown, most of the detected metal concentrations are below the applicable clean levels, but relatively high levels of lead (in excess of the cleanup level) were detected in samples WS6 and WS8. Subsequent analyses of these samples using the Toxicity Characteristic Leaching Procedure (TCLP) indicated TCLP-lead concentrations of 9.67 mg/L in WS6 and 0.25 mg/L in WS8. While both of these results indicate relatively low potential for leachability, the TCLP results of 9.67 mg/L in WS6 exceeds the 5.0 mg/L RCRA designation criteria for hazardous wastes.

Table 13. Select Analytical Results for Metals in Sediment Samples

Sample Number	Chromium[1] *(mg/Kg)*	Lead *(mg/Kg)*	Zinc *(mg/Kg)*	Copper *(mg/Kg)*	Nickel *(mg/Kg)*
PS1	nd	34	40	11	10
SS2	nd	40	47	8	12
SS3	nd	25	nd	nd	8
SS4	nd	6	nd	nd	5
SS5	nd	22	6	nd	3
WS6	10	**1,230**	8	68	12
WS7	nd	53	nd	12	13
WS8	nd	**525**	156	40	18
MTCA	**19/2,000[2]**	**250[3]**	**24,000[4]**	**3,200[4]**	**1,600[4]**

Notes: "nd" indicates not detected above applicable laboratory detection limits
1 - Total concentration of hexavalent chromium (chromium VI) and chromium III
2 - MTCA Method A cleanup level for chromium VI and III, respectively
Bolded values indicate concentrations exceed applicable cleanup levels
3 - MTCA Method A soil cleanup level for unrestricted land use
4 - MTCA Method B non-carcinogenic cleanup level

Laboratory analyses did not indicate the presence of PAHs in sediment samples SS2, SS3, SS4, SS5, or WS7 (see Appendix C). However, various PAHs were detected in samples PS1, WS6, and WS8 (Table 14). As shown, most of the PAH concentrations that were detected were below applicable cleanup levels. However, the concentration of benzo(a)pyrene exceeds the MTCA Method A cleanup level in sample PS1. Additionally, the total toxic equivalent concentration (TTEC) for benzo(a)pyrene, calculated from individual cPAH concentrations in each sample (per WAC 173-340-708(8)), exceeds the MTCA Method A cleanup level in samples PS1 and WS8.

Table 14. Select Analytical Results for PAHs in Sediment Samples

Analyte *(mg/Kg)*	PS1	WS6	WS8	MTCA
Naphthalene	nd	nd	nd	5[2]
2-Methylnaphthalene	nd	nd	nd	320[3]
1-Methylnaphthalene	nd	nd	nd	3.5[4]
Acenaphthylene	nd	nd	nd	na[5]
Acenaphthene	nd	nd	nd	4,800[3]
Fluorene	nd	nd	nd	3,200[3]
Phenanthrene	0.252	nd	0.104	na[5]
Anthracene	nd	nd	nd	24,000[3]
Fluoranthene	0.528	nd	0.216	3,200[3]
Pyrene	0.416	nd	0.185	2,400[3]
Benzo(a)anthracene1	0.187	nd	0.092	1.4[4]
Chrysene1	0.212	nd	0.100	140[4]
Benzo(b)fluoranthene1	0.349	0.093	0.153	1.4[4]
Benzo(k)fluoranthene1	0.103	nd	nd	14[4]
Benzo(a)pyrene1	**0.202**	nd	0.085	0.1[2]
Indeno(1,2,3-cd)pyrene1	0.135	nd	nd	1.4[4]
Dibenzo(a,h)anthracene1	nd	nd	nd	0.14[4]
TTEC for benzo(a)pyrene	**0.282**	nd	**0.110**	0.1[2]
Benzo(g,h,i)perylene	0.115	nd	nd	na[5]

Notes: 1 - cPAH used to calculate total toxic equivalent concentration (TTEC) for benzo(a)pyrene
"nd" indicates not detected above applicable laboratory detection limits
Bolded values indicate concentrations exceed applicable cleanup levels
2 - MTCA Method A soil cleanup level for unrestricted land use
3 - MTCA Method B non-carcinogenic cleanup level
4 - MTCA Method B carcinogenic cleanup level
5 - no applicable cleanup level has been established

4.0 Conclusions and Recommendations

The analytical data compiled during this investigation (summarized in Section 3.0), together with data from our previous studies (summarized in Section 2.0), has been compiled to characterize conditions within specific AOCs (shown on Figures 8 and 9). The analytical data collected to date in AOCs 1, 2, 3, 4, 5, 6, 9A, and 9B does not show any indications of impact from the activities associated with the former automobile-wrecking yard (John's Auto Wrecking). The laboratory analyses of all of the soil and groundwater samples collected from these AOCs indicates that contaminants of concern (COCs) are either not present at concentrations above applicable laboratory detection limits, or if present, are below applicable cleanup levels. One reoccurring issue during this and previous investigations was the detection of high-metal concentrations in turbid groundwater samples collected from direct-push borings. In each case, with the exception of those noted below for AOC 7&8, subsequent analyses of dissolved metals indicated that the previously detected metal (detected through total metal analyses) was not present at concentrations above laboratory detection levels. This shows that the initial total metal detections were related to and the result of high suspended solids in each of these samples.

The analytical data for each of the groundwater samples collected from direct-push borings in AOC 7&8 similarly showed high concentrations for total metals. Subsequent analyses for dissolved metals in all but one of the samples (B22-W collected from boring B22) did not indicate the presence of metals above laboratory detection limits. The initial analysis of total arsenic and the subsequent analysis of dissolved arsenic in sample B22-W indicated respective concentrations of 112 and 8 μg/L which are above the cleanup level of 5 μg/L. Laboratory analyses of an additional groundwater sample collected from nearby monitoring well MW-1 (see Figure 9) indicated a total arsenic concentration of 5 μg/L, but did not detect dissolved arsenic above laboratory detection limits. These results suggest there may be a minor issue with low levels of arsenic in the groundwater in this area. Laboratory analyses of all other COCs in AOC 7&8 were either not present at concentrations above applicable laboratory detection limits, or if present, were below applicable cleanup levels.

Laboratory analysis of two sediment samples (WS-6 and WS-8) collected from the wetland area adjacent to Hopkins Ditch (see Figure 9) indicate the presence of lead at respective concentrations of 1,230 and 525 mg/Kg. These values exceed the MTCA Method A cleanup level of 250 mg/Kg. Subsequent TCLP analyses indicated respective TCLP-lead concentrations of 9.67 and 0.25 mg/Kg. Both these results indicate that the lead present in these samples has relatively low mobility. However, the TCLP-lead result of 9.67 mg/Kg exceeds RCRA hazardous waste exclusion limits. Therefore, if soils are excavated for remediation, some soils may require disposal in a RCRA subtitle c (hazardous waste) landfill. Laboratory analysis for PAHs indicated the presence of benzo(a)pyrene at a concentration of 0.202 mg/Kg in the sediment sample (PS-1) collected from the base of the pond located just north of Hopkins Ditch (see Figure 9). Additionally, the TTECs of benzo(a)pyrene calculated for this same sample and one of the wetland sediment samples (WS-8) is 0.282 and 0.110 mg/Kg, respectively. All of these PAH values exceed applicable cleanup levels (the MTCA Method A cleanup level for both benzo(a)pyrene and the TTEC of benzo(a)pyrene is 0.1 mg/Kg). Laboratory analyses of all other COCs in the wetland and stream areas are either not present at concentrations above applicable laboratory detection limits, or are below applicable cleanup levels. These results indicate that there are isolated areas with minor PAH (and possibly lead) impacts in the wetland and stream areas at the south end of the site, and that additional characterization may be warranted.

4.1 June 25th Site Visit with Ecology

On June 25, 2013, following the completion of all currently contracted field work, we conducted a site visit with personnel from Ecology (Eugene Radcliff, the current VCP site manager, and Alexander Callender, Ecology's wetlands specialist for Thurston County). During this site visit, we discussed work completed to date and the results of the various laboratory analyses. We also completed a thorough walk of the site to inspect current conditions, and to conduct a reconnaissance-level assessment of the wetland area. During the site visit, Ecology made a number of assessments and noted several concerns. Following the site visit, Mr. Radcliff submitted an email documenting their observations and outlining their specific concerns. A copy of this email (dated June 26, 2013) is included in Appendix D of this report.

Ecology's primary observations and concerns for the site include the following:

- In addition to our previous observations of various wildlife species in the wetland area (including a significant population of amphibians (frogs), small unidentified black-colored fish, Gerridae (pond skaters), and various non-waterfowl-type birds), Ecology found signs of significant beaver activity (numerous freshly-chiseled logs) near the pond just north of Hopkins Ditch. Ecology's preliminary qualitative assessment of the wetland area, based on this and other observations of various vegetation types, was that it probably represents an intermediate-quality wetland. Ecology also concurred that a site-specific TEE would need to be completed to fully assess potential impacts and exposure pathways in this area of the site, and that formal wetland delineation would need to be completed to accommodate completion of the TEE.

- Ecology recommended that additional samples be collected in the pond and wetland areas to better characterize potential contamination. This includes the collection of additional sediment samples and surface water samples from the pond north of Hopkins Ditch and surface water samples from Hopkins Ditch where it enters and exits the property.

- Ecology noted that there is still a significant amount of debris associated with the former wrecking yard in various areas of the site. Of particular concern were numerous tires and wheels in the wetland area around, but also specifically in, Hopkins Ditch and the adjacent pond. They also noted that there is a berm-like feature on the north side of the pond area that appears to be comprised of buried tires. In their email response (Appendix D), Ecology also noted several other specific areas containing miscellaneous debris that would need to be removed and subsequently evaluated. These include a large creosote timber near the southern edge of the property and the debris pile associated with a demolished building near the northwest corner of the site (in AOC 1). Ecology indicated that the debris still present at the site represents source material and would need to be removed in order for the site to be considered for a no-further-action (NFA) determination. Ecology specifically stated that the site could not be considered for an NFA determination if there was still source material present to potentially re-contaminate the site.

- During the site visit, Ecology noted a second pond area in the woods south of Hopkins Ditch and recommended that sediment and surface water in this area be evaluated. Based on property line flagging observed during our site visit, this pond appears to straddle the property line. Before completing any work in this area, it is recommended that the southern extent of the property be clearly defined to insure that this pond is not actually located on the adjacent property to the south.

- Ecology noted there appears to be illegal dumping occurring in the northeast corner of the site, just outside the current gate, and that measures should be taken to try to dissuade this (i.e., placement of ecology blocks or installing a chain across the access road).

- In discussing the results of metal analyses, particularly with regards to the apparent arsenic detected at MW-1, Ecology indicated that groundwater monitoring would need to be accomplished at this location (AOC 7&8) and that four consecutive quarters with results below cleanup levels would need to be accomplished before the site could be considered for an NFA determination. The requirement of "four quarters of clean results" is not specifically codified but is usually required to appropriately evaluate the effects of seasonal variation.

4.2 Initial Evaluation of Potential Exposure Pathways

Because the analytical data do not indicate impacts in AOCs 1, 2, 3, 4, 5, 6, 9A, and 9B, there are no potential exposure pathways to evaluate in these AOCs. Potential impacts from arsenic in the groundwater in AOC 7&8 and the detected lead and PAH impacts in shallow sediment samples from the pond and wetland area (described in the preceding section) have potential to affect both human and ecological receptors. However, as the site is not permanently occupied and is fenced and locked, there is only minimal opportunity for exposure to human receptors (currently only the occasional site worker, who being aware of potential issues, can take appropriate precautions to protect themselves). Furthermore, arsenic levels in the groundwater in AOC 7&8 are very low, and TCLP-lead results for discrete samples from the wetland area show low potential for leachability, both of which indicate minimal risk for exposure.

Of the various contaminants detected at the site, the PAHs found in the shallow sediment samples from the pond and the wetland areas have the highest potential for exposure. As described above, the site is not currently occupied and access to the public is limited. Therefore, the potential exposure of humane receptors is extremely minimal. However, as described in the previous section, the wetland area on the southern portion of site (where PAHs were detected) potentially supports a relatively robust ecological system. The fact that PAHs were detected near surface, together with the fact that the specific PAHs detected in excess of cleanup levels are classified as carcinogenic, suggests there may be fairly significant potential exposure to ecological receptors at the site.

4.3 Recommendations

Based on the results of both our previous and current investigations (see Sections 2.0 and 3.0) and the suggestions/recommendations provided by Ecology during our recent site visit (see Section 4.1 and Appendix D), we have compiled the following list of recommendations with the ultimate goal of reaching final regulatory closure for the site.

- Undertake a program to remove all of the debris associated with the former auto-wrecking operation. In our opinion, the presence of this potential source material is currently the single largest obstacle to achieving an NFA determination and final regulatory closure for the site. In fact, the prolonged presence of this material on site poses a risk of the site being permanently dropped from the VCP, which would incur greater costs to achieve final closure. Therefore, implementing a final debris removal program should be a primary emphasis during the next phase of work. This program should include the following specific tasks:

    1. Removal of all tires, wheels, and other auto debris from the areas of Hopkins Ditch, the pond and surrounding area to the north of the ditch, and the wetland areas around the ditch. Debris removal should be accomplished using the least invasive method possible to minimize disturbance and further impacts to the wetland area (i.e., debris removal in this area should be accomplished largely by hand).

    2. Removal of the large creosote timber identified by Ecology in the wooded area to the south of Hopkins Ditch (and other lumber if found) followed by appropriate sampling to evaluate potential impacts to soils in this area. Laboratory analyses should include testing for PAHs, metals, and pentachlorophenol.

    3. Investigation and removal, if applicable, of the possible tire berm along the north edge of the pond north of Hopkins Ditch, followed by applicable testing.

    4. Removal of all other miscellaneous debris associated with the former auto-wrecking operation. This includes tires, wheels, auto-body parts, and other miscellaneous automotive parts and old fluid containers strewn across the various areas of the site. Because much of this debris is widely disbursed, removal is likely going to involve significant manpower to manually remove individual pieces of debris by hand. One approach to accomplishing this task may be the employment of volunteer organizations such as the Boy Scouts or other groups such as the Ecology Youth Corps (which would have some costs associated with their work).

    5. Removal of the large debris pile in AOC 1 associated with the demolished structure in this area. Much of this debris can be removed in bulk using heavy equipment (i.e., a back hoe and dump truck). Following the complete removal of all of the debris in this area, appropriate testing of the underlying soils should be completed including, but not limited to, the evaluation of PCBs, PAHs, metals, and petroleum hydrocarbons.

    6. Removal of any debris dumped outside the fence near the northeast corner of the site. Some type of obstruction (i.e., ecology blocks or a chain across the access road) should then be installed to dissuade further dumping.

- Conduct additional sediment and surface water testing in the area of the pond north of Hopkins Ditch, and in Hopkins Ditch itself, to better characterize potential contamination in these areas. These data will be used to assess potential exposure pathways and the completion of a site-specific TEE. Laboratory analyses should include testing for petroleum hydrocarbons, metals, PAHs, PCBs, VOCs, and semi VOCs. This additional characterization will also assist in determining appropriate remediation methods.
- Determine (possibly through a land survey) the southern boundary of the site to establish whether or not the pond in the wooded area south of Hopkins Ditch is actually located on the property. If it is found to be located on the property, it should be included in the additional characterization task described in the previous bullet and the wetland delineation/TEE described in the following bullet.
- Complete a formal wetland delineation and study for the southern portion of the site to determine the extent and quality of the wetland area and to determine the particular species of viable plants and animals that are supported. Then complete a site-specific TEE based on the wetland delineation/study to evaluate potential impacts to ecological receptors.
- Conduct groundwater monitoring for total metals at select monitoring wells for at least four consecutive quarters.
- Survey the site for existing transformers on power poles, and then review transformer history through the power company for any potential use of PCBs. Test the underlying soils near each identified transformer for PCBs, if warranted.
- Access the interior areas of the two structures in AOC 1 to determine if there are any hazardous materials present or indications of potential impact. If hazardous materials are present, they should be appropriately removed from the site. If there are any indications of impact, they should be evaluated and addressed accordingly.
- Review historical data, including topographic maps and aerial photographs, to specifically try to determined whether or not areas of the site have received extensive fill and/or been extensively reworked. Of particular concern is the area south of Hopkins Ditch. Several test pits should be excavated in this area to characterize the soils.
- To the degree possible, conduct remedial excavation of any identified soil impacts at the site.

5.0 References

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Drost, B.W., Ely, D.M., and Lum II, W.E., 1999, Conceptual model and numerical simulation of the ground-water-flow system in the unconsolidated sediments of Thurston County, Washington: U.S. Geological Survey Water-Resources Investigations Report 99-4165, 254 p.

Noble and Wallace, 1966, The geological map of Thurston County, Washington, USGS Water-Supply Bulletin 10

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Robinson, Noble, & Saltbush, Inc., letter report December 10, 2009, Site remediation of the Havens Property (aka Johns Auto Wrecking) 411 93rd Avenue SE, Olympia, Washington

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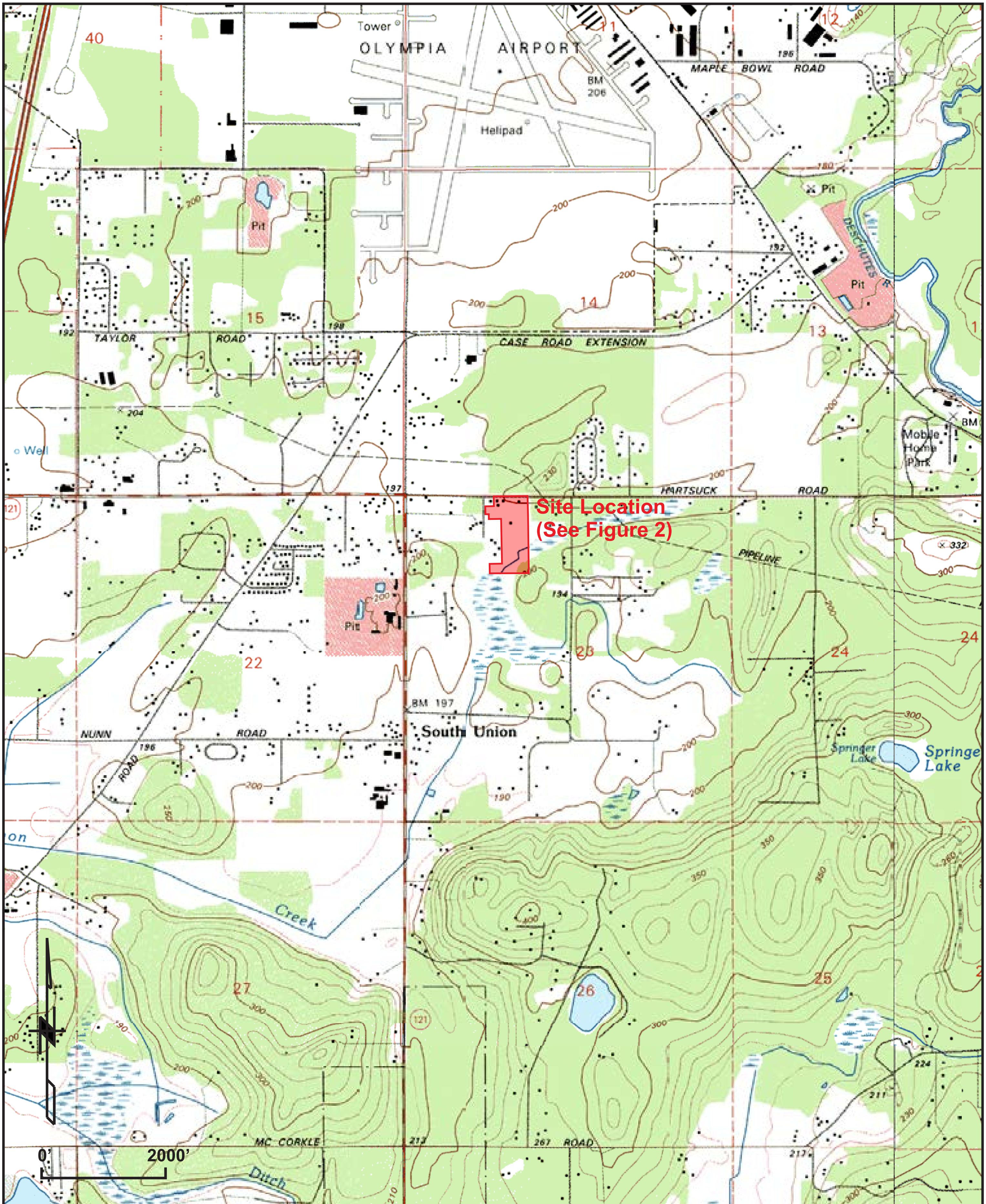
Washington State Department of Ecology, Cleanup levels and risk calculations–database of cleanup levels for chemicals and respective media, available online at https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx

Washington State Department of Ecology, Water well log database, available online at http://apps.ecy.wa.gov/welllog/

The statements, conclusions, and recommendations provided in this report are to be exclusively used within the context of this document. They are based upon generally accepted hydrogeologic and environmental practices and are the result of analysis by Robinson Noble, Inc. staff. This report, and any attachments to it, is for the exclusive use of the Law Office of Alan J. Wertjes and the Estate of John Havens. Unless specifically stated in the document, no warranty, expressed or implied, is made.

FIGURES



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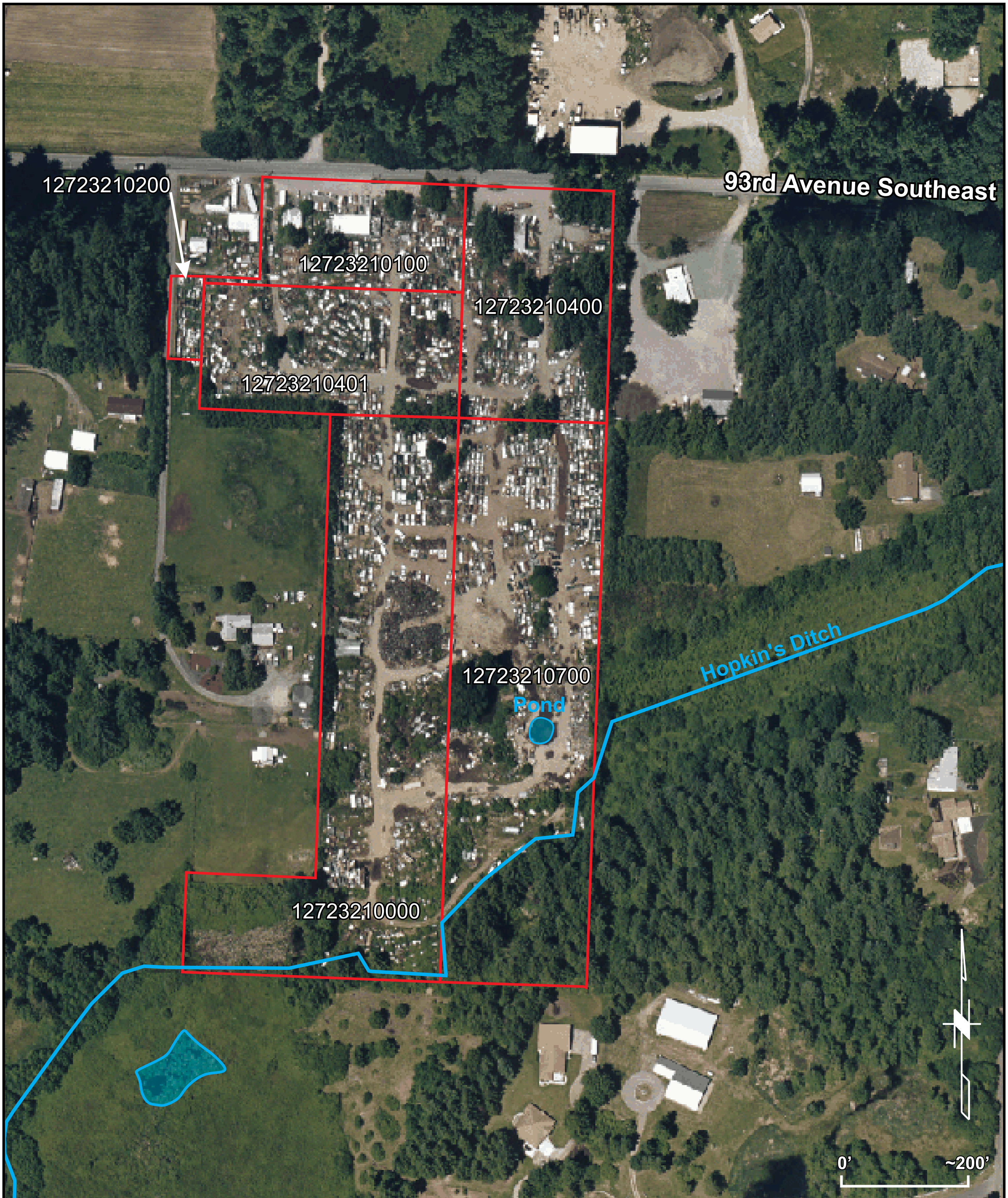
Note: Basemap taken from USGS Maytown Quad.	PM: MTW July 2013	Thurston County 2491-001E	T 17 N/R 02 W - 23 Scale 1 " = 2000'	Figure 1 Vicinity Map

John's Auto Wrecking: Remedial Investigation



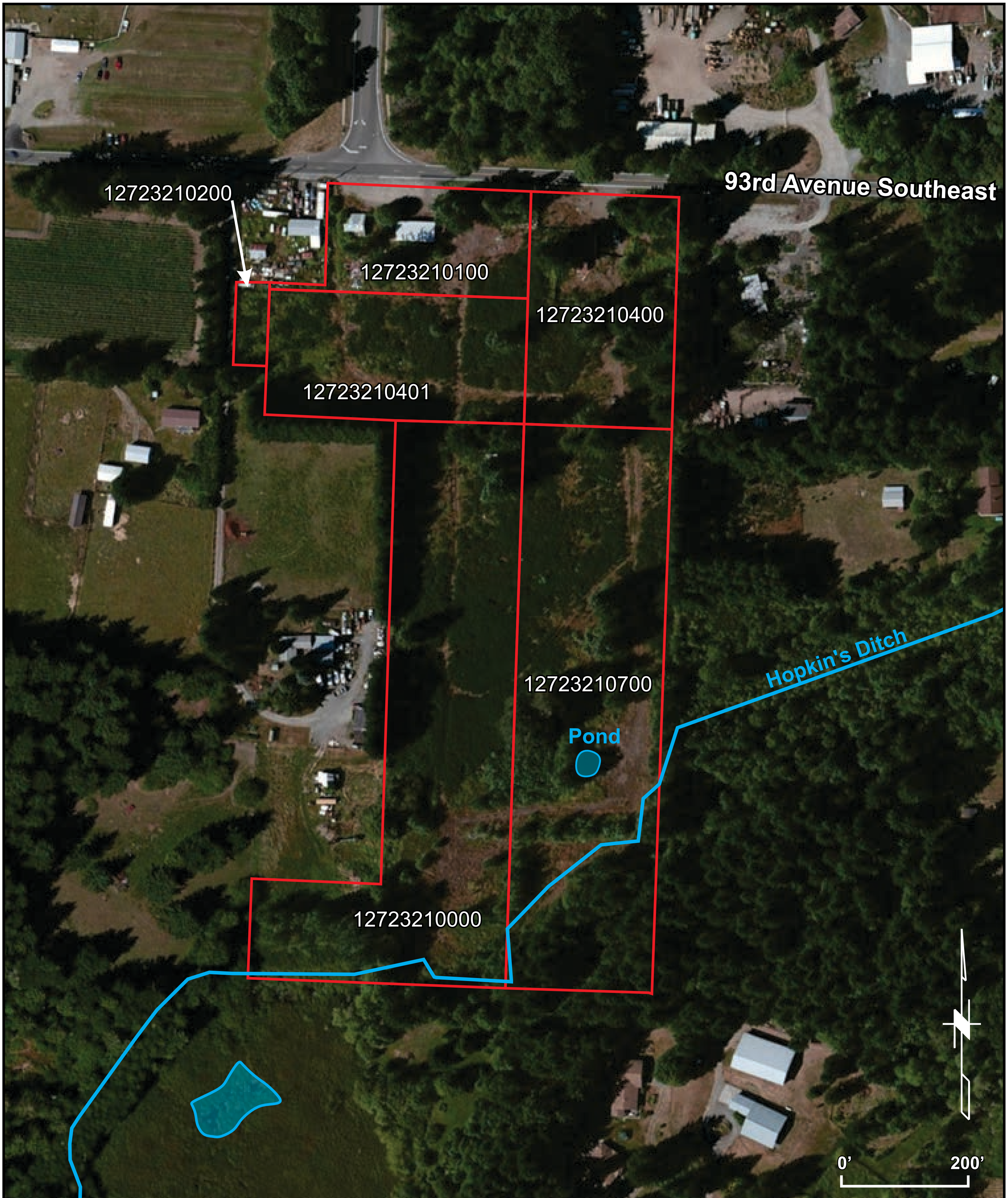
ROBINSON NOBLE

Note:
Image from
Thurston County
Geodata Site

PM: MTW
July 2013
2491-001E

Thurston County
T 17 N/R 02 W - 23
Scale 1" = ~200'

Figure 2
Site Conditions in 2000
John's Auto Wrecking: Remedial Investigation



ROBINSON NOBLE

Note:
Image from
ESRI ArcGIS

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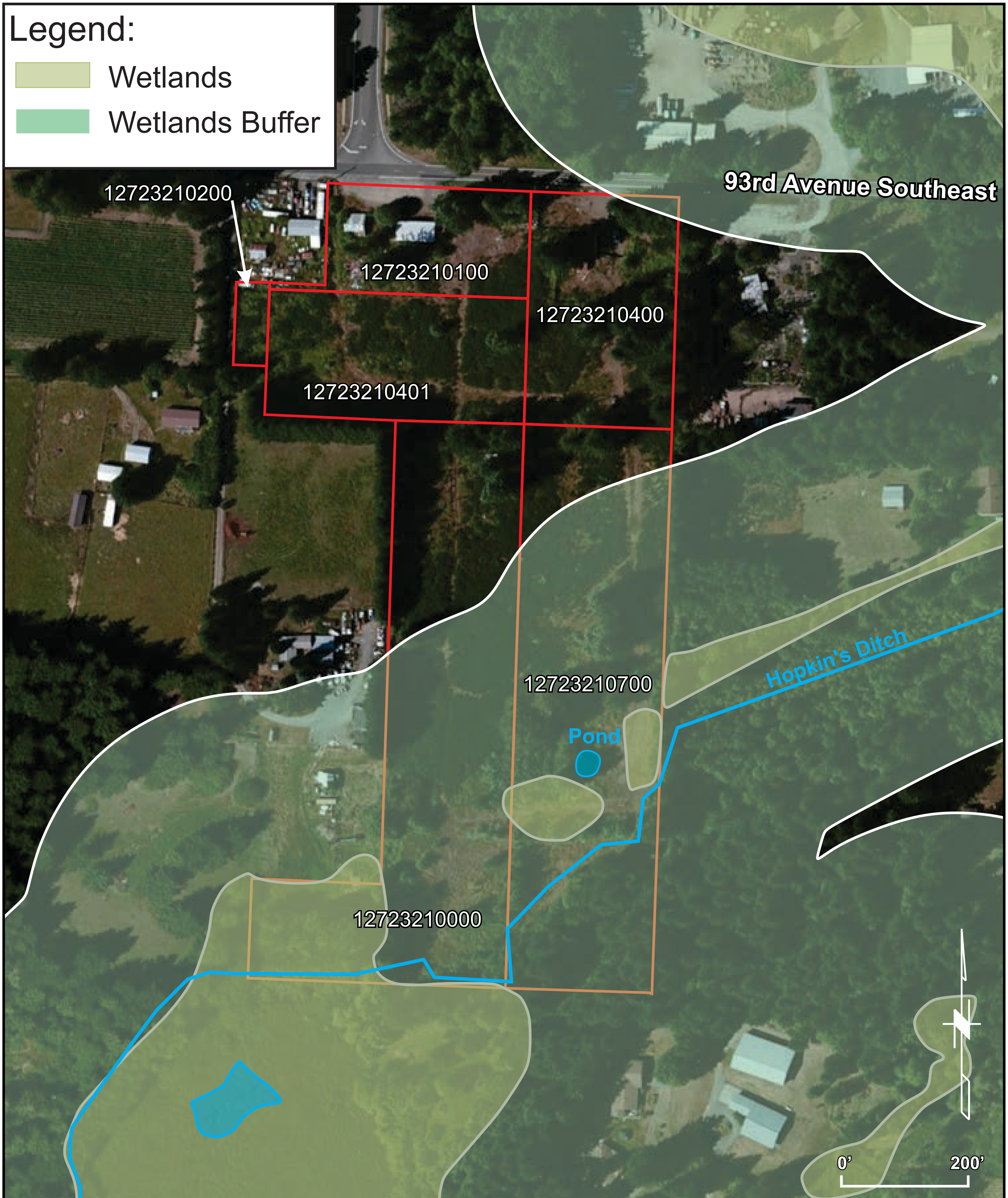
July 2013
2491-001E

Thurston County
T 17 N/R 02 W - 23
Scale 1" = 200'

Figure 3
Parcel Map
John's Auto Wrecking: Remedial Investigation



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Note:
Image from
ESRI ArcGIS

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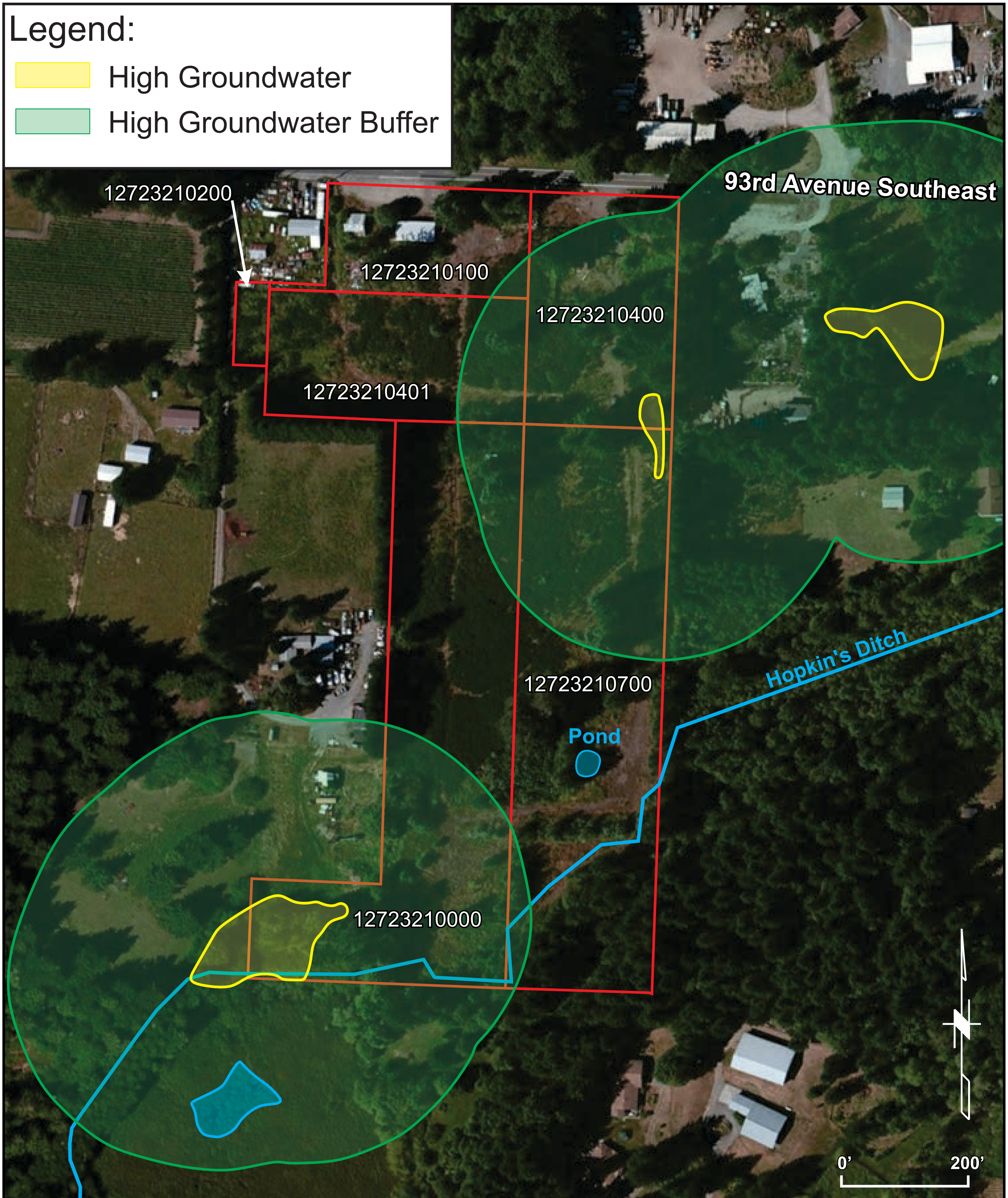
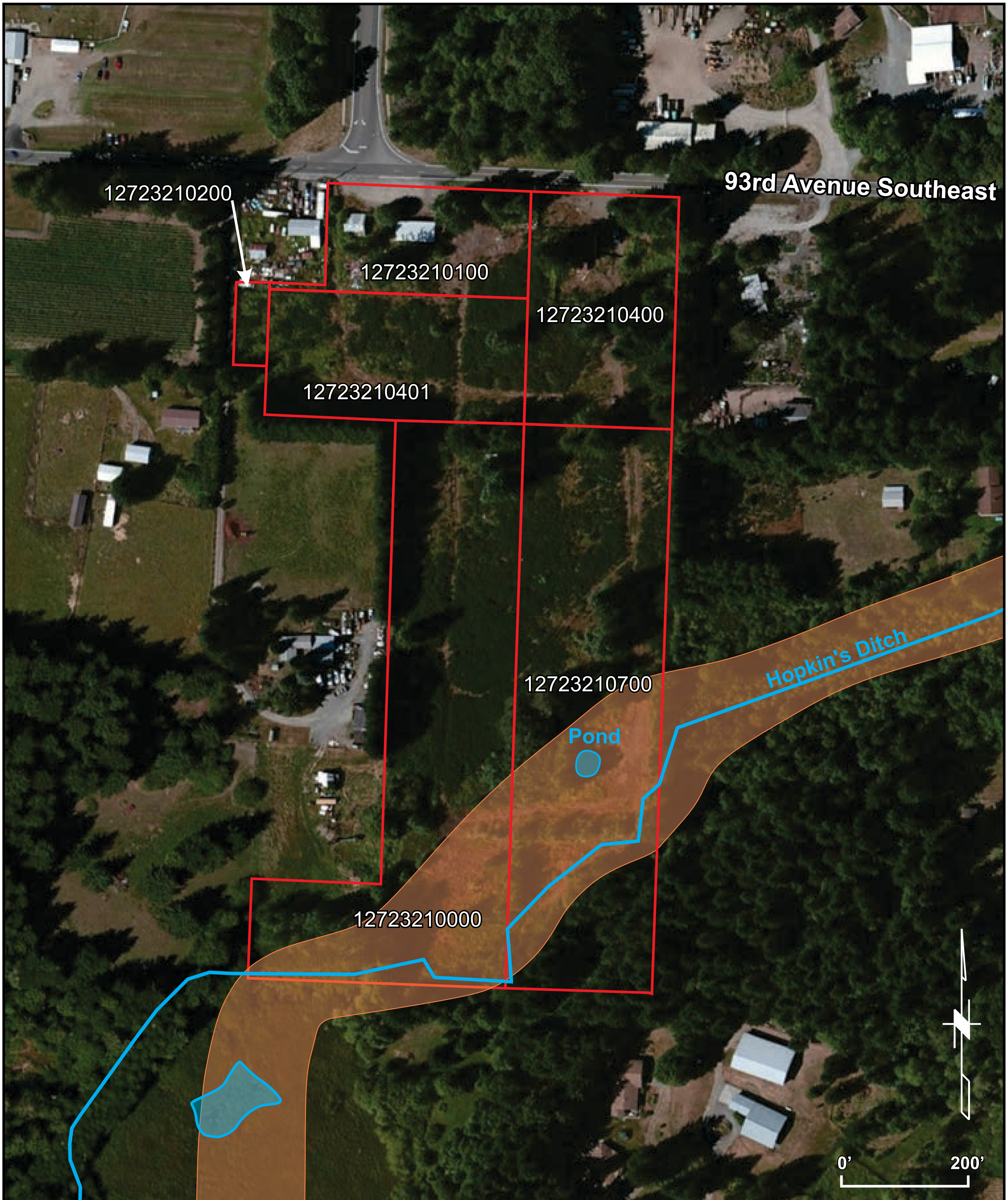
Thurston County
T 17 N/R 02 W - 23
Scale 1" = 200'

Figure 4
Wetlands Map
John's Auto Wrecking: Remedial Investigation



ROBINSON NOBLE	Note: Image from ESRI ArcGIS	PM: MTW July 2013 2491-001E	Thurston County T 17 N/R 02 W - 23 Scale 1" = 200'	Figure 5 High Groundwater Hazard Map John's Auto Wrecking: Remedial Investigation



ROBINSON NOBLE

Note:
Image from
ESRI ArcGIS

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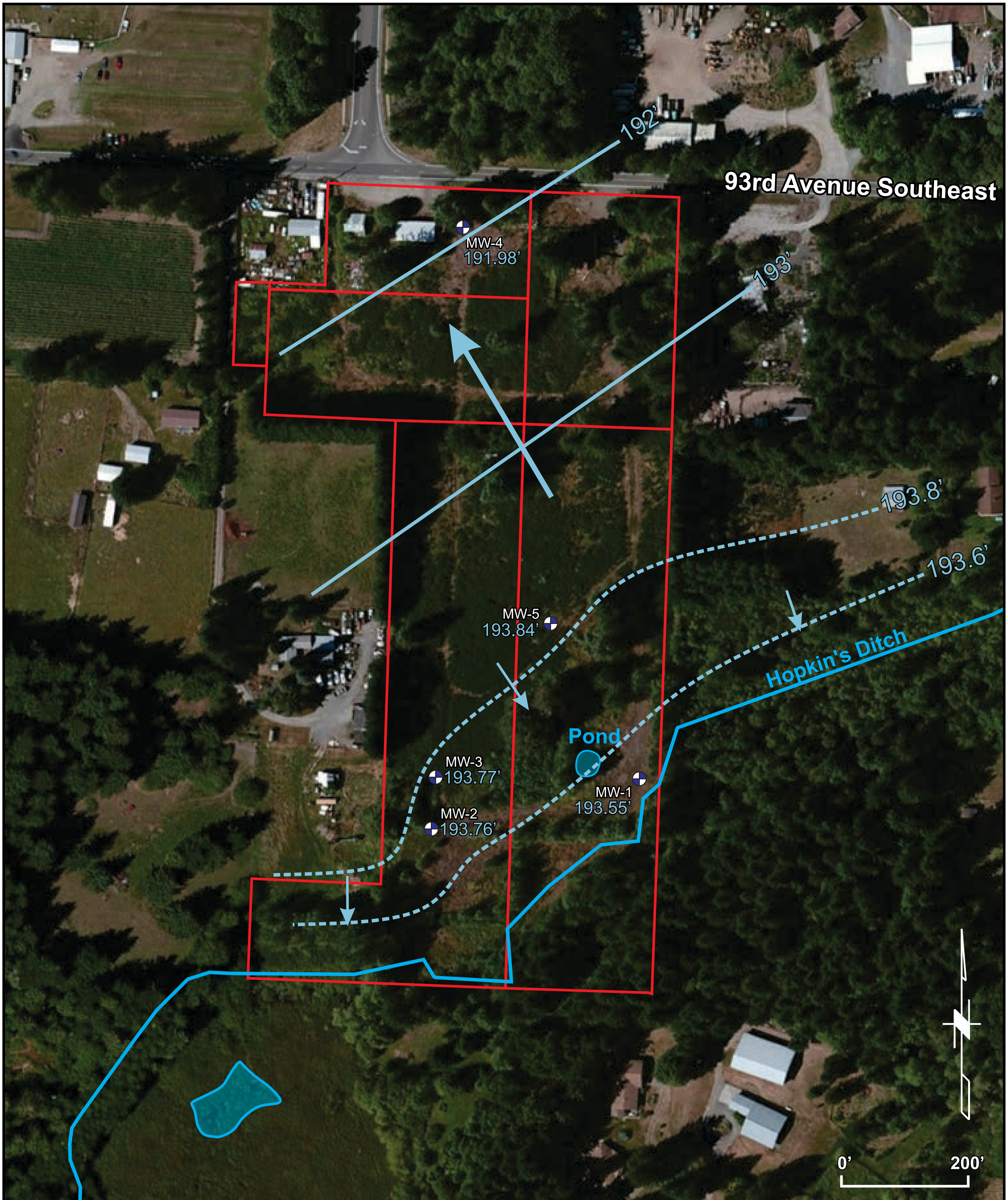
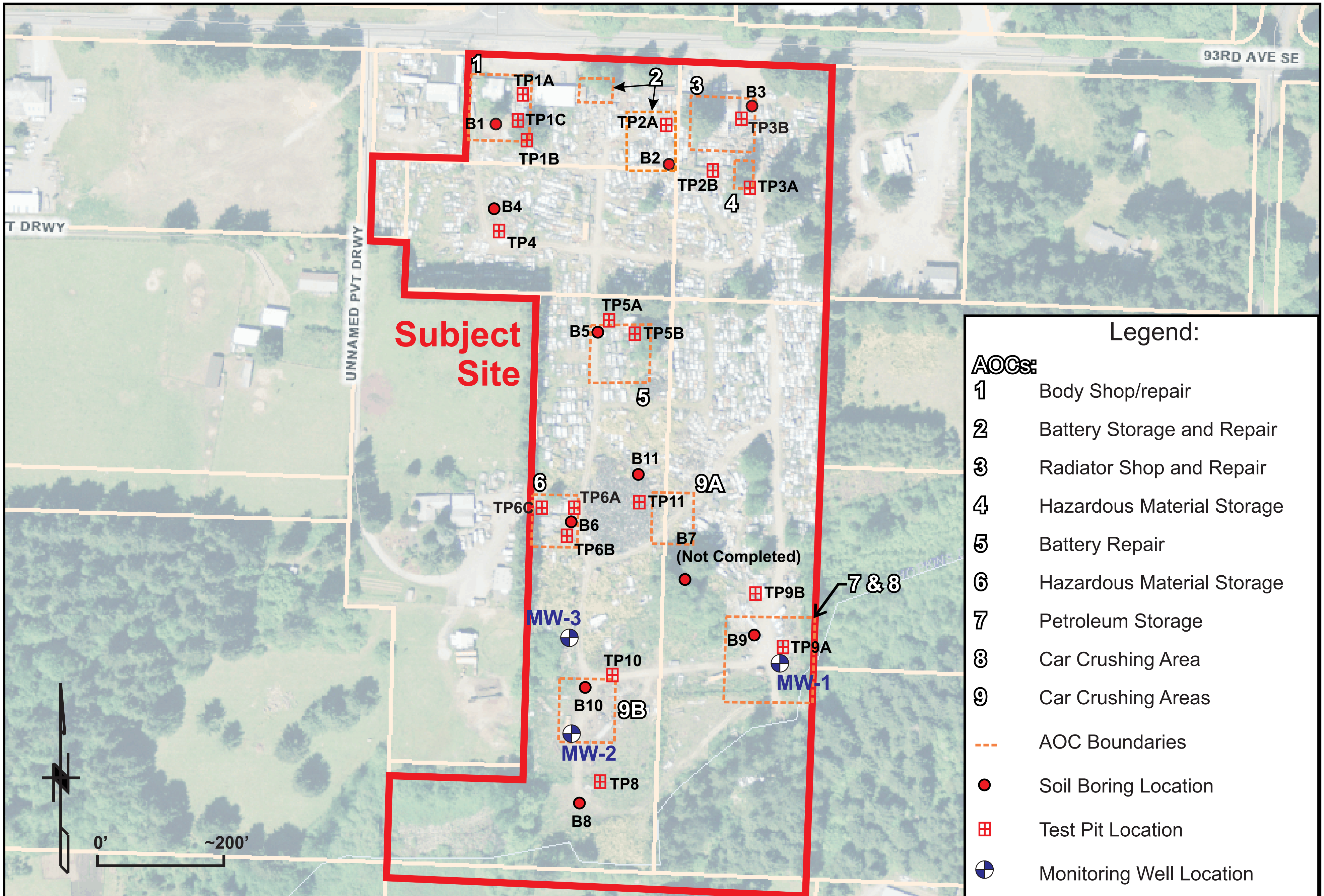
July 2013
2491-001E

Thurston County
T 17 N/R 02 W - 23
Scale 1" = 200'

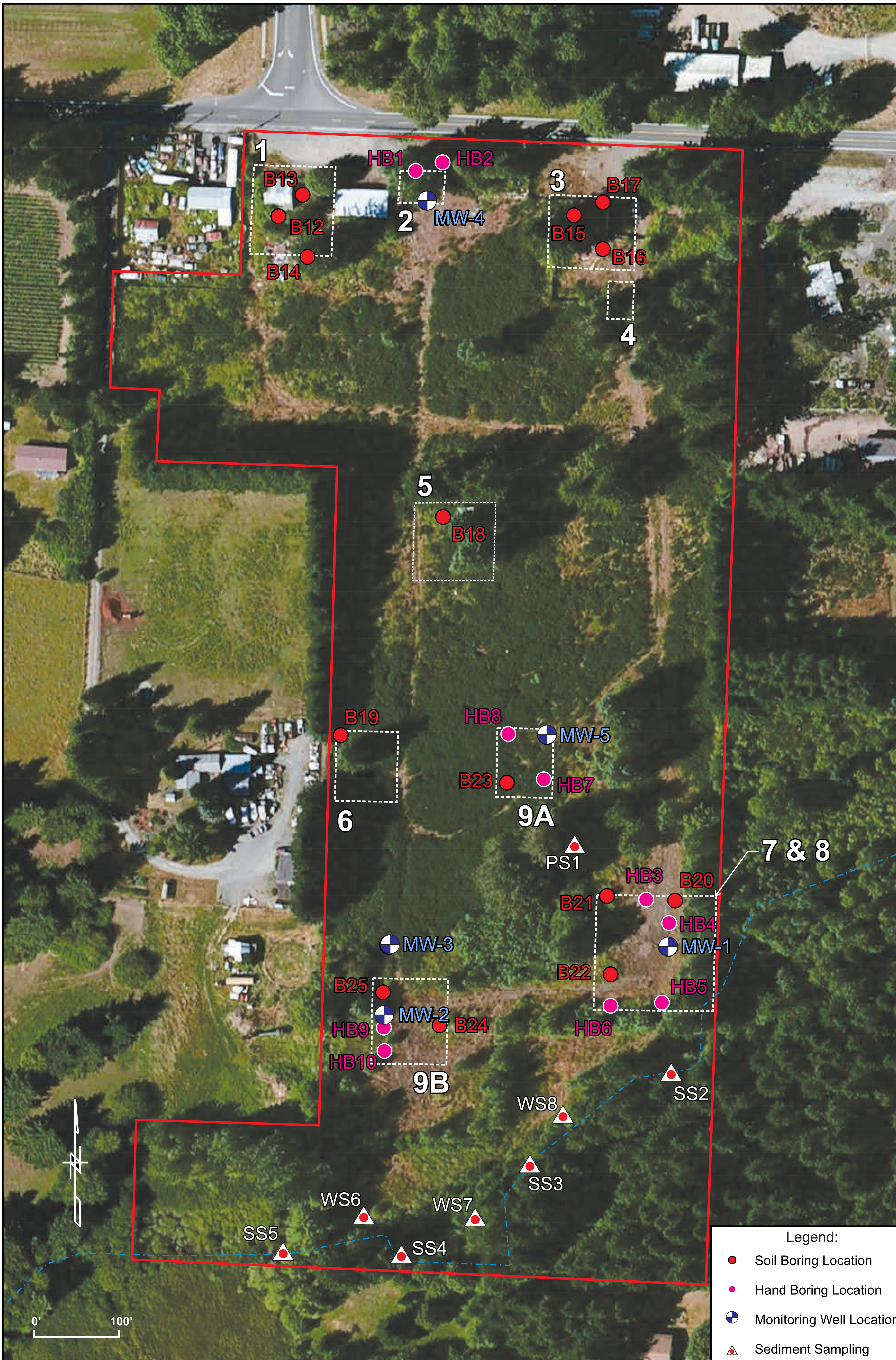
Figure 6
Flood Zones Map
John's Auto Wrecking: Remedial Investigation



ROBINSON NOBLE	Note: Image from ESRI ArcGIS	PM: MTW July 2013 2491-001E	Thurston County T 17 N/R 02 W - 23 Scale 1" = 200'	Water Levels Measured: 02/28/2013	Figure 7 Potentiometric Surface Map John's Auto Wrecking: Remedial Investigation



ROBINSON NOBLE	Note: Image taken from Thurston County GIS	PM: MTW July 2013 2491-001E	Thurston County T 17 N/R 02 W - 23 Scale 1" = ~200'	Figure 8 Previous Investigations and Remediation Work John's Auto Wrecking: Remedial Investigation



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Note:
Image from
ESRI ArcGIS

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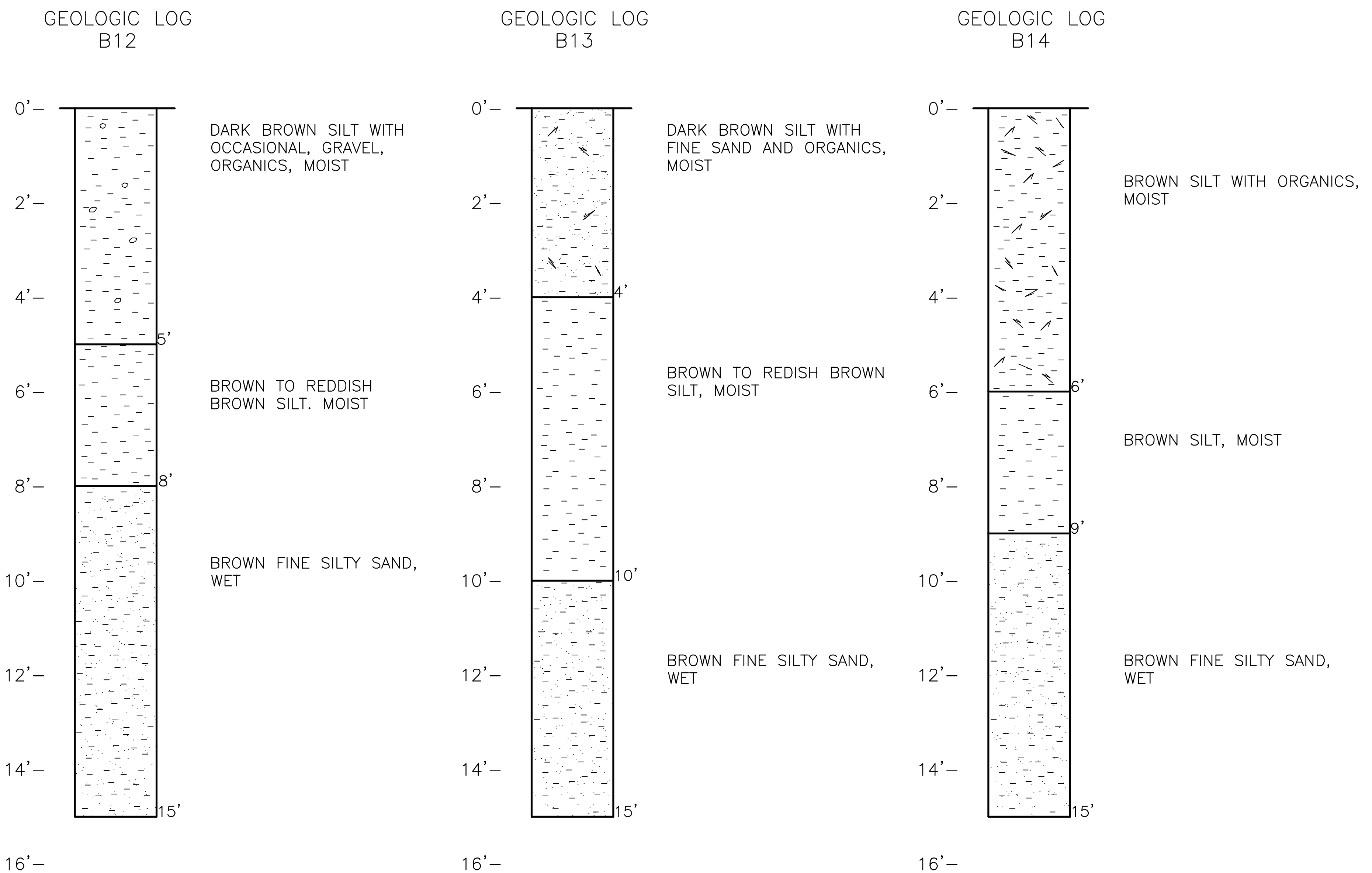
July 2013
2491-001E

Thurston County
T 17 N/R 02 W - 23
Scale 1" = 100'

Figure 9
Areas of Concern and Current Investigation Work
John's Auto Wrecking: Remedial Investigation



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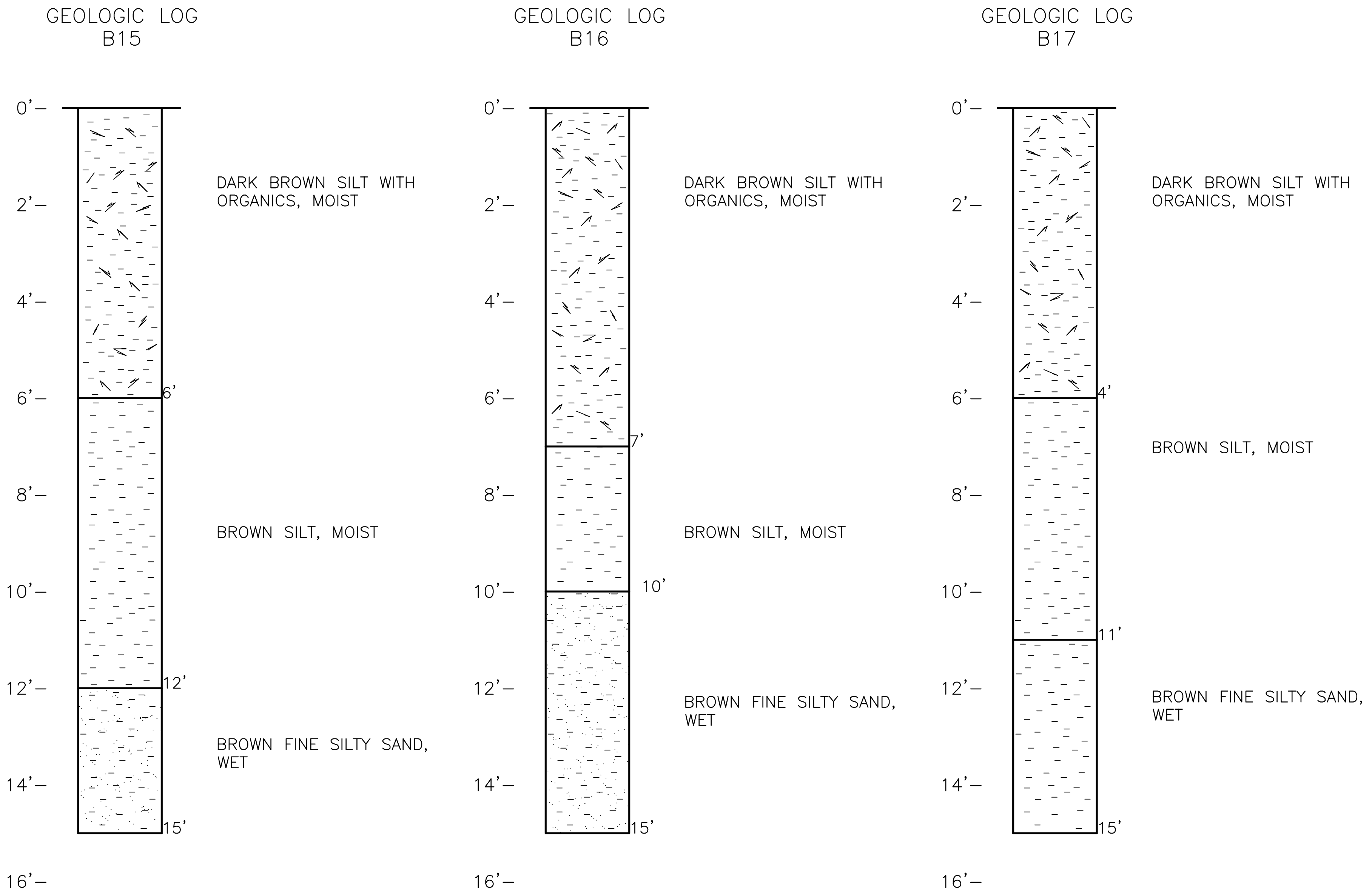
2754-001E

Thurston County
T 17 N/R 02 W - 23
Scale 1" = 4.0'

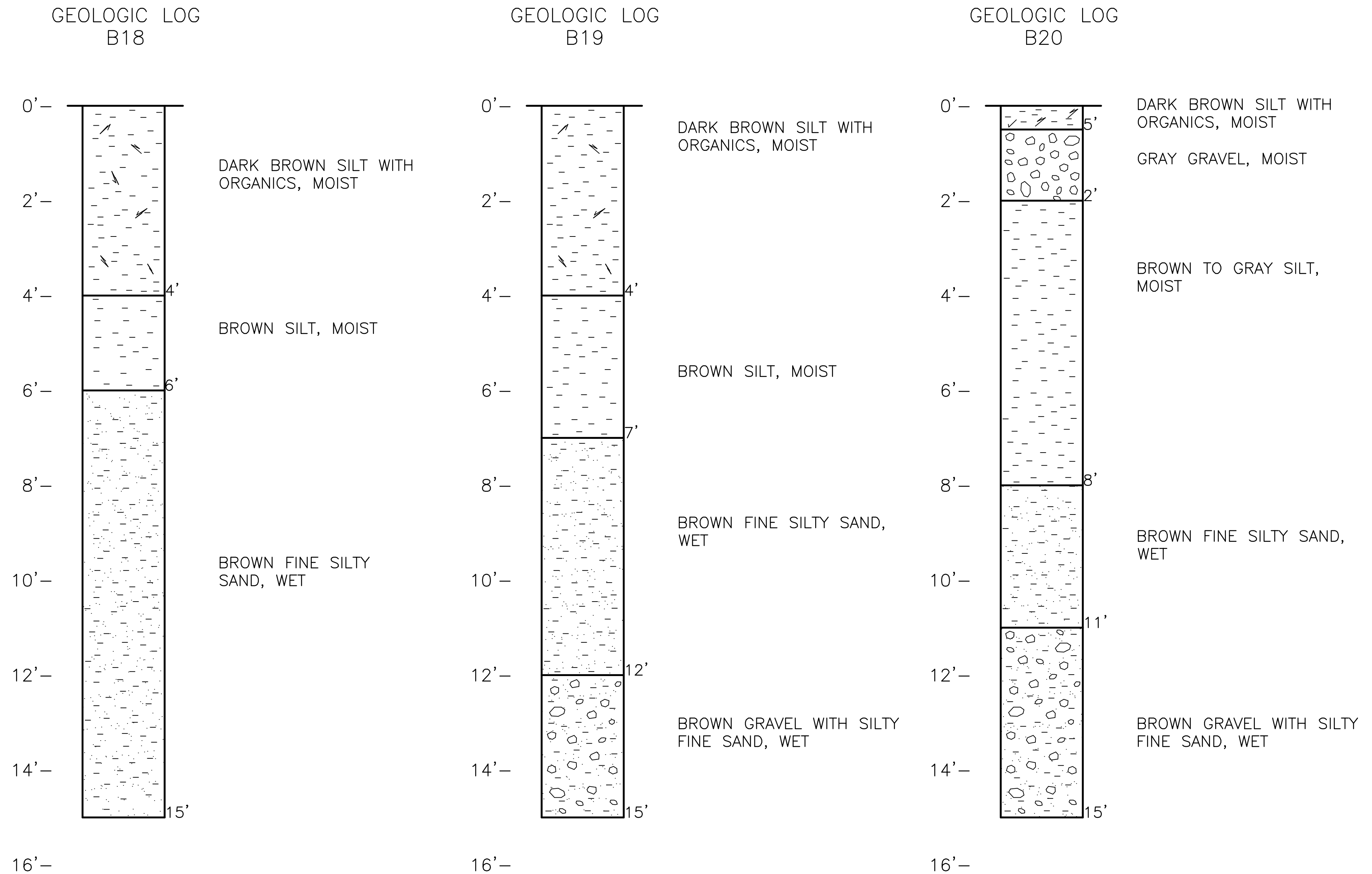
Figure 10

Geologic Logs for Direct-Push Boreholes B12 Through B14

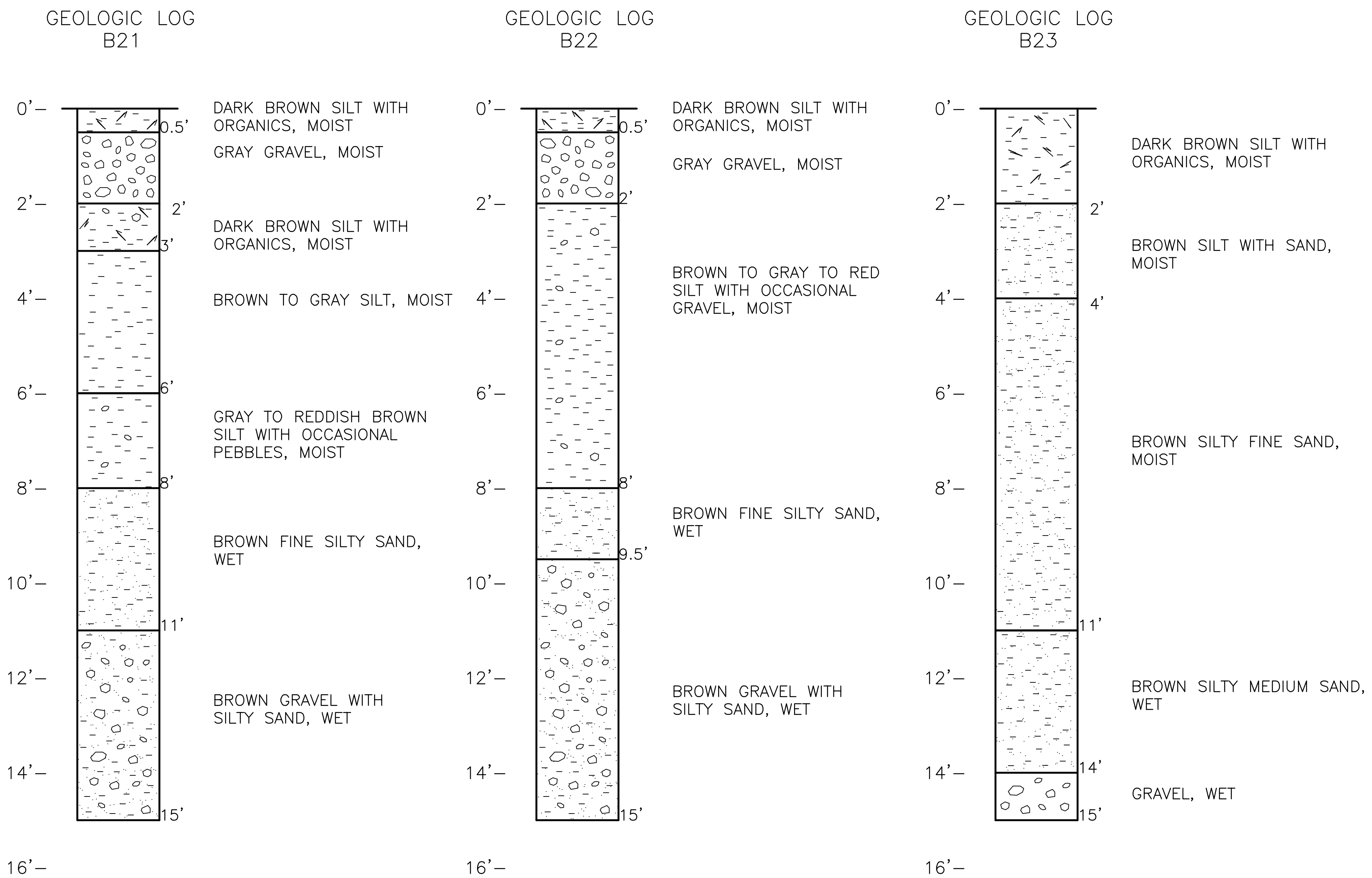
John's Auto Wrecking: Remedial Investigation



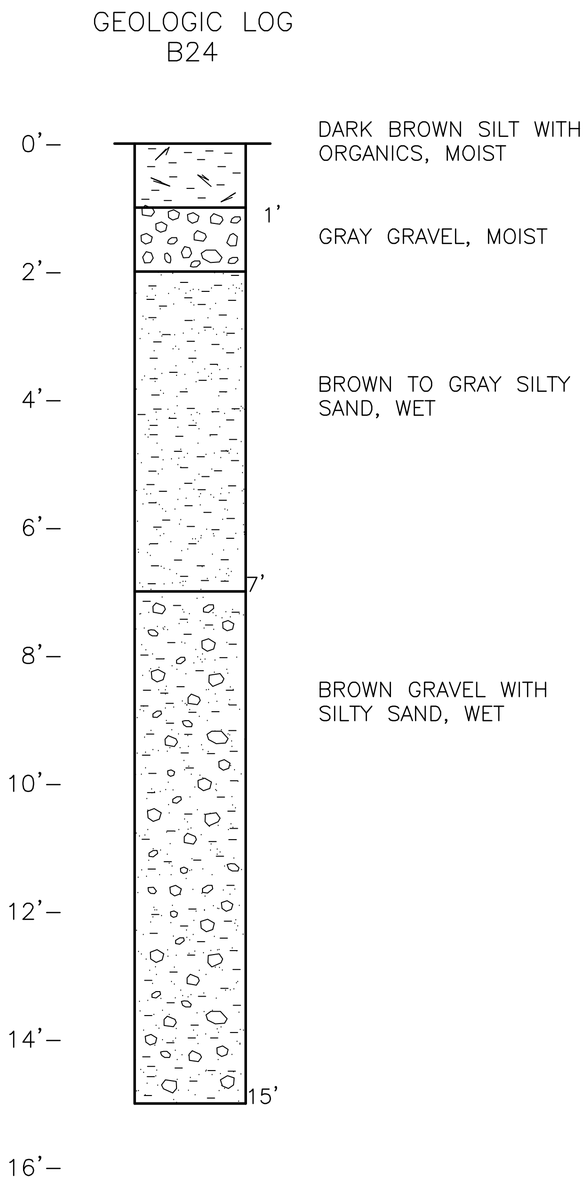
ROBINSON NOBLE	PM: MTW	Thurston County	Figure 11
	July 2013	T 17 N/R 02 W - 23	Geologic Logs for Direct-Push Boreholes B15 Through B17
	2754-001E	Scale 1" = 4.0'	John's Auto Wrecking: Remedial Investigation

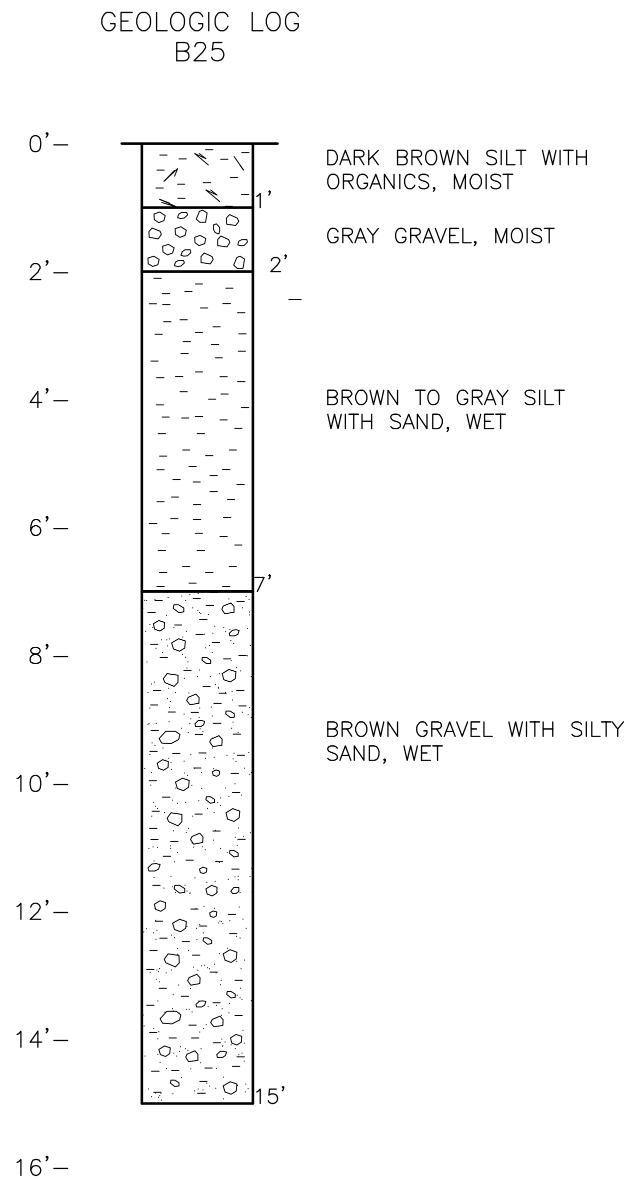


ROBINSON NOBLE	PM: MTW	Thurston County	Figure 12
	July 2013	T 17 N/R 02 W - 23	Geologic Logs for Direct-Push Boreholes B18 Through B20
	2754-001E	Scale 1" = 4.0'	John's Auto Wrecking: Remedial Investigation



ROBINSON NOBLE	PM: MTW July 2013 2754-001E	Thurston County T 17 N/R 02 W - 23 Scale 1" = 4.0'	Figure 13 Geologic Logs for Direct-Push Boreholes B21 Through B23 John's Auto Wrecking: Remedial Investigation





ROBINSON NOBLE

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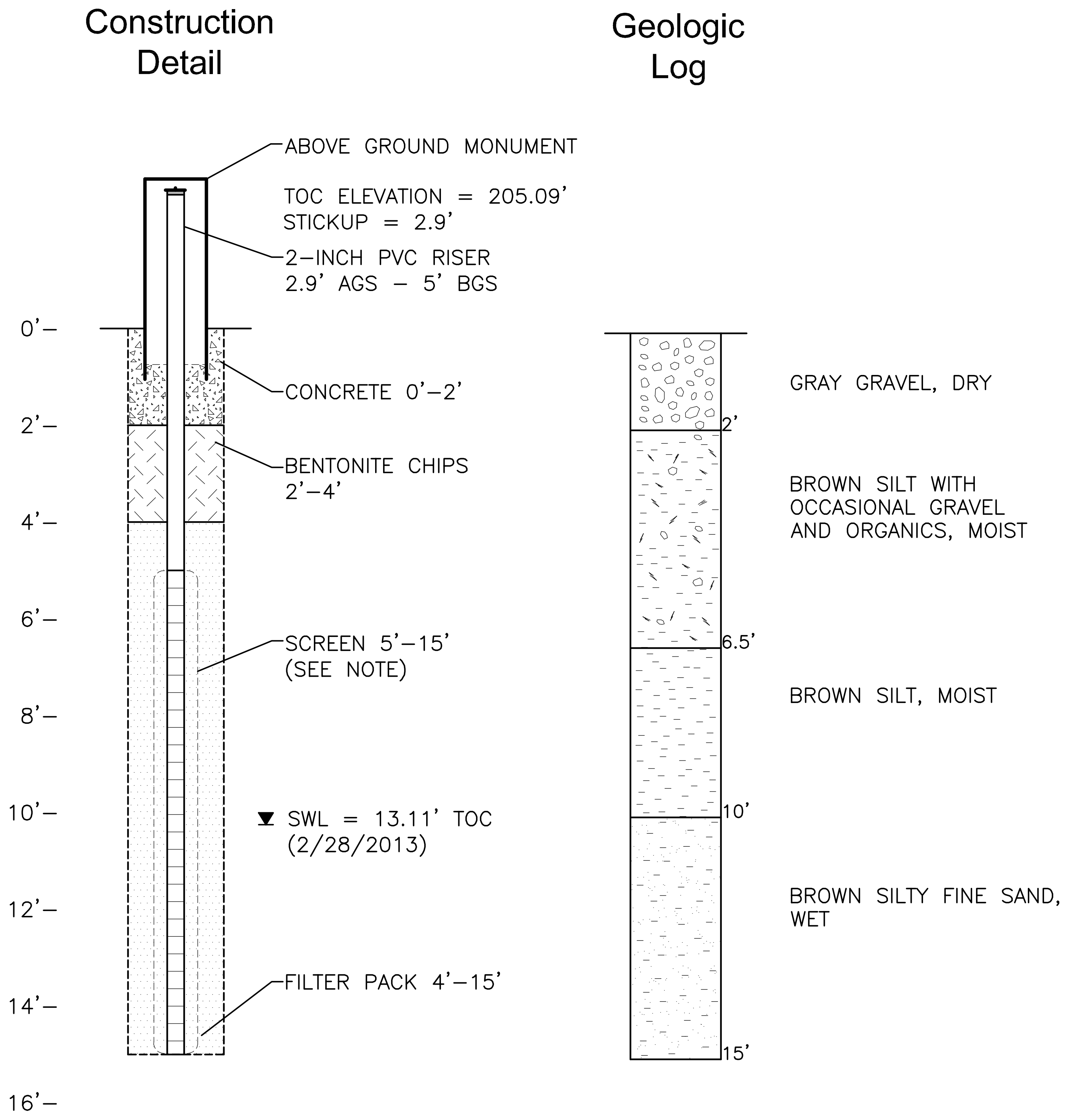
July 2013
2754-001E

Thurston County
T 17 N/R 02 W - 23
Scale 1" = 4.0'

Figure 14
Geologic Logs for Direct-Push Boreholes B24 And B25
John's Auto Wrecking: Remedial Investigation

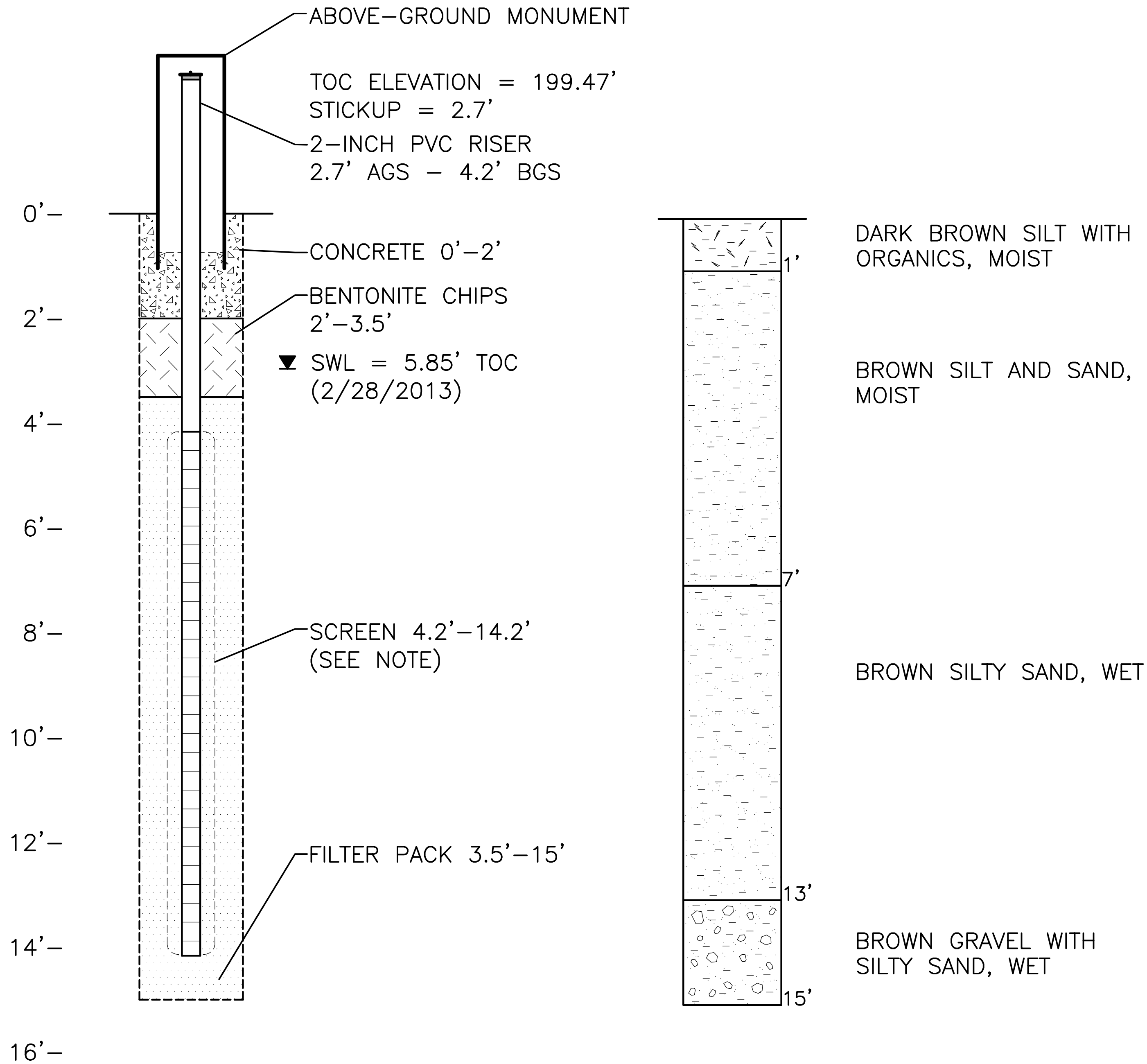


Note: Well screen is 2-inch pre-pack, 10-slot (0.010-inch opening) PVC pipe. Filter pack is 10x20 Colorado Silica Sand product.

ROBINSON NOBLE	PM: MTW July 2013 2491-001E	Thurston County T 17 N/R 02 W - 23 Well ID: BIB975	Figure 15 Construction Detail and Geologic Log for Monitor Well MW-4 John's Auto Wrecking: Remedial Investigation

Construction Detail

Geologic Log



Note: Well screen is 2-inch pre-pack, 10-slot (0.010-inch opening) PVC pipe. Filter pack is 10x20 Colorado Silica Sand product.

ROBINSON NOBLE	PM: MTW July 2013 2491-001E	Thurston County T 17 N/R 02 W - 23 Well ID: BIB976	Figure 16 Construction Detail and Geologic Log for Monitor Well MW-5 John's Auto Wrecking: Remedial Investigation

APPENDIX A

ROBINSON
NOBLE SALTBUSH INC. Established 1947
GROUNDWATER & ENVIRONMENTAL SCIENTISTS

April 21, 2009

Alan J. Wertjes
Attorney at Law
1800 Cooper Pt. Rd. SW, Bldg. 3
Olympia, WA 98502

Subject: Site Investigation/characterization, Havens Property (aka) Johns Auto Wrecking, 411 93rd Avenue SE, Olympia, Washington

Dear Mr. Wertjes:

Robinson, Noble & Saltbush is pleased to present this letter report detailing our recent subsurface investigation of the Havens property. The site activities included the advancement of a total of 11 borings and excavation of 17 test pits. A series of soil and groundwater samples were collected and analyzed for potential contaminates associated with auto wrecking yard activities. The observations made during the subsurface work and the results of the laboratory analysis are presented below.

Site Location and History

The subject site is located within Township 17N, Range 02W, Section 23. The property is comprised of six parcels identified by Thurston County Assessor-Treasurer's records as parcels 12723210100, 12723220200, 12723210400, 12723210401, 12723210700, and 12723211000. The address assigned to these parcels is 411 93rd Avenue SE, Washington 98501 (Figure 1). These parcels are contiguous. The subject consists of approximately 15 acres.

In November 2008, Robinson, Noble and Saltbush completed a file review for the Havens property of available documents contained within the Washington State Department of Ecology (Ecology) and Thurston County Health Department records. Information within the department of Ecology records indicate the site is listed on the Department of Ecology's Hazardous Sites List. The site was ranked a "1" following the completion of a site-hazard assessment. Sites receiving a rank of 1 or 2 are generally considered the highest priority for cleanup by Ecology. Ecology loosely defines these sites as posing a risk to human health and the environment.

To address the site ranking, the property owners enrolled the site in the Ecology Voluntary Cleanup Program (VCP), but the site has since been removed from the VCP due to inactivity. During the site's enrollment within the VCP, a limited effort was made by the property owner to characterize the subject site. Eventually, activity ceased and no official reports were generated.

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e-mail: mail@robinson-noble.com

During the property owner's preliminary investigation, areas of concern were identified which we present below. Soil samples were collected with the assistance of Thurston County Health during the initial investigation. During this initial site work, Patrick Soderberg of Thurston County Health reportedly observed drums overflowing during a rainstorm event and releasing unknown quantities of petroleum hydrocarbons. Also, at the time of the initial investigation, the site contained a large number if automobiles and stored automotive parts and pieces. Since those initial site activities, the site has been cleared of nearly all the vehicles and many of the stored automotive pieces.

As part of the limited investigations completed while the site was enrolled in the VCP with Ecology, nine areas of concern were identified. A site diagram has been attached as Figure 2 which indicates the general areas of concern presented in the previous work. The nine areas were collaboratively identified following discussions with the property owner's previous consultant and representatives of Thurston County Health. The areas were identified as points of concern based upon on-site observations and discussions identifying specific types of past use.

Site Geology/Hydrology

The subject lies in a relatively flat, glacial outwash plain at an elevation approximately 200 feet above sea level. The site is within the Salmon Creek drainage basin and is prone to flooding during periods of heavy precipitation.

Soils in the area of the subject have been classified by the United States Department of Agriculture, published in the *Soil Survey for the Thurston County Washington Area* (1990), as predominantly two distinct soil types: Nisqually loamy, fine sand and Norma fine, sandy loam. These soils developed on glacial outwash plains and alluvium, respectively. Nearly three quarters of the property extending southward from the northern property boundary, are mapped as the Nisqually loamy, fine sand. The majority of the remaining property is mapped as Norma fine, sandy loam. Both of theses soils have high infiltration rates ranging from 1.98 to 5.98 in/hr. These descriptions are consistent with conditions observed during the drilling on site.

Surface water is present; Hopkins ditch bisects the southern quarter of the property, flowing from the eastern boundary to the southwestern corner of the property. A small pond/wetland is mapped on the southern half of parcel 12723210700. An additional wetland is mapped in the southeast corner of parcel 12723211000. The ditch, pond, and wetlands are believed to be a reflection of shallow ground water.

The subject property and surrounding area are located within a glacial outwash plain. The geological map of Thurston County, Washington, (*USGS Water-Supply Bulletin 10* by Noble and Wallace, 1966) has mapped the area as recessional outwash (Qvr1). That report describes the sediments *"as glaciofluvial materials deposited during recession of the Vashon glacier. Qvr [is] gravel* *and sand poorly sorted, usually above the water table but excellent aquifer where below the water table... Usually overlies till or recessional gravel."*

Noble and Wallace (1966) report that this sandy outwash averages 25 feet thick but is much thicker to the north near Ward and Hewitt Lakes, approximately 2.5 miles away. Drost and others (1998) indicate the recessional outwash in the vicinity of the subject property ranges from 0 to 25 feet thick and may thicken to the west of the property. The recessional material, as mapped by Drost, appears to be absent approximately 1 mile southeast of the subject site.

In the normal sequence of glacial sediments in the Puget Sound area, Vashon till (Qvt) exists beneath the Vashon recessional outwash. Till is a compact mixture of clay, silt, sand, and gravel that typically has a relatively low permeability. Mapping by Drost and others (1998) indicate till is present at the property and has a thickness of 25 to 50 feet. Beneath the till is the Vashon advance outwash (Qva). The Qva is described by Drost as a coarse, sand and gravel aquifer.

The data obtained from drilling and excavation activities indicate the shallow geology below the subject property is composed of a heterogeneous mix of glacial recessional outwash deposits. The recessional sediments are a range of brown silts, sands, and gravel to silty, fine sands. These materials correlate closely with the description of the Qvr unit described by Drost. An increase in gravel size and distribution was noted in borings and test pits completed in the southern quarter of the property. Similar sediments were observed in all of the borings and excavated test pits. Shallow ground water was encountered in the borings at a depth of seven to nine feet below ground surface (bgs).

Shallow ground water beneath the subject site appears to be perched on the underlying compact till. The shallow groundwater gradient is presumed to trend toward Hopkins ditch. According to a Pacific Ground Water Group report[1], shallow ground water beneath the subject site flows toward Hopkins ditch. Since Hopkins ditch bisects a portion of the property, the gradient in areas north of the ditch trends to the southeast while areas south of the ditch trends toward the northwest. Shallow groundwater flow ultimately is controlled by the topographic surface of the underlying till material.

Site Activities

On February 15, 2009, site work for the Havens property began with a site walk completed by Robinson, Noble & Saltbush personnel and accompanied by a representative of APS, a private utility locating company. During the site walk, the boring and test pit locations were identified. Taking into account the nine areas of concern previously identified, additional field observations were used to determine the final locations of the 10 borings and test pits drilled or excavated for the current study (Figure 3). Observations made during the site inspections identified several potential contamination sources including partially filled steel drums, 24 five-gallon

[1] Pacific Ground Water Group, (2001) *Salmon Creek Drainage Basin Conceptual Model* prepared for URS Corp and Thurston County Water and Waste Management.

buckets (waste oil), two large industrial batteries, and a pile of old lighting fixtures. These remaining potential contamination sources should be collected and secured to prevent release of additional contamination into the environment.

Following the site walk, APS cleared each of the boring and test pit locations (Figure 3). Once the utility locate was completed, Northwest Probe, Inc., of Puyallup, Washington mobilized a direct-push drilling rig over the first boring location. A second contractor, Langseth Environmental Services of Tacoma, Washington began test pit excavation utilizing a rubber-tired backhoe. Field work was completed in one day.

Field screening was conducted during drilling and excavation operations using visual and olfactory observations. A total of 36 soil samples were collected from the test pits and 12 soil samples from the borings. Each of the soil samples were logged into the laboratory chain-of-custody; however, some of the deeper samples were held to be run following the results of soil samples taken from shallower depths within adjacent test pits. Soil and water samples not analyzed in the field were submitted to Libby Environmental for fixed laboratory (off-site) additional analysis (presented below). The complete analytical results of all the soil and groundwater submittals are attached in Appendix D and are summarized below.

A series of ten soil borings (Figures 4-6) were completed to depths ranging from 12 to 16 feet below ground surface (bgs). A series of 16 test pits were completed. The test pits were generally excavated to a depth of five feet bgs. The test pits were located in close proximity to the soil borings (Figure 3). At some locations, a second test pit at each boring location was incorporated into the work plan to allow for a more detailed site characterization. Two test pits were completed where staining, distressed vegetations, and or significant material storage were identified. Second test pits were completed at boring locations B1, B2, B3, B5, B6, and B9.

Each test pit and boring was logged and subjected to field screening. Field screening of samples from the borings did not suggest the presence of the target compounds. However, field screening for several of the test pit samples did. Target compounds include petroleum hydrocarbons, metals, PCB's, Chlorinated Solvents, and glycols. Selected soil samples were collected from the test pit and submitted for on-site laboratory analysis using a mobile laboratory provided by Libby Environmental, LLC. Soil samples were collected using EPA Method 5035A for volatile organic compound analysis (VOC). Samples were collected in standard four-ounce soil jars filled using stainless steel spoons. On-site analysis was completed for gasoline-, diesel-, and oil-range petroleum hydrocarbons. A water sample and selected soil samples were collected from each boring and submitted for additional on-site laboratory analysis.

<u>Laboratory Results</u>

Target analytes included petroleum hydrocarbons (gasoline NWTPH-Gx, diesel, and oil-range NWTPH-DxExt.), metals, PCBs, chlorinated solvents (8270), and glycols. The metals of concern have been subdivided into two separate categories: the five metals (lead, arsenic, cadmium, chromium, mercury) commonly associated with contaminated sites and three additional metals (nickel, zinc, copper). The three additional metals were requested by Ecology in an opinion letter dated February 23, 2006 and have been targeted for areas where cars were crushed or repaired. Analysis for PCBs was completed for selected samples containing elevated levels of heavy oils. The table below presents the contaminates of concern for each of the nine areas of concern.

Table 1. Laboratory Breakdown

Contaminates of Concern	Areas of Concern	Media
Petroleum Hydrocarbons	All	Soil and Ground water
Metals (lead, arsenic, cadmium, chromium, mercury)	All	Soil and Ground water
Metals (nickel, zinc, copper)	1, 2, 3, 5, 8, 9	Soil and Ground water
PCBs	Lab dependant*	Soil and Ground water
Chlorinated Solvents	All	Soil and Ground water
Glycols	1, 3, 8, 9	Ground water

* *Samples with heavy oil concentrations above MTCA Method A cleanup levels were run for PCBs*

All samples analyzed for VOC's, gasoline-range hydrocarbons, and glycols were determined to have concentrations of theses contaminates below laboratory detection levels. However, as shown on the attached analytical reports, concentrations of oil-range petroleum hydrocarbons and metals were detected in soil and groundwater samples. Laboratory results exceeding cleanup levels are discussed in detail in the following sections.

Soil concentrations of oil were identified in soil samples collected from six of the 16 test pits. The following table outlines the analytes and concentrations (above laboratory detection limits) detected in soil samples. Surface samples were collected from areas with observed soil staining and or distressed vegetation.

Table 2: Analytical Concentrations of NWTPH Dx/DX Ext. in Soil above Laboratory Detection Limits

Sample ID	Diesel (mg/kg)	Mineral Oil (mg/kg)	Oil (mg/kg)
TP1-Surf A	nd	nd	**66,700**
TP1-1'A	nd	nd	140
TP3-Surf B	nd	nd	500
TP5-Surf B	nd	nd	340
TP6-0.5'A	nd	nd	**61,900**
TP9-Surf A	nd	nd	320
Method A Limit	**2,000**	**4,000**	**2,000**

Bold *denotes reported sample concentration exceeds MTCA Method A Limit; nd denotes analyte not detected above laboratory detection limit.*

Sample TP1-SurfA was collected from soil near an overturned, five-gallon bucket. Surprisingly, the initial results (mobile lab) for sample TP1-SurfA did not reveal elevated levels of oil. Considering the nature of the soil sample location, the lab was asked to re-analyze the sample. Libby completed the analysis at their fixed laboratory and a high oil concentration was identified. The bucket is believed to have been used to contain waste oil. Visual observations of the bucket indicate the bucket was approximately 80 percent full, suggesting a maximum release of one gallon of waste oil. The area surrounding TP1A was littered with 24 waste-oil buckets, many were observed to be full of oil. The remaining buckets appeared upright and intact.

Sample TP6-0.5'A was collected just below the surface near concrete bunkers along the western edge of the property in an area described as hazardous material storage. Several partially filled drums were observed within the concrete bunkers. The contents of the drums are unknown.

Samples from TP3B, TP5B, TP6A, and TP9A were analyzed for PCBs. As stated above, the initial laboratory results for TP1-SurfA did not reveal a detection of oil. Therefore, at the time the selection of soil samples by the lab to be analyzed for PCBs (as per the work plan), TP1-SurfA was not selected for anaylsis. Once the discrepancy was identified, the samples had been disposed of. None of the soil samples analyzed for PCBs were determined to exceed the MTCA Method A cleanup levels of 1.0 mg/kg. Analytical results for sample TP6-0.5A indicate a level of Aroclor 1260 of 0.9 mg/kg. Aroclor 1260 is one of a number of common PCB blends generally associated with electrical equipment. No oil or PCBs were detected in any of the groundwater samples collected.

The laboratory results from the metals analysis for the soil samples identified several samples with elevated levels of metals. As previously discussed, MTCA five metals (lead, cadmium, arsenic, and mercury), as well as, copper, zinc, and nickel were analyzed for selected soil and groundwater samples. No soil samples were found to exceed the respective MTCA Method A cleanup level. However, analysis of a soil sample collected from TP1-1'B revealed an elevated level of nickel of 115 mg/kg. The MTCA Priority Contaminates of Ecological Concern Table 749-2 presented in Model Toxics Control Act WAC 173-340, indicates a maximum soil concentration for unrestricted land use of nickel is 100 mg/kg. Depending on the designed end use of the property, these levels may be more restrictive then necessary. However, since additional soil remediation is recommended for the area surrounding TP1, it may be prudent to remove the all known impacted soils and include nickel in the confirmation sampling. Additional discussion concerning recommended remediation efforts is presented below.

The laboratory results from the metal's analysis on selected groundwater samples identified five borings with detected analytes. Of the ten borings completed, all but B4 and B10 were run for zinc, copper, and nickel. These borings were not selected because the presumed former site activities at these locations did not involve activities likely to generate the target compounds in question. Borings B5, B8, B9, B10, and B11 were each found to contain metals above detection levels. The analytical results are presented in Table 3 below.

Table 3: Analytical Concentrations of Metals in Water above Laboratory Detection Limits

Sample ID	Lead (ug/l)	Cadmium (ug/l)	Chromium (ug/l)	Arsenic (ug/l)	Mercury (ug/l)	Zinc (ug/l)	Copper (ug/l)	Nickel (ug/l)
B5	11	nd	nd	nd	nd	nd	22	nd
B8	**25**	nd	30	**14**	nd	113	196	nd
B9	**113**	2.0	34	**32**	nd	560	**1400**	**807**
B10	**72**	nd	**54**	**7**	nd	nd	nd	n/a
B11	nd	nd	nd	nd	nd	nd	nd	**239**
Method A Limit	**15**	**5.0**	**50/100***	**5.0**	**2.0**			
Method B Limit						**4,800**	**590**	**1400a/ 160c****

***Bold** denotes reported sample concentration exceeds reported cleanup limit; nd denotes analyte not detected above laboratory detection limit; n/a denotes not analyzed.*

* *MTCA Method A Cleanup Level 50 ug/l when Chromium VI present and 100 ug/l when absent*

** *National Toxic Rule, EPA 40 CFR part 131, fresh water 1400a (acute exposure)/160c (chronic exposure) limits*

Given the lack of a published MTCA Method A or calculated Method B clean up for nickel, we have chosen to present the National Toxic Rules exposure limits for fresh water bodies. These exposure limits are likely to be applied to any water in direct connection with the surrounding creek and wetlands.

Discussion

The initial phase of this investigation revealed some contamination from petroleum hydrocarbons has impacted soil beneath the site. Laboratory analyses of soil samples collected indicate the presence of petroleum contamination in excess of current MTCA Method A cleanup levels in areas observed to have surface staining.

The two samples identified as exceeding MTCA cleanup levels were located at TP1A and TP6A, both where surface staining was observed. The high levels of oils were detected in shallow soil samples, collected at or near the ground surface. Additional soil samples, collected at deeper levels were found to have concentrations below cleanup levels. Laboratory analyses of groundwater samples collected from each of the ten borings did not indicate the presence of petroleum hydrocarbons above practical quantitative laboratory detection levels. The nature of the observed soil impacts, and the lack of groundwater impacts, suggests a targeted removal of the stained material should suffice to remediate the petroleum hydrocarbon contamination. With the collection of confirmation samples, the remediation will generate an estimated five to ten cubic yards of material. Confirmation sampling should include analysis for oil, cPAH, and PCBs.

Groundwater sampling identified concentrations of lead, chromium, and arsenic above the respective MTCA Method A cleanup levels. The metals were identified in three borings located within the southern third of the property. Shallow soil samples collected from these areas revealed soil concentrations of the targeted metals to be below MTCA Method A cleanup levels. Soil samples collected from borings B8, B9, and B10 were all well below applicable clean up levels for the target metals.

Chromium concentrations in boring B10 revealed levels exceeding MTCA Method A clean up for chromium when hexavalent chromium is present. Following the initial laboratory results, sample B10 was delivered to Spectra Laboratories of Tacoma, Washington for additional investigation. The sample was analyzed for the presence of hexavalent chromium. The laboratory results indicate levels of hexavalent chromium were below 0.01 mg/l. However, the sample was two days outside the allowable holding time for groundwater samples and, as such, the results are not definitive. Discussions with Libby Environmental suggest that exceeding the holding should not change the results, and it is therefore unlikely that any hexavalent chromium is impacting the ground water beneath the site.

Additional target compounds zinc, copper, and nickel were analyzed for the collected groundwater samples. Samples from B9 and B11 were determined to have copper and nickel concentrations exceeding published clean up levels. B11 is in the central portion of the property.

The groundwater samples were collected from direct-push soil borings through a temporary screen placed in the open borehole. While this method allows for adequate water entry and sample collection, the temporary nature of the screen set prevents adequate well development and purging. Groundwater samples collected from direct-push soil borings are generally turbid, containing high amounts of suspended and colloidal solids. It is likely, given the nature of the groundwater sampling completed during this initial investigation, that the metals levels identified in the ground water are artificially high. Prior to initiating a remedial effort, an additional round of groundwater samples should be collected from properly developed, monitoring wells.

Recommendations

Additional site work should include:

- Entry into Ecology's Voluntary Cleanup Program (VCP) should be made in order to assure that assessment and remedial action tasks are completed to the satisfaction of Ecology. As part of the site entry into the VCP, a Terrestrial Ecological Evaluation should be completed (due to the site proximity to mapped wetlands).

- Excavation and removal of identified contaminated soil surrounding test pits TP1A and TP6A coupled with conformational sampling.

- Confirmation sampling following the removal of petroleum impacted soils should include testing for cPAH and PCBs.

- Characterization and removal of all remaining sources of contamination including steel drums, five-gallon buckets, batteries, and old electrical fixtures.

- Installation of three monitoring wells to allow for proper development and low-flow sampling. The monitoring wells should be installed within close proximity the locations of B8, B9, and B10. The monitoring wells should be designed to sample shallow ground water, screened form ~7- to 20-feet bgs depending on anticipated seasonal water level fluctuations. The monitoring wells, once developed, will be sampled for lead, cadmium, chromium, arsenic, mercury, copper, zinc, and nickel.

<u>Summary</u>

It is our opinion that the contaminants identified are the result of historic site activities associated with the operation of an auto wrecking yard. Given the recent removal of a majority of the sources of contamination, removal of the impacted soils and remaining potential sources scattered across the site will alleviate much of the need for future remedial activities. It is also our opinion that properly constructed and developed monitoring wells will provide a more accurate representation of the ground water beneath the subject site. Our experience has shown properly developed and sampled wells have generally provided lower concentrations of metals within sampled ground water previously identified with elevated metals concentrations. Provided this assumption proves out, additional site characterization concerning groundwater contamination (including plume delineation) and additional remedial efforts may not be necessary.

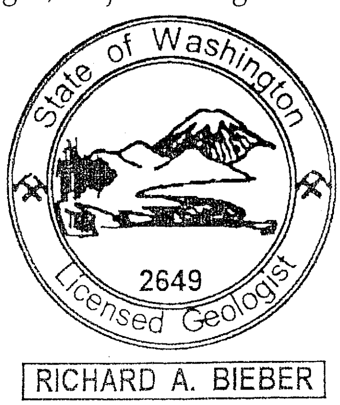
We appreciate this opportunity to be of service. Please do not hesitate to contact me if you have any questions.

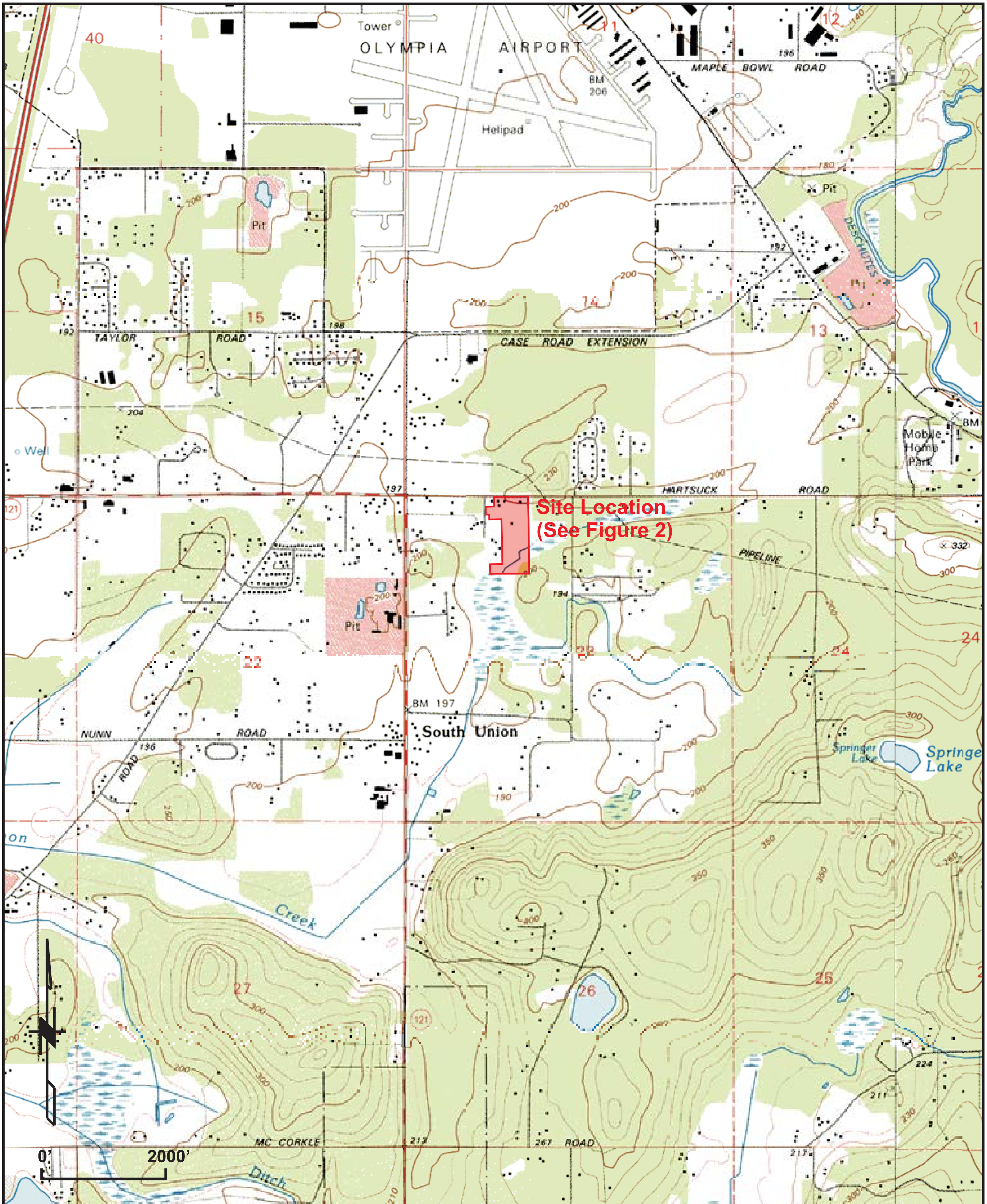
Very truly yours,
Robinson, Noble & Saltbush, Inc.

Richard A. Bieber, LG
Project Hydrogeologist, Project Manager

John F. Hildenbrand
Associate Environmental Scientist
Environmental Services Manager

attachments

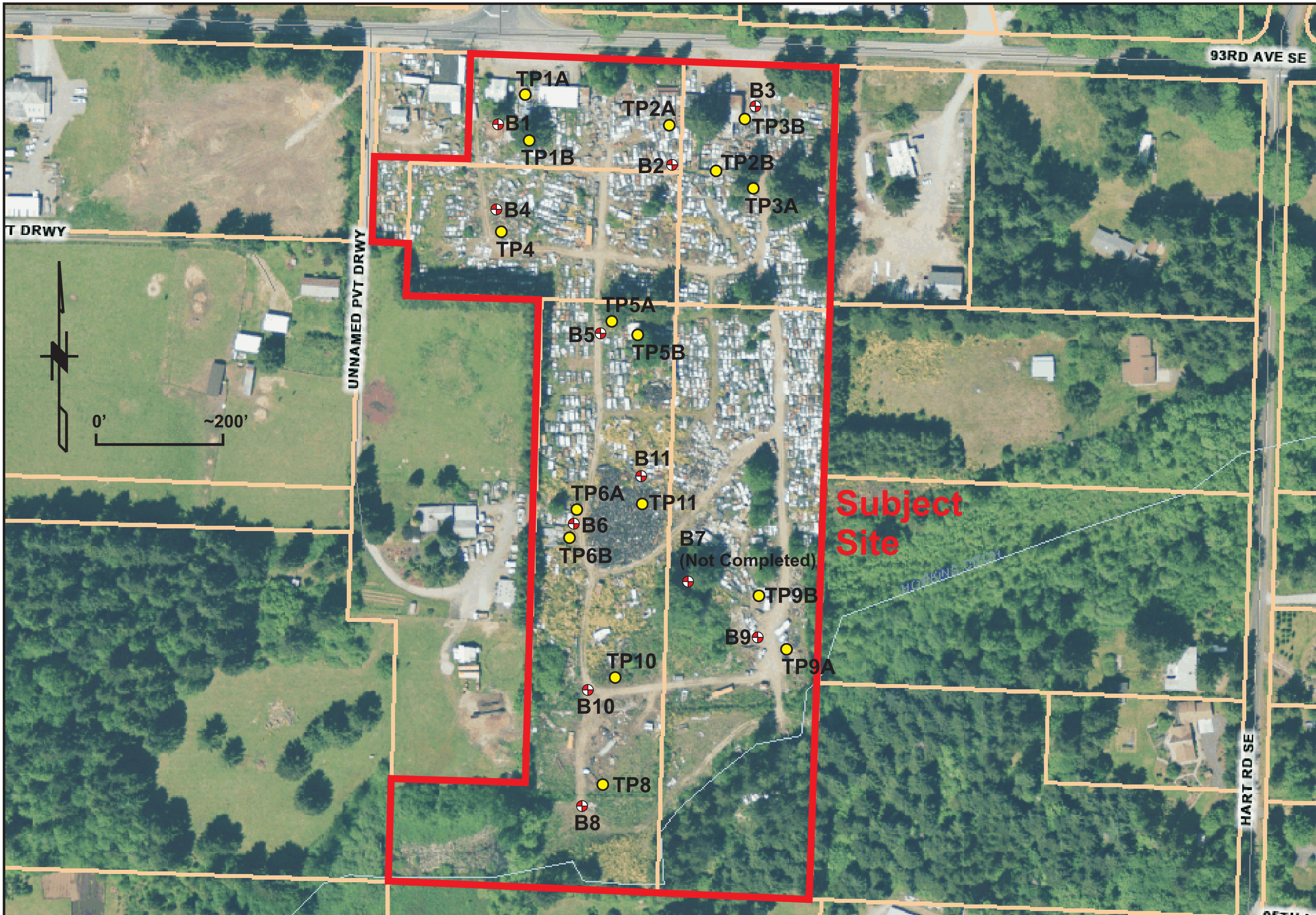




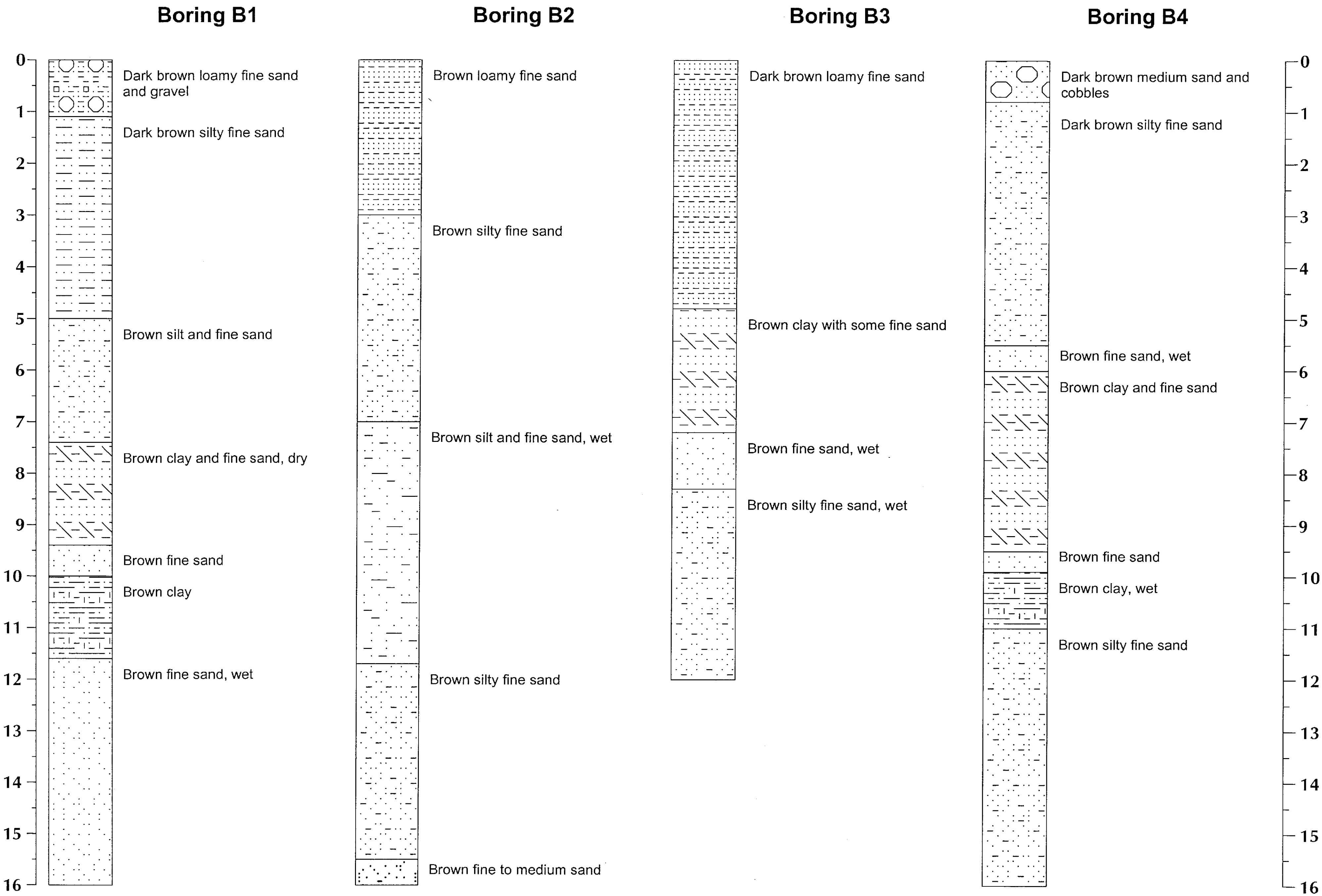
ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Basemap taken from USGS Maytown Quad.	PM: RAB April 2009	Thurston County 2491-001B	T 17 N/R 02 W - 23 Scale 1 " = 2000'	Figure 1 Vicinity Map

Havens Property: 93rd Ave SE, Oly/Site Characterization

ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Image taken from Thurston County GIS Website	PM: RAB April 2009 2491-001B	Thurston County T 17 N/R 02 W - 23 Scale 1" = ~200'	Figure 2 Aerial Photo and Identified Areas of Concern Havens Property: 93rd Ave SE, Oly/Site Characterization



ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Image taken from Thurston County GIS Website	PM: RAB April 2009 2491-001B	Thurston County T 17 N/R 02 W - 23 Scale 1" = ~200'	Figure 3 Test Pits and Boring Locations Photo Havens Property: 93rd Ave SE, Oly/Site Characterization



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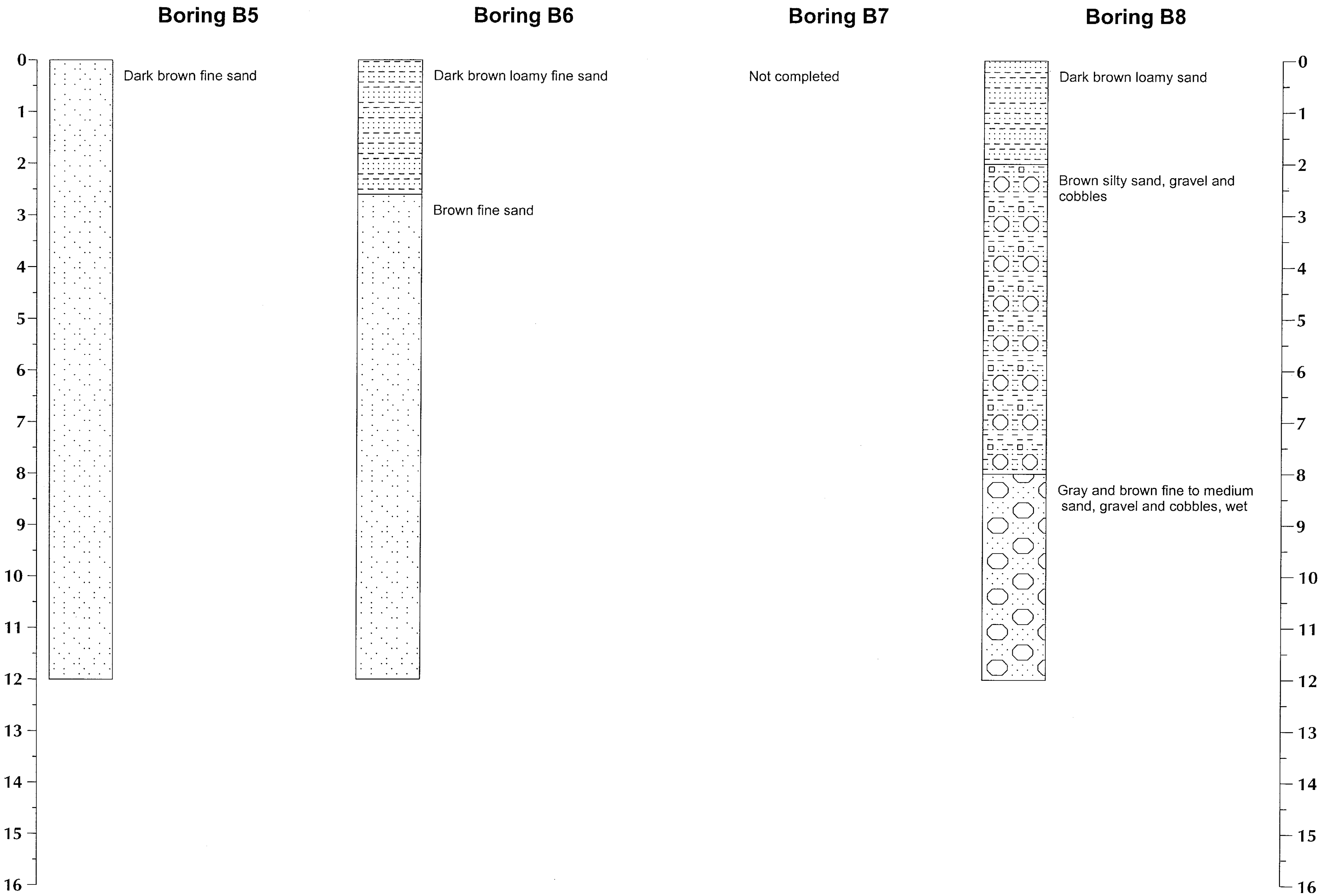
PM: RAB
May 2009
2491-001B

Figure 4
Boring Logs
Havens Property: 93rd Ave SE, Oly/Site Characterization



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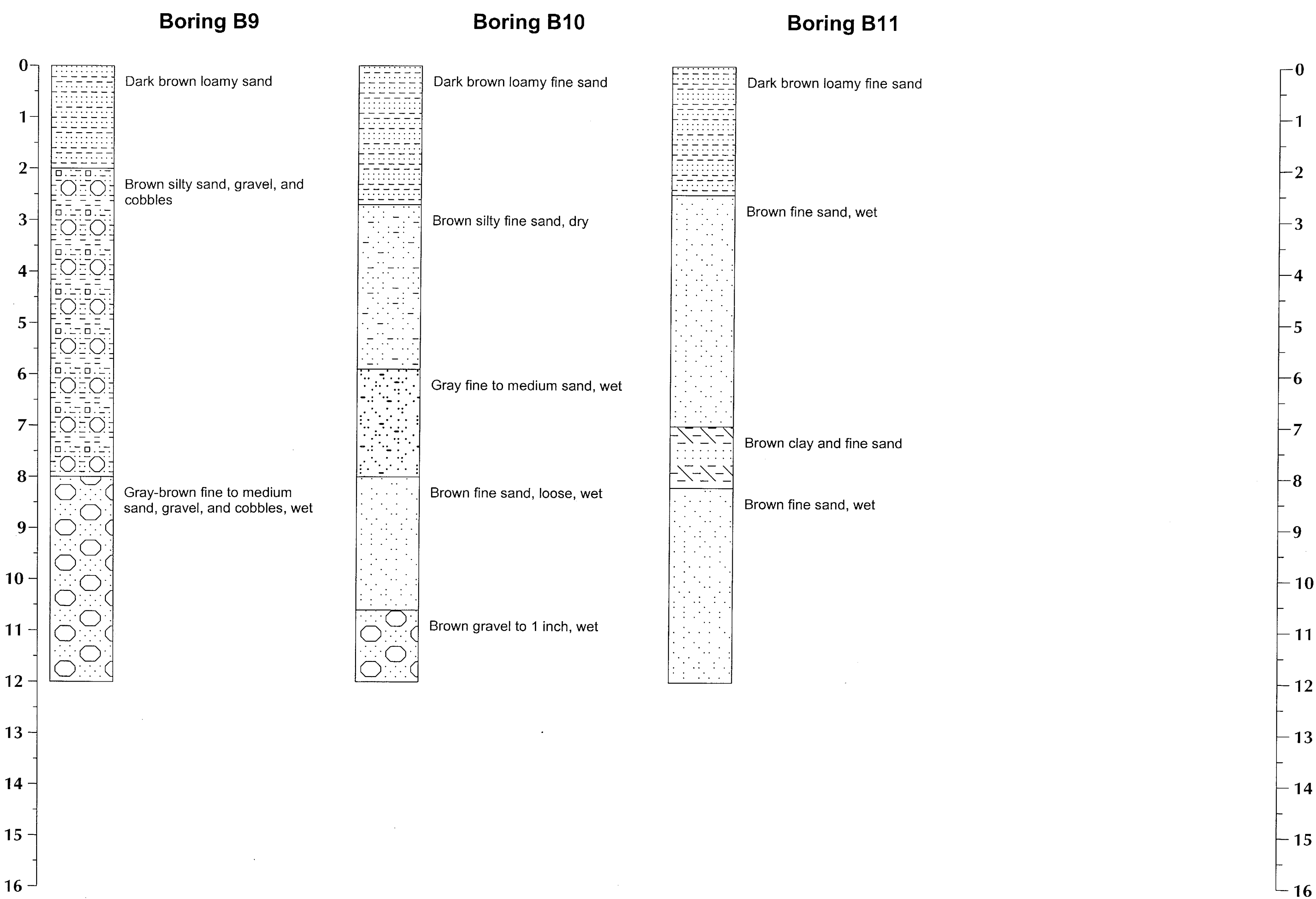
May 2009

2491-001B

Figure 5

Boring Logs

Havens Property: 93rd Ave SE, Oly/Site Characterization



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GROUNDWATER & ENVIRONMENTAL SCIENTISTS

PM: RAB
May 2009
2491-001B

Figure 6
Boring Logs
Havens Property: 93rd Ave SE, Oly/Site Characterization

Libby Environmental, Inc.

4139 Libby Road N.E., Olympia, WA 98506-2518

March 13, 2009

Rick Bieber
Robinson, Noble & Saltbush, Inc.
3011 Huson Street South
Suite A
Tacoma, WA 98409

Dear Mr. Bieber:

Please find enclosed the analytical data report for the Havens Project located in Tumwater, Washington. Mobile Lab Services were conducted on February 18, 2009. Soil and water samples were received and analyzed for Volatile Organic Compounds by EPA Method 8260B. Additional samples were analyzed off site for Gasoline by NWTPH-Gx, Diesel & Oil NWTPH-Dx/Dx Extended, Metals by EPA Method 7000 Series, and Glycols.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is also enclosed. All soil samples are reported on a dry weight basis.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
President
Libby Environmental, Inc.

Phone (360) 352-2110 * Fax (360) 352-4154 * libbyenv@aol.com

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN SOIL

Sample Description		Method Blank	TP1 Surf A	TP1-1'B	TP2-1' A	TP2-1' B	TP4-1'
Date Extracted	Reporting	N/A	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
Date Analyzed	Limits	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd	nd	nd	nd	nd
Chloromethane	0.06	nd	nd	nd	nd	nd	nd
Vinyl chloride *	0.02	nd	nd	nd	nd	nd	nd
Bromomethane	0.09	nd	nd	nd	nd	nd	nd
Chloroethane	0.06	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd
Methylene chloride	0.02	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	0.02	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
Chloroform	0.02	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Benzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.03	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.02	nd	nd	nd	nd	nd	nd
Dibromomethane	0.04	nd	nd	nd	nd	nd	nd
Bromodichloromethane	0.02	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Toluene	0.02	nd	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
Dibromochloromethane	0.03	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd	nd	nd	nd
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd	nd
Ethylbenzene	0.03	nd	nd	nd	nd	nd	nd
Total Xylenes	0.03	nd	nd	nd	nd	nd	nd
Styrenes	0.02	nd	nd	nd	nd	nd	nd

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN SOIL

Sample Description		Method Blank	TP1 Surf A	TP1-1'B	TP2-1' A	TP2-1' B	TP4-1'
Date Extracted	Reporting	N/A	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
Date Analyzed	Limits	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.02	nd	nd	nd	nd	nd	nd
Isopropylbenzene	0.08	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.02	nd	nd	nd	nd	nd	nd
Bromobenzene	0.03	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.02	nd	nd	nd	nd	nd	nd
n-Propylbenzene	0.02	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
Isopropyltoluene	0.02	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
n-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.03	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd	nd	nd	nd	nd
Naphthalene	0.03	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	1.0	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		125	128	131	110	132	111
1,2-Dichloroethane-d4		84	75.7	128	92.1	84.8	86.5
Toluene-d8		117	118	117	119	117	117
4-Bromofluorobenzene		112	117	108	100	121	103

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%
ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

QA/QC Data - EPA 8260B Analyses

Sample Identification: TP1-1'B

	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 (%)	
1,1-Dichloroethene	1.00	0.68	68	1.00	0.84	84	21.1
Benzene	1.00	0.80	80	1.00	0.98	98	20.2
Toluene	1.00	0.78	78	1.00	1.00	100	24.7
Chlorobenzene	1.00	1.03	103	1.00	1.29	129	22.4
Trichloroethene (TCE)	1.00	0.67	67	1.00	0.84	84	22.5
Surrogate Recovery							
Dibromofluoromethane			132			128	
1,2-Dichloroethane-d4			88.8			90.2	
Toluene-d8			117			117	
4-Bromofluorobenzene			110			111	

	Laboratory Control Sample		
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
1,1-Dichloroethene	1.00	0.72	72
Benzene	1.00	0.88	88
Toluene	1.00	0.88	88
Chlorobenzene	1.00	0.74	74
Trichloroethene (TCE)	1.00	0.71	71
Surrogate Recovery			
Dibromofluoromethane			127
1,2-Dichloroethane-d4			91
Toluene-d8			115
4-Bromofluorobenzene			126

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN SOIL

Sample Description		Method Blank	TP5-0.5' A	TP5 Surf B	TP6-0.5' A	TP6 Surf B	TP8-3'
Date Extracted	Reporting	N/A	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
Date Analyzed	Limits	2/22/09	2/22/09	2/22/09	2/22/09	2/22/09	2/22/09
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd	nd	nd	nd	nd
Chloromethane	0.06	nd	nd	nd	nd	nd	nd
Vinyl chloride *	0.02	nd	nd	nd	nd	nd	nd
Bromomethane	0.09	nd	nd	nd	nd	nd	nd
Chloroethane	0.06	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd
Methylene chloride	0.02	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	0.02	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
Chloroform	0.02	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Benzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.03	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.02	nd	nd	nd	nd	nd	nd
Dibromomethane	0.04	nd	nd	nd	nd	nd	nd
Bromodichloromethane	0.02	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Toluene	0.02	nd	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
Dibromochloromethane	0.03	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd	nd	nd	nd
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd	nd
Ethylbenzene	0.03	nd	nd	nd	nd	nd	nd
Total Xylenes	0.03	nd	nd	nd	nd	nd	nd
Styrenes	0.02	nd	nd	nd	nd	nd	nd

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN SOIL

Sample Description		Method Blank	TP5-0.5' A	TP5 Surf B	TP6-0.5' A	TP6 Surf B	TP8-3'
Date Extracted	Reporting	N/A	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
Date Analyzed	Limits	2/22/09	2/22/09	2/22/09	2/22/09	2/22/09	2/22/09
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.02	nd	nd	nd	nd	nd	nd
Isopropylbenzene	0.08	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.02	nd	nd	nd	nd	nd	nd
Bromobenzene	0.03	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.02	nd	nd	nd	nd	nd	nd
n-Propylbenzene	0.02	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
Isopropyltoluene	0.02	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
n-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.03	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd	nd	nd	nd	nd
Naphthalene	0.03	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	1.0	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		128	97.1	132	125	123	131
1,2-Dichloroethane-d4		87.1	90.8	80.6	117	120	73.3
Toluene-d8		112	111	113	119	114	121
4-Bromofluorobenzene		115	93.1	116	108	108	120

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%
ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN SOIL

Sample Description		TP9 Surf A	TP9 Surf A Dup	TP9 Surf B	TP9-1' B	TP10-1'	TP3-1A
Date Extracted	Reporting	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
Date Analyzed	Limits	2/22/09	2/22/09	2/22/09	2/22/09	2/22/09	2/22/09
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd	nd	nd	nd	nd
Chloromethane	0.06	nd	nd	nd	nd	nd	nd
Vinyl chloride *	0.02	nd	nd	nd	nd	nd	nd
Bromomethane	0.09	nd	nd	nd	nd	nd	nd
Chloroethane	0.06	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd
Methylene chloride	0.02	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	0.02	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
Chloroform	0.02	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Benzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.03	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.02	nd	nd	nd	nd	nd	nd
Dibromomethane	0.04	nd	nd	nd	nd	nd	nd
Bromodichloromethane	0.02	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Toluene	0.02	nd	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
Dibromochloromethane	0.03	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd	nd	nd	nd
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd	nd
Ethylbenzene	0.03	nd	nd	nd	nd	nd	nd
Total Xylenes	0.03	nd	nd	nd	nd	nd	nd
Styrenes	0.02	nd	nd	nd	nd	nd	nd

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HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN SOIL

Sample Description		TP9 Surf A	TP9 Surf A Dup	TP9 Surf B	TP9-1' B	TP10-1'	TP3-1A
Date Extracted	Reporting	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
Date Analyzed	Limits	2/22/09	2/22/09	2/22/09	2/22/09	2/22/09	2/22/09
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.02	nd	nd	nd	nd	nd	nd
Isopropylbenzene	0.08	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.02	nd	nd	nd	nd	nd	nd
Bromobenzene	0.03	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.02	nd	nd	nd	nd	nd	nd
n-Propylbenzene	0.02	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
Isopropyltoluene	0.02	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
n-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.03	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd	nd	nd	nd	nd
Naphthalene	0.03	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	1.0	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		103	131	128	127	132	101
1,2-Dichloroethane-d4		79.1	78.5	75.8	77.7	96.4	99.3
Toluene-d8		112	120	125	117	114	130
4-Bromofluorobenzene		94	112	121	109	112	99.0

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%
ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN SOIL

Sample Description		TP3 Surf B	TP11-1'
Date Extracted	Reporting	2/18/09	2/18/09
Date Analyzed	Limits	2/22/09	2/22/09
	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd
Chloromethane	0.06	nd	nd
Vinyl chloride *	0.02	nd	nd
Bromomethane	0.09	nd	nd
Chloroethane	0.06	nd	nd
Trichlorofluoromethane	0.05	nd	nd
1,1-Dichloroethene	0.05	nd	nd
Methylene chloride	0.02	nd	nd
trans -1,2-Dichloroethene	0.02	nd	nd
1,1-Dichloroethane	0.02	nd	nd
2,2-Dichloropropane	0.05	nd	nd
cis -1,2-Dichloroethene	0.02	nd	nd
Chloroform	0.02	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd
Carbon tetrachloride	0.02	nd	nd
1,1-Dichloropropene	0.02	nd	nd
Benzene	0.02	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd
Trichloroethene (TCE)	0.03	nd	nd
1,2-Dichloropropane	0.02	nd	nd
Dibromomethane	0.04	nd	nd
Bromodichloromethane	0.02	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd
Toluene	0.02	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd
1,3-Dichloropropane	0.05	nd	nd
Dibromochloromethane	0.03	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd
Chlorobenzene	0.02	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd
Ethylbenzene	0.03	nd	nd
Total Xylenes	0.03	nd	nd
Styrenes	0.02	nd	nd

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN SOIL

Sample Description		TP3 Surf B	TP11-1'
Date Extracted	Reporting	2/18/09	2/18/09
Date Analyzed	Limits	2/22/09	2/22/09
	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.02	nd	nd
Isopropylbenzene	0.08	nd	nd
1,2,3-Trichloropropane	0.02	nd	nd
Bromobenzene	0.03	nd	nd
1,1,2,2-Tetrachloroethane	0.02	nd	nd
n-Propylbenzene	0.02	nd	nd
2-Chlorotoluene	0.02	nd	nd
4-Chlorotoluene	0.02	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd
tert-Butylbenzene	0.02	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd
sec-Butylbenzene	0.02	nd	nd
1,3-Dichlorobenzene	0.02	nd	nd
Isopropyltoluene	0.02	nd	nd
1,4-Dichlorobenzene	0.02	nd	nd
1,2-Dichlorobenzene	0.02	nd	nd
n-Butylbenzene	0.02	nd	nd
1,2-Dibromo-3-Chloropropane	0.03	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd
Naphthalene	0.03	nd	nd
1,2,3-Trichlorobenzene	1.0	nd	nd
Surrogate Recovery			
Dibromofluoromethane		125	123
1,2-Dichloroethane-d4		115	110
Toluene-d8		116	112
4-Bromofluorobenzene		102	101

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%
ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

QA/QC Data - EPA 8260B Analyses

Sample Identification: TP10-1'

	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 (%)	
1,1-Dichloroethene	1.00	1.27	127	1.00	1.03	103	20.9
Benzene	1.00	0.97	97	1.00	1.27	127	26.8
Toluene	1.00	1.13	113	1.00	1.24	124	9.3
Chlorobenzene	1.00	1.20	120	1.00	0.91	91	27.5
Trichloroethene (TCE)	1.00	0.78	78	1.00	0.98	98	22.7
Surrogate Recovery							
Dibromofluoromethane			134			132	
1,2-Dichloroethane-d4			80.4			89.0	
Toluene-d8			115			116	
4-Bromofluorobenzene			113			119	

	Laboratory Control Sample		
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
1,1-Dichloroethene	1.00	0.85	85
Benzene	1.00	1.24	124
Toluene	1.00	1.35	135
Chlorobenzene	1.00	0.75	75
Trichloroethene (TCE)	1.00	1.00	100
Surrogate Recovery			
Dibromofluoromethane			131
1,2-Dichloroethane-d4			89.5
Toluene-d8			117
4-Bromofluorobenzene			116

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN WATER

Sample Description		Method Blank	B1	B2	B2 Dup	B3	B4
Date Sampled	Reporting	N/A	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
Date Analyzed	Limits	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
Dichlorodifluoromethane	2.0	nd	nd	nd	nd	nd	nd
Chloromethane	2.0	nd	nd	nd	nd	nd	nd
Vinyl chloride *	0.2	nd	nd	nd	nd	nd	nd
Bromomethane	2.0	nd	nd	nd	nd	nd	nd
Chloroethane	2.0	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	2.0	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	2.0	nd	nd	nd	nd	nd	nd
Methylene chloride	1.0	nd	nd	nd	nd	nd	nd
MTBE	1.0	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	1.0	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	2.0	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
Chloroform	1.0	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	1.0	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	1.0	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	1.0	nd	nd	nd	nd	nd	nd
Benzene	1.0	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	1.0	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	1.0	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	1.0	nd	nd	nd	nd	nd	nd
Dibromomethane	1.0	nd	nd	nd	nd	nd	nd
Bromodichloromethane	1.0	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	1.0	nd	nd	nd	nd	nd	nd
Toluene	1.0	nd	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	1.0	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	1.0	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	1.0	nd	nd	nd	nd	nd	nd
Dibromochloromethane	1.0	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.01	nd	nd	nd	nd	nd	nd
Chlorobenzene	1.0	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	1.0	nd	nd	nd	nd	nd	nd
Ethylbenzene	1.0	nd	nd	nd	nd	nd	nd
Total Xylenes	1.0	nd	nd	nd	nd	nd	nd
Styrenes	1.0	nd	nd	nd	nd	nd	nd

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN WATER

Sample Description		Method Blank	B1	B2	B2 Dup	B3	B4
Date Extracted	Reporting	N/A	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
Date Analyzed	Limits	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
Isopropylbenzene	4.0	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	1.0	nd	nd	nd	nd	nd	nd
Bromobenzene	1.0	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	1.0	nd	nd	nd	nd	nd	nd
n-Propylbenzene	1.0	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	1.0	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	1.0	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	1.0	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	1.0	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	1.0	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	1.0	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	1.0	nd	nd	nd	nd	nd	nd
Isopropyltoluene	1.0	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	1.0	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	1.0	nd	nd	nd	nd	nd	nd
n-Butylbenzene	1.0	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	1.0	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	2.0	nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	5.0	nd	nd	nd	nd	nd	nd
Naphthalene	5.0	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	5.0	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		125	133	86.7	127	128	127
1,2-Dichloroethane-d4		84	122	66.8	72.4	80.2	103
Toluene-d8		117	121	108	118	109	117
4-Bromofluorobenzene		112	108	86.6	110	113	100

"nd" Indicates not detected at listed detection limit.

"int" Indicates that interference prevents determination.

* INSTRUMENT DETECTION LIMIT

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

QA/QC Data - EPA 8260B Analyses

	Sample Identification: B1						
	Matrix Spike			Matrix Spike Duplicate			RPD
	Spiked Conc. (ug/l)	Measured Conc. (ug/l)	Spike Recovery (%)	Spiked Conc. (ug/l)	Measured Conc. (ug/l)	Spike Recovery (%)	
1,1-Dichloroethene	30	24.0	80	30	32.9	110	31.3
Benzene	30	28.9	96	30	37.7	126	26.4
Toluene	30	27.6	92	30	37.2	124	29.6
Chlorobenzene	30	28.6	95	30	26.2	87	8.8
Trichloroethene (TCE)	30	24.4	81	30	32.6	109	28.8
Surrogate Recovery							
Dibromofluoromethane			133			127	
1,2-Dichloroethane-d4			87			78	
Toluene-d8			118			115	
4-Bromofluorobenzene			112			116	

	Laboratory Control Sample		
	Spiked Conc. (ug/l)	Measured Conc. (ug/l)	Spike Recovery (%)
1,1-Dichloroethene	20	14.3	72
Benzene	20	17.6	88
Toluene	20	17.6	88
Chlorobenzene	20	14.9	75
Trichloroethene (TCE)	20	14.2	71
Surrogate Recovery			
Dibromofluoromethane			127
1,2-Dichloroethane-d4			91
Toluene-d8			115
4-Bromofluorobenzene			126

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN WATER

Sample Description		B6	B8	B9	B10	B11
Date Sampled	Reporting	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
Date Analyzed	Limits	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
Dichlorodifluoromethane	2.0	nd	nd	nd	nd	nd
Chloromethane	2.0	nd	nd	nd	nd	nd
Vinyl chloride *	0.2	nd	nd	nd	nd	nd
Bromomethane	2.0	nd	nd	nd	nd	nd
Chloroethane	2.0	nd	nd	nd	nd	nd
Trichlorofluoromethane	2.0	nd	nd	nd	nd	nd
1,1-Dichloroethene	2.0	nd	nd	nd	nd	nd
Methylene chloride	1.0	nd	nd	nd	nd	nd
MTBE	1.0	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd
1,1-Dichloroethane	1.0	nd	nd	nd	nd	nd
2,2-Dichloropropane	2.0	nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd
Chloroform	1.0	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	1.0	nd	nd	nd	nd	nd
Carbon tetrachloride	1.0	nd	nd	nd	nd	nd
1,1-Dichloropropene	1.0	nd	nd	nd	nd	nd
Benzene	1.0	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	1.0	nd	nd	nd	nd	nd
Trichloroethene (TCE)	1.0	nd	nd	nd	nd	nd
1,2-Dichloropropane	1.0	nd	nd	nd	nd	nd
Dibromomethane	1.0	nd	nd	nd	nd	nd
Bromodichloromethane	1.0	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	1.0	nd	nd	nd	nd	nd
Toluene	1.0	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	1.0	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	1.0	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd	nd	nd	nd
1,3-Dichloropropane	1.0	nd	nd	nd	nd	nd
Dibromochloromethane	1.0	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.01	nd	nd	nd	nd	nd
Chlorobenzene	1.0	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	1.0	nd	nd	nd	nd	nd
Ethylbenzene	1.0	nd	nd	nd	nd	nd
Total Xylenes	1.0	nd	nd	nd	nd	nd
Styrenes	1.0	nd	nd	nd	nd	nd

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN WATER

Sample Description		B6	B8	B9	B10	B11
Date Extracted	Reporting	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
Date Analyzed	Limits	2/18/09	2/18/09	2/18/09	2/18/09	2/18/09
	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
Isopropylbenzene	4.0	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	1.0	nd	nd	nd	nd	nd
Bromobenzene	1.0	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	1.0	nd	nd	nd	nd	nd
n-Propylbenzene	1.0	nd	nd	nd	nd	nd
2-Chlorotoluene	1.0	nd	nd	nd	nd	nd
4-Chlorotoluene	1.0	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	1.0	nd	nd	nd	nd	nd
tert-Butylbenzene	1.0	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	1.0	nd	nd	nd	nd	nd
sec-Butylbenzene	1.0	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	1.0	nd	nd	nd	nd	nd
Isopropyltoluene	1.0	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	1.0	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	1.0	nd	nd	nd	nd	nd
n-Butylbenzene	1.0	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	1.0	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	2.0	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	5.0	nd	nd	nd	nd	nd
Naphthalene	5.0	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	5.0	nd	nd	nd	nd	nd
Surrogate Recovery						
Dibromofluoromethane		99.3	97.3	110	120	133
1,2-Dichloroethane-d4		73.1	72.1	93.5	101	129
Toluene-d8		114	111	108	115	119
4-Bromofluorobenzene		102	88.5	92.2	100	109

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%
ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

Analyses of Gasoline (NWTPH-Gx) in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (ug/l)
Method Blank	2/18/09	90	nd
B1	2/18/09	98	nd
B2	2/18/09	88	nd
B2 Dup	2/18/09	94	nd
B3	2/18/09	67	nd
B4	2/18/09	112	nd
B5	2/18/09	90	nd
B6	2/18/09	71	nd
B8	2/18/09	101	nd
B9	2/18/09	111	nd
B10	2/18/09	86	nd
B11	2/18/09	85	nd
Practical Quantitation Limit			100

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Trifluorotoluene): 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (mg/kg)	Mineral Oil (mg/kg)	Oil (mg/kg)
Method Blank	2/20/09	111	nd	nd	nd
TP2-1' A	2/20/09	104	nd	nd	nd
TP2-1' B	2/20/09	88	nd	nd	nd
TP1-Surf A	2/20/09	110	nd	nd	nd
TP1-1' B	2/20/09	98	nd	nd	nd
TP4-1'	2/20/09	85	nd	nd	nd
TP5-0.5A	2/20/09	79	nd	nd	nd
TP5-Surf B	2/20/09	105	nd	nd	340
TP6-0.5A	2/20/09	int	nd	nd	61900
TP6-Surf B	2/20/09	110	nd	nd	nd
TP6-Surf B Dup	2/20/09	109	nd	nd	nd
TP8-3'	2/20/09	110	nd	nd	nd
TP9-Surf A	2/20/09	110	nd	nd	320
TP9-1' B	2/20/09	95	nd	nd	nd
TP9- Surf B	2/20/09	90	nd	nd	nd
TP10-1'	2/20/09	105	nd	nd	nd
TP11-1'	2/20/09	85	nd	nd	nd
TP11-1' Dup	2/20/09	135	nd	nd	nd
TP3-1'A	2/20/09	83	nd	nd	nd
TP3-Surf B	2/20/09	100	nd	nd	500
Practical Quantitation Limit			25	40	40

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Athanasius

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (mg/kg)	Mineral Oil (mg/kg)	Oil (mg/kg)
Method Blank	2/25/09	110	nd	nd	nd
TP1-Surf A	2/25/09	int	nd	nd	66700
TP1-Surf A Dup	2/25/09	int	nd	nd	65700
TP1-1' B	2/25/09	90	nd	nd	140
TP6-0.5'A	2/25/09	int	nd	nd	38600
TP6-4.0' A	2/25/09	90	nd	nd	nd
TP6-4.0' A Dup	2/25/09	89	nd	nd	nd
Practical Quantitation Limit			25	40	40

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Athanasius

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (ug/l)	Mineral Oil (ug/l)	Oil (ug/l)
Method Blank	2/19/09	105	nd	nd	nd
B1	2/19/09	100	nd	nd	nd
B2	2/19/09	65	nd	nd	nd
B3	2/19/09	101	nd	nd	nd
B4	2/19/09	106	nd	nd	nd
B5	2/19/09	116	nd	nd	nd
B6	2/19/09	81	nd	nd	nd
B8	2/20/09	100	nd	nd	nd
B9	2/20/09	72	nd	nd	nd
B9 DUP	2/20/09	110	nd	nd	nd
B10	2/20/09	113	nd	nd	nd
B11	2/20/09	118	nd	nd	nd
Practical Quantitation Limit			200	400	400

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Gautam Dutta

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

Analyses of Gasoline (NWTPH-Gx) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)
Method Blank	2/18/09	90	nd
TP1-Surf A	2/18/09	70	nd
TP1-1' B	2/18/09	71	nd
TP2-1' A	2/18/09	68	nd
TP2-1' B	2/18/09	69	nd
TP4-1'	2/18/09	79	nd
TP4-1' Dup	2/18/09	87	nd
Practical Quantitation Limit			10

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Trifluorotoluene): 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

Analyses of Gasoline (NWTPH-Gx) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)
Method Blank	2/19/09	121	nd
TP3-1'A	2/19/09	118	nd
TP3-Surf B	2/19/09	100	nd
TP5-0.5A	2/19/09	105	nd
TP5-Surf B	2/19/09	112	nd
TP6-0.5A	2/19/09	91	nd
TP6-Surf B	2/20/09	82	nd
TP8-3'	2/20/09	89	nd
TP9-Surf A	2/20/09	104	nd
TP9-1' B	2/19/09	110	nd
TP9- Surf B	2/19/09	93	nd
TP10-1'	2/19/09	75	nd
TP11-1'	2/20/09	87	nd
TP11-1' DUP	2/20/09	66	nd
Practical Quantitation Limit			10

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Trifluorotoluene): 65% TO 135%

ANALYSES PERFORMED BY: Gautam Dutta

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

Analyses of Metals in Soil by EPA Method 7000 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)	Mercury (mg/kg)
Method Blank	2/20/09	nd	nd	nd	nd	nd
TP1-Surf A	2/20/09	25	nd	nd	nd	nd
TP1-1' B	2/20/09	26	nd	nd	nd	nd
TP2-1' A	2/20/09	nd	nd	nd	nd	nd
TP2-1' B	2/20/09	nd	nd	nd	nd	nd
TP4-1'	2/20/09	nd	nd	nd	nd	nd
TP3-1'A	2/20/09	nd	nd	nd	nd	nd
TP3-Surf B	2/20/09	230	nd	nd	nd	nd
TP5-0.5A	2/20/09	nd	nd	nd	nd	nd
TP5-Surf B	2/20/09	27	nd	nd	nd	nd
TP6-0.5A	2/20/09	8	nd	nd	nd	nd
TP6-Surf B	2/20/09	nd	nd	nd	nd	nd
TP8-3'	2/20/09	nd	nd	nd	nd	nd
TP9-Surf A	2/20/09	25	nd	nd	nd	nd
TP9-1' B	2/20/09	6	nd	nd	nd	nd
TP9- Surf B	2/20/09	nd	nd	nd	nd	nd
TP10-1'	2/20/09	nd	nd	nd	nd	nd
TP11-1'	2/20/09	nd	nd	nd	nd	nd
TP11-1' DUP	2/20/09	nd	nd	nd	nd	nd
Practical Quantitation Limit		5.0	1.0	5.0	5.0	0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

QA/QC for Metals in Soil by EPA Method 7000 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)	Mercury (% Recovery)
LCS	2/20/09	101%	122%	101%	114%	88%
TP11-1' MS	2/20/09	127%	97%	73%	101%	93%
TP11-1' MSD	2/20/09	125%	98%	80%	98%	93%
RPD	2/20/09	2%	1%	9%	3%	0%
Practical Quantitation Limit		5.0	1.0	5.0	5.0	0.5

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

Analyses of Metals in Soil by EPA Method 7000 Series

Sample Number	Date Analyzed	Copper (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)
Method Blank	2/24/09	nd	nd	nd
TP1-Surf A	2/24/09	7	16	19
TP1-1' B	2/24/09	11	23	115 -
TP2-1' A	2/24/09	nd	nd	21
TP2-1' B	2/24/09	nd	nd	25
TP3-1'A	2/24/09	nd	nd	20
TP3-Surf B	2/24/09	20	19	32
TP5-0.5A	2/24/09	nd	11	27
TP5-Surf B	2/24/09	nd	9	nd
TP8-3'	2/24/09	nd	nd	13
TP9-Surf A	2/24/09	5	17	30
TP9-1' B	2/24/09	nd	nd	35
TP9- Surf B	2/24/09	nd	13	40
TP11-1'	2/24/09	nd	nd	23
TP11-1' DUP	2/24/09	nd	nd	--
Practical Quantitation Limit		5.0	1.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt & Zoe (DAL)

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

QA/QC for Metals in Soil by EPA Method 7000 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)	Nickel (% Recovery)
LCS	2/24/09	96%	71%	98%
TP11-1' MS	2/24/09	92%	108%	106%
TP11-1' MSD	2/24/09	93%	114%	106%
RPD	2/24/09	1%	5%	0%
Practical Quantitation Limit		5.0	1.0	5.0

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt & Zoe (DAL)

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

Analyses of Metals in Soil by EPA Method 7000 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)	Mercury (mg/kg)
Method Blank	3/1/09	nd	nd	nd	nd	nd
B8-2.5'	3/1/09	nd	nd	nd	nd	nd
B9-8.5'	3/1/09	nd	nd	nd	nd	nd
B10-4.5'	3/1/09	nd	nd	nd	nd	nd
B10-4.5' Dup	3/1/09	nd	nd	nd	nd	nd
Practical Quantitation Limit		5.0	1.0	5.0	5.0	0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

QA/QC for Metals in Soil by EPA Method 7000 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)	Mercury (% Recovery)
LCS	3/1/09	105%	96%	100%	100%	90%
B10-4.5' MS	3/1/09	102%	85%	int	109%	94%
B10-4.5' MSD	3/1/09	114%	80%	int	99%	86%
RPD	3/1/09	11%	6%		10%	9%
Practical Quantitation Limit		5.0	1.0	5.0	5.0	0.5

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

Analyses of Metals in Soil by EPA Method 7000 Series

Sample Number	Date Analyzed	Copper (mg/kg)	Zinc (mg/kg)	Nickel (mg/kg)
Method Blank	3/1/09	nd	nd	nd
B8-2.5'	3/1/09	nd	3.1	12
B9-8.5'	3/1/09	nd	10.2	20
B10-4.5'	3/1/09	nd	3.4	20
B10-4.5' Dup	3/1/09	nd	3.2	--
Practical Quantitation Limit		5.0	1.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt & Spectra Labs

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

QA/QC for Metals in Soil by EPA Method 7000 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)	Nickel (% Recovery)
LCS	3/1/09	105%	100%	--
B10-4.5' MS	3/1/09	int	int	--
B10-4.5' MSD	3/1/09	int	int	--
RPD	3/1/09			
Practical Quantitation Limit		5.0	1.0	5.0

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt & Spectra Labs

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

Analyses of Metals in Water by EPA Method 7000 Series

Sample Number	Date Analyzed	Lead (ug/l)	Cadmium (ug/l)	Chromium (ug/l)	Arsenic (ug/l)	Mercury (ug/l)
Method Blank	2/20/09	nd	nd	nd	nd	nd
B1	2/20/09	nd	nd	nd	nd	nd
B2	2/20/09	nd	nd	nd	nd	nd
B3	2/20/09	nd	nd	nd	nd	nd
B4	2/20/09	nd	nd	nd	nd	nd
B5	2/20/09	11	nd	nd	nd	nd
B6	2/20/09	nd	nd	nd	nd	nd
B8	2/20/09	25	nd	30	14	nd
B9	2/20/09	113	2.0	34	32	nd
B10	2/20/09	72	nd	54	7.0	nd
B11	2/20/09	nd	nd	nd	nd	nd
B11 Dup	2/20/09	nd	nd	nd	nd	nd
Practical Quantitation Limit		5.0	1.0	10.0	3.0	1.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

QA/QC for Metals in Water by EPA Method 7000 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)	Mercury (% Recovery)
LCS	2/20/09	100%	97%	127%	94%	93%
B11 MS	2/20/09	106%	108%	128%	86%	83%
B11 MSD	2/20/09	101%	107%	127%	81%	97%
RPD	2/20/09	4.8	0.9	0.8	6.0	16
Practical Quantitation Limit		5.0	1.0	10.0	3.0	1.0

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

Analyses of Metals in Water by EPA Method 7000 Series

Sample Number	Date Analyzed	Copper (ug/l)	Zinc (ug/l)	Nickel (ug/l)
Method Blank	2/24/09	nd	nd	nd
B1	2/24/09	nd	nd	nd
B2	2/24/09	nd	nd	nd
B3	2/24/09	nd	nd	nd
B5	2/24/09	22	nd	nd
B8	2/24/09	196	113	nd
B9	2/24/09	1400	560	807
B11	2/24/09	nd	nd	239
B11 Dup	2/24/09	nd	nd	--
Practical Quantitation Limit		5.0	10.0	50.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt & Zoe (DAL)

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Libby Env.Project No.L090218-10

QA/QC for Metals in Water by EPA Method 7000 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)	Nickel (% Recovery)
LCS	2/24/09	99%	99%	98%
B11 MS	2/24/09	118%	102%	104%
B11 MSD	2/24/09	111%	100%	98%
RPD	2/24/09	6.1	2.0	5.9
Practical Quantitation Limit		5.0	10.0	5.0

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt & Zoe (DAL)

SPECTRA Laboratories

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

03/10/2009

Libby Environmental, LLC
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project: Havens
Date Received: 02/27/2009
Spectra Project: 2009020488

Client ID	Spectra #	Analyte	Result	Units	Method	Matrix	Date Sampled
B10	1	Hexavalent Chromium	< 0.01	mg/L	SM3500-CR-D	Water	02/18/2009

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a8/scj

SPECTRA Laboratories

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

03/06/2009

Libby Environmental, LLC
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project: Havens
Sample Matrix: Water
Date Sampled: 02/18/2009
Date Received: 02/19/2009
Spectra Project: 2009020318

Client ID	Spectra #	Analyte	Result	Units	Method
B1	1	Ethylene Glycol	<10	mg/L	GC-FID
B1	1	Propylene Glycol	<10	mg/L	GC-FID
B3	2	Ethylene Glycol	<10	mg/L	GC-FID
B3	2	Propylene Glycol	<10	mg/L	GC-FID
B8	3	Ethylene Glycol	<10	mg/L	GC-FID
B8	3	Propylene Glycol	<10	mg/L	GC-FID
B9	4	Ethylene Glycol	<10	mg/L	GC-FID
B9	4	Propylene Glycol	<10	mg/L	GC-FID

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a7/sgh

2930 Westlake Ave N Suite 100
Seattle, WA 98109
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Attn: Sherry Chilcutt
4139 Libby Road NE
Olympia, WA 98506

RE: Haven
Fremont Project No: CHM090225-2

February 27th, 2009

Sherry:

Enclosed are the analytical results for the ***Haven*** soil samples received by Fremont Analytical on Wednesday February 25th, 2009.

The samples were received in good condition – in the proper containers (4 oz soil jars), properly sealed, labeled and within holding time. The samples were extracted, analyzed and then stored in a refrigeration unit at the USEPA-recommended temperature of 4°C ± 2°C. There were no sample receipt or sample analysis issues to report.

Examination of these samples was conducted for the presence of the following:

- ***PCB's (Polychlorinated Biphenyls) in Soil by EPA 8082***

This application was performed under Washington State Department of Ecology accreditation parameters. All appropriate Quality Assurance / Quality Control method parameters have been applied.

Please contact the laboratory if you should have any questions about the report.

Thank you for using Fremont Analytical!

Sincerely,

MDee

Michael Dee
Sr. Chemist / Principal
mikedee@fremontanalytical.com

Fremont Analytical

2930 Westlake Ave. N., Suite 100
Seattle, WA 98109

T: 206.352.3790
F: 206.352.7178
Email: info@fremontanalytical.com

Analysis of PCB's (Polychlorinated Biphenyls) in Soil by EPA 8082

Project: Haven
Client: Libby Environmental
Client Project #: N/A
Lab Project #: CHM090225-2

EPA 8082 (mg/kg)	MRL	Method Blank	LCS	TP 5-Surface B	Duplicate TP 5-Surface B	TP 6-0.5A
Date Extracted		2/26/09	2/26/09	2/26/09	2/26/09	2/26/09
Date Analyzed		2/26/09	2/26/09	2/26/09	2/26/09	2/26/09
Matrix				Soil	Soil	Soil
Aroclor 1016	0.5	nd		nd	nd	nd
Aroclor 1221	0.5	nd		nd	nd	nd
Aroclor 1232	0.5	nd		nd	nd	nd
Aroclor 1242	0.5	nd		nd	nd	nd
Aroclor 1248	0.5	nd		nd	nd	nd
Aroclor 1254	0.5	nd		nd	nd	nd
Aroclor 1260	0.5	nd	96%	nd	nd	**0.9**
Surrogate Recovery						
Surr 1 (TCMX)		100%	97%	88%	81%	70%
Surr 2 (DCBP)		99%	112%	105%	82%	108%

"nd" Indicates no detection at the listed reporting limits
"int" Indicates that interference prevents determination
"C" Indicates coelution with Sample Peaks
"J" Indicates estimated value
"MRL" Indicates Method Reporting Limit
"LCS" Indicates Laboratory Control Sample
"MS" Indicates Matrix Spike
"MSD" Indicates Matrix Spike Duplicate
"RPD" Indicates Relative Percent Difference

Acceptable RPD is determined to be less than 30%
Acceptable Recovery Limits:
Surrogates = 65% to 135%
LCS, LCSD, MS, MSD = 65% to 135%
Surrogates Concentration = 25 µg/L
Spike Concentration = 1.0 mg/kg

2930 Westlake Ave. N., Suite 100
Seattle, WA 98109

T: 206.352.3790
F: 206.352.7178
Email: info@fremontanalytical.com

Analysis of PCB's (Polychlorinated Biphenyls) in Soil by EPA 8082

Project: Haven
Client: Libby Environmental
Client Project #: N/A
Lab Project #: CHM090225-2

EPA 8082 (mg/kg)	MRL	TP 9-Surface A	TP 3-Surface B	MS TP 5-Surface B
Date Extracted		2/26/09	2/26/09	2/26/09
Date Analyzed		2/26/09	2/26/09	2/26/09
Matrix		Soil	Soil	Soil
Aroclor 1016	0.5	nd	nd	
Aroclor 1221	0.5	nd	nd	
Aroclor 1232	0.5	nd	nd	
Aroclor 1242	0.5	nd	nd	
Aroclor 1248	0.5	nd	nd	
Aroclor 1254	0.5	nd	nd	
Aroclor 1260	0.5	nd	nd	99%
Surrogate Recovery				
Surr 1 (TCMX)		79%	85%	81%
Surr 2 (DCBP)		82%	88%	91%

"nd" Indicates no detection at the listed reporting limi
"int" Indicates that interference prevents determinati
"C" Indicates coelution with Sample Peaks
"J" Indicates estimated value
"MRL" Indicates Method Reporting Limit
"LCS" Indicates Laboratory Control Sample
"MS" Indicates Matrix Spike
"MSD" Indicates Matrix Spike Duplicate
"RPD" Indicates Relative Percent Difference

Acceptable RPD is determined to be less than 30%
Acceptable Recovery Limits:
Surrogates = 65% to 135%
LCS, LCSD, MS, MSD = 65% to 135%
Surrogates Concentration = 25 µg/L
Spike Concentration = 1.0 mg/kg

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506

Ph 360-352-2110
Fax 360-352-4154

Client: Libby Env.
Address: (see above)
Phone: Fax:
Client Project #

Date: 2/24/09
Page: 1 of 1
Project Manager: Sherry Chilcutt
Project Name: HAVEN
Location:
Collector:
Date of Collection: 2/18

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext	PAH 8270	PCB's 8082	MTCA 5 Metals				Field Note/# Containers
1	TP5 Surface B		11:15	Soil	4oz jar										X					
2	TP6 -0.5A		11:45	↓	↓										↓					
3	TP9 - Surface A		13:35	↓	↓										↓					
4	TP3 Surface B		2:22	↓	↓										↓					
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				

Relinquished by	Date / Time	Received by	Date / Time
[signature]	2/24/09 4pm	LWS	2/24/09 4pm
LWS		[signature]	2/25/09 1230

Sample Receipt:

Good Condition?	Y
Cold?	OK
Seals Intact?	Y
Total Number of Containers	4

Remarks: Std

TAT 24HR 48HR 5-Day

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 2-18-09
Page: 1 of ~~2~~ 3 4 scc

Client: RNS
Project Manager: R Bieber
Address:
Project Name: Havens Project
Phone: 253-475-7711 Fax: 253-472-5846
Location: Tumwater Washington
Client Project #
Collector: S Malon R Bieber Date of Collection: 2-18-09

#	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Ni Zn Cu		Glycol	Field Note/# Containers
1	TP2-1'A	1'	0845	S	4oz VOA			X			X		X			X	X			2
2	TP2-4 A	4'	0845	S	4oz VOA			X			X		X							2 Hold
3	~~B2-7.5~~ B2		0848	W	Amber VOA			X			X		X			X	X		~~X~~	6
4	~~B~~ B2-7'	7'	09000	S	VOA			X			X									2 Hold
5	TP2-1'B	1'	0900	S	4oz VOA			X			X		X			X	X			2
6	TP2-4'B	4'	0900	S	"															2
7	B4		0937	W	Amber poly VOA			X			X		X			X				6
8	B4-5.8'	5.8	0936	S	4oz VOA			~~X~~			~~X~~		~~X~~			~~X~~				2 Hold
9	TP1-surf A	surf	0925	S	"			X			X		X			X	X			2
10	TP1-3.5 A	3.5	0940	S	"			X			X		X			X	X			2 Hold
11	TP1-11'A	11	0945	S	"			X			X		X			X	X			2 Hold
12	TP1-4B	4'	1010		"															2 Hold
13	TP1-1B	1'	1005	S	"			X			X		X			X	X			2
14	B1-7.5	7.5	1006	S	"			X			X		X			X	X			2 Hold
15	B1		1006	W	Amber poly			X			X		X			X	X		X	6
16	TP4-1'	1'	1030	S	4oz VOA			X			X		X			X				2
17	TP4-4.5	4.5	1025	S	"															2 Hold
18	B5-6.5'	6.5	1033	S	"			X			X		X			X	X			2 Hold

Relinquished by:	Date / Time	Received by	Date / Time
[signature]	2/18/08 3:00	[signature] T Chalk	2-18-09
Relinquished by:	Date / Time	Received by	Date / Time
Relinquished by:	Date / Time	Received by	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

TAT 24HR 48HR 5-Day

Distribution White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

Date: 2-18-09 Page: 2 of 4

Client: RNS
Project Manager: R Barber
Address:
Project Name: Havers Project
Phone: Fax:
Location: Tumwater, Washington
Client Project #
Collector: S Malone, R Barber
Date of Collection: 2-18-09

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	N. Tox	Glycols		Field Note/# Containers
1	B5		1033	W	VOA poly/amber			X			X		X			X	X			6
2	B6		1058	W	"			X			X		X			X				6
3	B6-5.5		1058	S	4oz VOA			X			X		X			X				2 Hold
4	TP5-0.5A		1045	S	"			X			X		X			X	X			2
5	TP5-5.5A		1050	S	"			X												2 Hold
6	TP5-surfB		1115	S	"			X			X		X			X	X			2
7	TP5-1B		1120	S	"			X												2 Hold
8	TP5-4B		1125	S																2 Hold
9	B11		1127	W	VOA poly/amber			X			X		X			X	X			6
10	B11-5.0		1127	S	4oz VOA			X			X		X			X	X			2 Hold
11	TP6-0.5A		1145	S	"			X			X		X			X				2
12	TP6-4.0A		1150	S	"															2 Hold
13	B8-2.5		1154	S	"			X			X		X			X	X			2 Hold
14	B8		1157	W	VOA poly/amber			X			X		X			X	X		X	6
15	TP6-surfB		1200	S	4oz VOA			X			X		X			X				2
16	TP6-4'B		1205	S	"															2 Hold
17	TP8-3'		1250	S	"			X			X		X			X	X			2
18	TP8-8'		1255	S	"															2 Hold

Relinquished by:	Date / Time	Received by	Date / Time
[signature]	2/18/09 3:00	[signature]	2-18-09
Relinquished by:	Date / Time	Received by	Date / Time
Relinquished by:	Date / Time	Received by	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

TAT 24HR 48HR 5-Day

Distribution White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: RNS
Address:
Phone: Fax:
Client Project #

Date: 2-18-09
Page: 3 of ~~3~~ 4 SCC
Project Manager: R Barber
Project Name: Havens Project
Location: Tumwater, Washington
Collector: S Malon R Barber
Date of Collection: 2-18-09

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Ni, Zn, Cu	Glycols		Field Note/# Containers
1	B10-4.5		1309	S	4oz VOA															2 Hold
2	B10		1311	W	Poly/Amber VOA			X			X		X			X				~~7~~
3	B9		1338	W	"			X			X		X			X	X		X	7
4	B9 8.5		1336	S	4oz VOA															2 Hold
5	TP9-surf A		1335	S	"			X			X		X			X	X			2
6	TP9-4' A		1340	S	"															2 Hold
7	TP9-surf B		1355	S	"			X			X		X			X	X			2
8	TP9-1' B		1400	S	"			X			X		X			X	X			2
9	TP9-4' B		1405	S	"															2 Hold
10	TP10-1		1320	S	"			X			X		X			X				2
11	TP10-5'		1325	S	"															2 Hold
12	TP3-1A		1410	S	"			X			X		X			X	X			2
13	TP3-4'A		1415	S	"															2 Hold
14	B3-7.5		1403	S	"															2 Hold
15	B3		1409	S	"			X			X		X			X	X		X	7 Misslabeled as a Soil? actually water (S)
16	TP~~B~~11-1'		1445	S	"			X			X		X			X				2
17	TP~~B~~11-4'		1450	S																2 Hold
18	TP~~B~~3-SurfB		1425	S				X			X		X			X	X			2

Run A

Relinquished by:	Date / Time	Received by	Date / Time
[signature]	2/18/09 3:00	[signature]	2-18-09
Relinquished by:	Date / Time	Received by	Date / Time
Relinquished by:	Date / Time	Received by	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

TAT 24HR 48HR 5-Day

Distribution White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 2-18-06 | Page: 4 of 4

Client: RNS

Address:

Phone: Fax:

Client Project #

Project Manager: R Bieber

Project Name: Stavers

Location:

Collector: R Bieber S Makine

Date of Collection: 2-18-06

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals			Field Note/# Containers
1	TP3-4'B		1435	S	4oz VOA														2 Hold
2	TP3-1'B		1430	S	4oz VOA														2 Hold
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			

Relinquished by:	Date / Time	Received by	Date / Time
[signature]	2/18/09 3:00	[signature]	2-18-09

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

TAT 24HR 48HR 5-Day

Distribution White - Lab, Yellow - File, Pink - Originator

ROBINSON NOBLE SALTBUSH INC. Established 1947
GROUNDWATER & ENVIRONMENTAL SCIENTISTS

December 10, 2009

Alan J. Wertjes
Attorney at Law
1800 Cooper Pt. Rd. SW, Bldg. 3
Olympia, WA 98502

Subject: Site Remediation of the Havens Property (aka Johns Auto Wrecking)
411 93rd Avenue SE, Olympia, Washington

Dear Mr. Wertjes:

Robinson & Noble is pleased to present this letter report detailing our recent remediation activities at the Havens property site. Previous site activities identified impacted areas associated with the historic auto wrecking yard activities as discussed in our April 2009[1] report. The current remediation activities included the placement of three monitoring wells, collection and removal of the remaining sources of potential contamination, and the removal and disposal of identified impacted soils. This letter details these site activities and the results of the completed laboratory analysis.

Site Location and History

The subject site is located within Township 17N, Range 02W, Section 23. The property is comprised of six parcels identified by Thurston County Assessor-Treasurer's records as parcels 12723210100, 12723220200, 12723210400, 12723210401, 12723210700, and 12723211000. These parcels are contiguous. The address assigned to these parcels is 411 93rd Avenue SE, Washington 98501 (Figure 1). The subject consists of approximately 15 acres.

In November 2008, Robinson & Noble completed a file review of available documents contained within the Washington State Department of Ecology (Ecology) and Thurston County Health Department records for the Havens property. The Department of Ecology records indicate the site is listed on Ecology's Hazardous Sites List. The site was ranked a "1" following the completion of a site-hazard assessment. Sites receiving a rank of 1 or 2 are generally considered the highest priority for cleanup by Ecology. Ecology loosely defines these sites as posing a risk to human health and the environment.

To address the site ranking, the property owners enrolled the site in the Ecology Voluntary Cleanup Program (VCP). During the site's enrollment within the VCP, a limited effort was made by the property owner to characterize the subject site. Eventually, activity ceased and no official reports were generated. The site was subsequently removed from the VCP due to inac-

[1] Robinson, Noble & Saltbush, Inc., April 2009, Site Investigation/characterization, Havens Property (aka) Johns Auto Wrecking, 411 93rd Avenue SE, Olympia, Washington, as published for the Havens Estate

3011 South Huson Street, Suite A Tacoma, Washington 98409 ▪ (253) 475-7711 ▪ Fax: (253) 472-5846
e-mail: mail@robinson-noble.com

tivity. In 2008, Robinson & Noble was contracted to complete a file review and prepare a work plan to conduct a remedial investigation of the site.

Site work for the Havens property started in February 2009. Robinson & Noble, with the assistance of Pacific Northwest Probe & Drilling and Langseth Environmental, completed a series of ten soil borings ranging from 12 to 16 feet below ground surface (bgs) and 16 test pits excavated to depths ranging from five to 12 feet bgs. Soil borings were completed near identified areas of concern. The test pits were located in close proximity to the soil borings. At some locations, a second test pit at each boring location was incorporated into the work plan to allow for a more detailed characterization. Two test pits were completed where staining, distressed vegetation, and/or significant material storage were identified. Laboratory results for the collected soil samples identified contaminated soil surrounding test pits TP1A and TP6A. Additionally, groundwater samples collected from borings B8, B9, B10, and B11 identified elevated levels of target metals (Robinson, Noble & Saltbush, April 2009).

Site Activities

On August 13, 2009, remediation activities began with the collection and removal of the unsecured sources of potential contamination documented during the February 2009 field work. Langseth Environmental, with the assistance of ProVac Services, collected all of the loose buckets and drums of waste oil. Once collected, the waste oil from the buckets was field screened for chlorinated solvents. Buckets and drums determined to be free of chlorinated solvents were purged of their contents using a Vactor truck. The emptied buckets were wiped clean and crushed for disposal at a solid waste landfill. Field characterization identified one drum, which contained an unknown quantity of chlorinated solvents. This drum was secured and stored under cover on a concrete floor in one of the remaining structures on site. The drum was later sampled, characterized, and properly disposed of by PSC transportation group. Table 1 presents the material removed from the site. Shipping manifest and weigh tickets for all disposal activities are attached.

Table 1. Removed sources of contamination

Quantity	Description	Quantity	Description
800 gallons	Used Oil	1	275-gallon tank
3 tons	Sludge	1	500-gallon tank
~ 50	5 gallon buckets	1	1,300-gallon tank
13	55-gallon drums	2	Large industrial batteries
1	250-gallon tank	4	Automobile batteries

Once the site was secured of the remaining sources of contamination, the focus of the remediation activities shifted to the excavation of identified impacted soils. On August 14, Langseth Environmental mobilized a rubber tire back hoe to complete the excavation of impacted soils. Initial excavations were completed in the areas surrounding TP6A and TP1A (Figure 2). Following the removal of the impacted soils, confirmation samples were collected and submitted to an on-site mobile lab for analysis. As with previous efforts, laboratory analysis was provided by Libby Environmental, Inc. Two additional sites were identified as potentially impacted areas: a sump within the floor of the concrete bunker near TP6A and an area of oil staining (TP1C) in the garage/shed located south of TP1A (Figure 2). Soils were removed at each location. Once field screening determined that impacted soil had been removed, confirmation soil samples were collected. Target analytes included gasoline-, diesel-, and oil-range petroleum hydrocarbons (analyzed with methods NWTPH-Gx and NWTPH-Dx/DxExtended). Additional analytes tested were lead, arsenic, cadmium, chromium, copper, zinc, mercury, nickel, PCBs, and carcinogenic polyaromatic hydrocarbons (cPAHs). In addition to those listed above, soil collected from TP6C was also analyzed for benzene; toluene; ethyl benzene; xylene, commonly referred to as BTEX (method VOA 8021B); and chlorinated solvents (method 8270).

Laboratory results of the collected confirmation samples indicate concentrations of copper, zinc and nickel were identified at TP1B and TP6C. These concentrations were below published MTCA Method B (unrestricted land use) cleanup levels of 2,960 and 24,000 mg/kg for copper and zinc. The MTCA Priority Contaminates of Ecological Concern Table 749-2 presented in Model Toxics Control Act WAC 173-340, indicates a maximum soil concentration for unrestricted land use of nickel is 100 mg/kg. Test Pit TP1B was also identified as having a concentration of mineral oil in the soil of 1,020 mg/kg. The MTCA Method A cleanup level for mineral oil in the soil is 4,000 mg/kg. These results indicate that each location has been successfully remediated. A complete list of analytical results is attached. A total of 4.8 tons of contaminated soils were removed from the site.

Monitoring Well Installation

To further quantify the soil and groundwater impacts, we supervised the placement of three monitoring wells on August 20, 2009. All of the wells were constructed with two-inch diameter, schedule 40 PVC blank risers and two-inch diameter, schedule 40 PVC 0.020-inch slot (20-slot) screens coupled with flush-threaded joints and installed with caps screwed to the bottom of the assemblies. Specific screen and riser lengths were adjusted as appropriate for the material encountered at each drilling location. The screens were packed in Colorado Silica Sand Products 10 x 20 sand. Typically, the filter packs extended from the bottom of each boring to approximately one foot above the screens. The remaining annular spaces above the pack were filled with hydrated bentonite chips to within three feet of the surface. Above ground monuments and bollards were set in concrete pads at each location. Well logs and construction diagrams are presented in Figure 3.

Each monitoring well was logged and sampled material was subjected to field screening. Field screening did not indicate the presence of any contamination. Well drilling encountered varying mixtures of brown, silty sands and gravels. The wells that were completed in the first groundwater zone encountered a medium-grained sand and gravel. Water levels measured after the completion of the monitoring wells indicate a general groundwater depth of approximately 7.5 bgs. The local groundwater flow direction appears to be to the west northwest.

Once the wells were completed, each well was developed using a DC-submersible pump, surge block, and water bailer. Following the development, we collected a water sample from each well and submitted them to an off-site laboratory for analysis. The groundwater samples were analyzed for lead, arsenic, cadmium, chromium, copper, zinc, mercury, and nickel.

As presented in our April 2009 letter, elevated levels of metals were detected in groundwater samples collected from several of the direct push borings completed on the southern half of the property. At that time, we suggested that the elevated levels of metals observed in the groundwater samples were a result of turbid water being sampled from the direct-push borings. We recommended that the placement and sampling of properly developed monitoring wells would produce a groundwater sample more reflective of actual conditions beneath the site. The laboratory results from the metals analysis in the monitoring wells did not indicate any analytes above laboratory detection limits. We believe these samples represent current groundwater quality at the subject. Additional sampling is not recommended at this time.

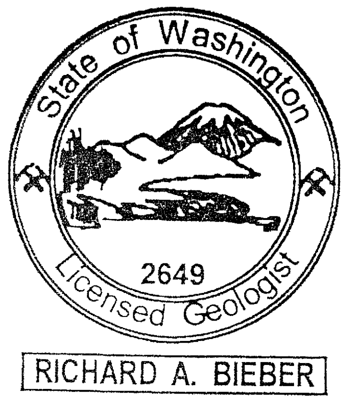
Summary

It is our opinion that the contaminants identified are the result of historic site activities associated with the operation of an auto wrecking yard. We have supervised the collection and disposal of the identified potential sources of contamination. In addition we have directed the excavation and disposal of identified impacted soils. We have also determined that previously identified metals within the groundwater were not reflective of actual conditions beneath the site. Following the site's re-entry into the VCP, we anticipate the site be granted a no-further-action designation reflecting the completion of the subsurface investigation and subsequent remedial activities.

We appreciate this opportunity to be of service. Please contact us if you have any questions.

Very truly yours,
Robinson & Noble, Inc.

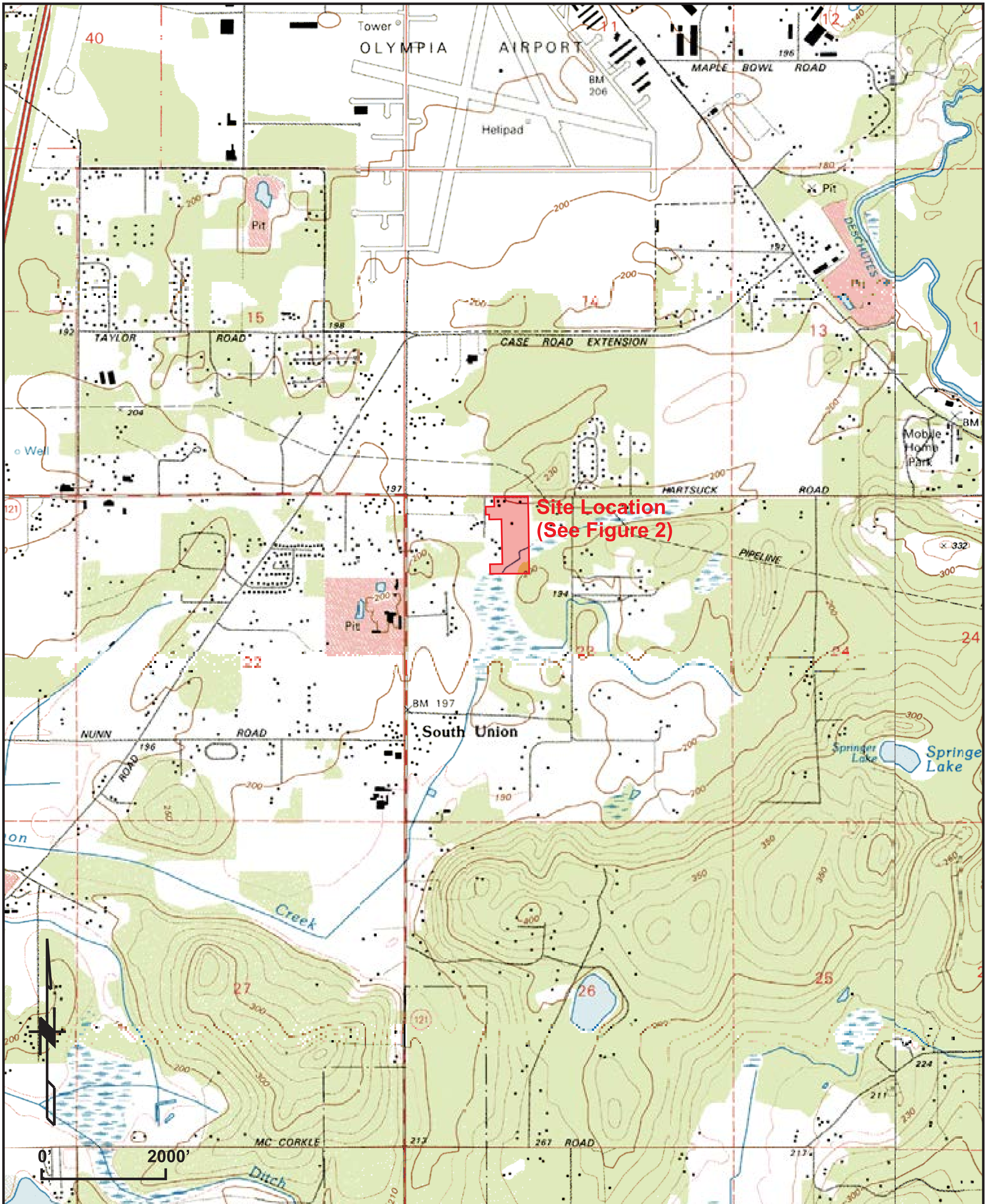
Richard A. Bieber, LG
Project Hydrogeologist, Project Manager



cc: Patrick Soderberg

attachments

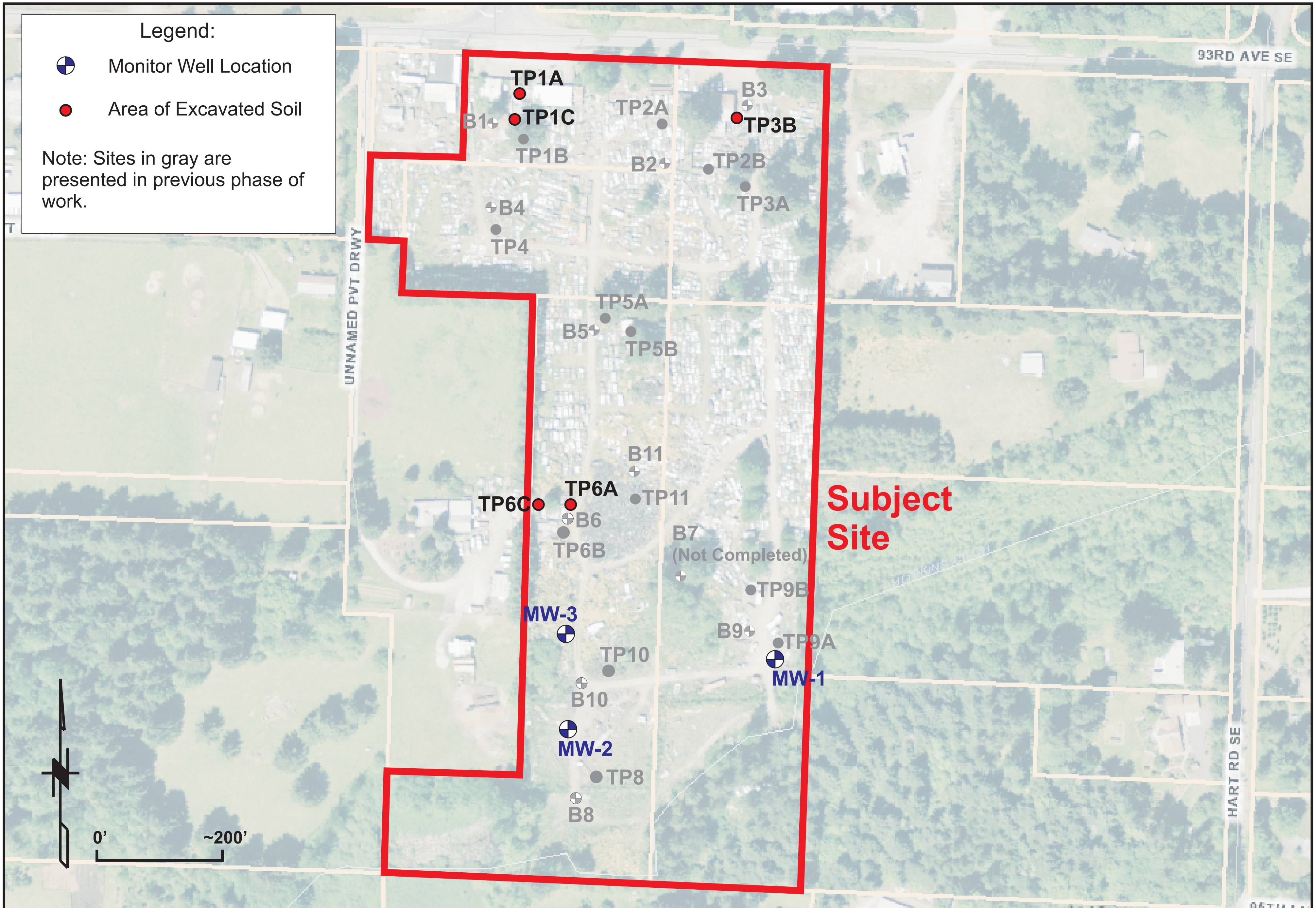
FIGURES



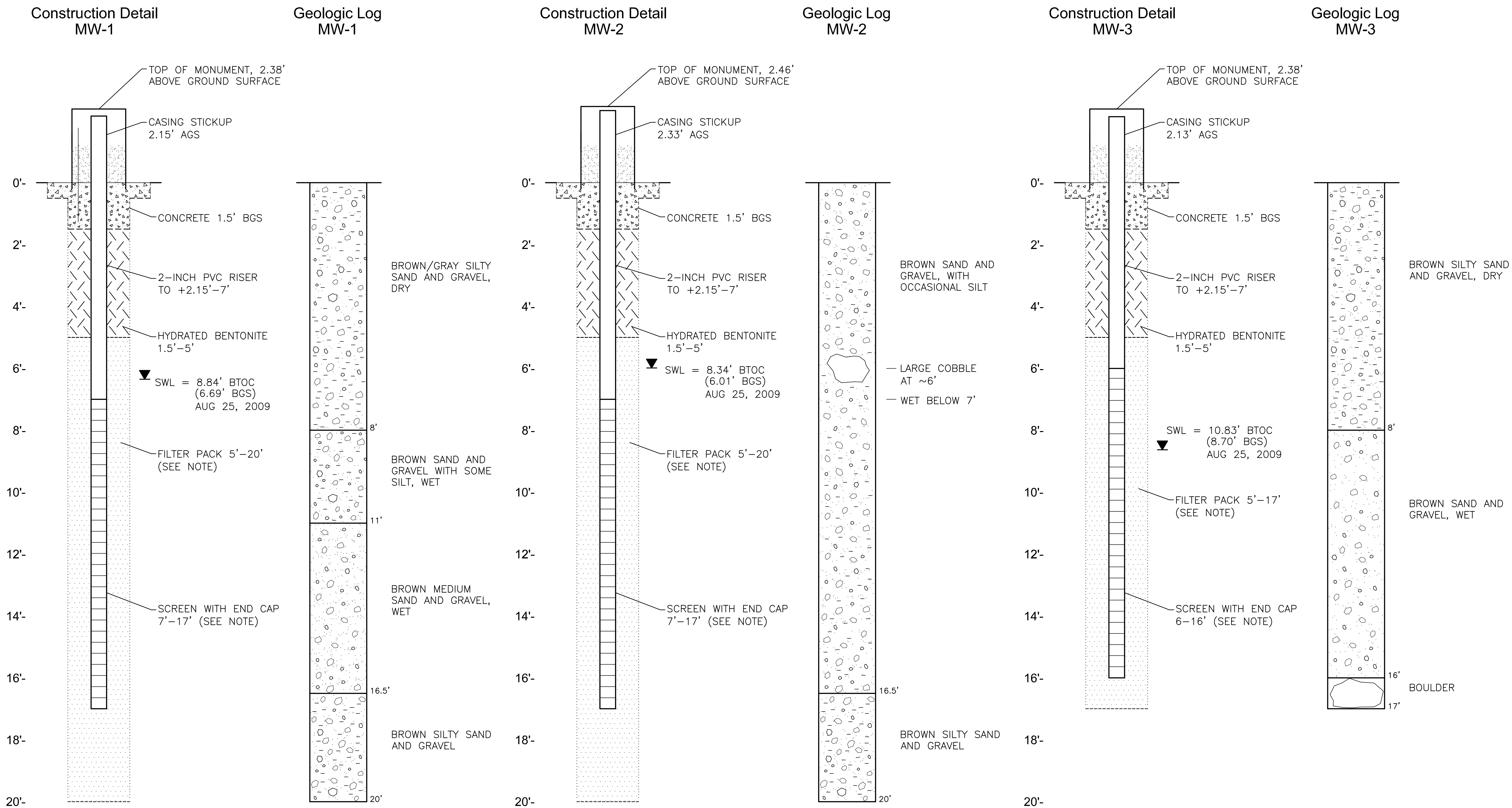
ROBINSON NOBLE SALTBUSH INC.
GROUNDWATER & ENVIRONMENTAL SCIENTISTS

Note: Basemap taken from USGS Maytown Quad.	PM: RAB December 2009	Thurston County 2491-001C	T 17 N/R 02 W - 23 Scale 1 " = 2000'	Figure 1 Vicinity Map

Havens Property: 93rd Ave SE, Olympia/Site Remediation



ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Image taken from Thurston County GIS Website	PM: RAB December 2009 2491-001C	Thurston County T 17 N/R 02 W - 23 Scale 1" = ~200'	Figure 2 Monitor Well and Previous Test Pit and Boring Location Map Havens Property: 93rd Ave SE, Olympia/Site Remediation



ROBINSON NOBLE SALTBUSH INC.
GROUNDWATER & ENVIRONMENTAL SCIENTISTS

PM: RAB	Thurston County	NOTE: ALL WELL SCREEN ARE 2-INCH SCHEDULE 40 PVC PIPE, 20-SLOT (0.020 OPENING). FILTER PACK IS 10x20 COLORADO SILICA SAND PRODUCT.	
December 2009	T 17 N/R 02 W - 23		
2491-001C			

Figure 3
Construction Detail and Geologic Log for Monitor Wells 1 - 3
Havens Property: 93rd Ave SE, Olympia/Site Remediation

SAMPLING RESULTS

scale: 1 square=______

August 28, 2009 MW-1 notes 2491-001A

Sampling MW-1 w/ peristaltic pump using a graduated bucket.

DTW BTOC 2-inch 8.84'

water column is 9.94' (x 0.163) = 1.62 gallons (x 3) = 4.86 gallons to be removed.

water is coming out clear w/ very little to no particles

13:05 - well has reached stabilization sampling @ 13:10

Samples stored in a cooler with Blue Ice

volume purged before sampling - 3.75 gallons

MW-1 Wertjes - Havens Property Tuesday, August 28, 2009

Time (min)	Time (actual)	Flow Rate	Cum Volume	Temp °C	Cond	Spec Cond	TDS	DO mg/L	pH	Eh mV
5	12:30	~0.08	0.5	12.73	0.116	0.089	0.075	4.97		
10	12:35		0.75	12.64°	0.115	0.088	0.075	4.89	6.01	50
15	12:40		1	12.70	0.114	0.087	0.074	4.84		
20	12:45	0.10	1.5	12.73	0.113	0.087	0.074	4.80	6.11	45
25	12:50	0.10	2	12.66	0.113	0.086	0.073	4.78		
30	12:55	0.05	2.75	12.54	0.112	0.085	0.073	4.78	6.08	46
35	13:00	0.10	2.75	12.63	0.111	0.085	0.072	4.77	6.03	49
40	13:05	0.10	3.75	12.53°C	0.111	0.084	0.072	4.77	6.07	47

scale: 1 square=______

scale: 1 square=____

Tuesday, August 25, 2009 MW-2

pump used: peristaltic
purge method: graduated bucket
Total Well Depth: 18.24
DTW: 8.34
water Column: 9.90 ft of H_2O
× 0.163 = 1.61 gallons
× 3 = 4.84 gallons (three well volumes)

screened interval - 5.91 - 15.91' bgs

13:30 pumping from well

water is coming out of the well w/ a brown tinge, no →

notes 2491-001A

→ visible particles, however

14:20 Three well volumes removed, sampling.

MW-2

Time (actual)	Time (min)	Flow Rate	Cum Volume	Temp °C	Cond.	Spec Cond	TDS	DO	pH	Eh
13:35	5	0.1	0.78	15.04	0.099	0.080	0.065	0.68		
13:40	10	0.1	0.75	14.21	0.100	0.080	0.065	0.42	6.10	46
13:45	15	0.05	1	13.87	0.102	0.080	0.066	0.34	6.13	43
13:50	20	0.1	1.5	13.75	0.101	0.080	0.066	0.30	6.11	45
13:55	25	0.1	2	13.94	0.101	0.080	0.066	0.27	6.13	44
14:00	30	0.1	2.5	13.83	0.101	0.080	0.066	0.26	6.12	44
14:05	35	0.1	3	13.59	0.100	0.078	0.065	0.23	6.11	45
14:10	40	0.1	3.5	13.68	0.100	0.078	0.065	0.22	6.22	39
14:15	45	0.15	4.25	13.81	0.100	0.079	0.065	0.21	6.19	40
14:20	50	0.15	5	13.81	0.100	0.078	0.065	0.20	6.20	40

scale: 1 square=____

scale: 1 square=

Tuesday, August 25, 2009 Notes for mw-3 2491-001A

pump used: perastaltic
purge method: graduated bucket
Total well depth: 17.99' TOC
DTW: 10.83' TOC
water column: 7.16 ft of H_2O
X0.163 = 1.17 gallons
3 well volumes = 3.50 gallons

14:30 pumping water from mw-3

-water has a slight tan/brown color

15:15 Three well volumes removed
sampling mw-3

mw-3

Time (actual)	Time (min)	Flow Rate	Cum Volume	Temp °C	Cond	Spec Cond	TDS	DO	pH	Eh
14:40	10	0.1	0.5	15.11	0.097	0.079	0.063	1.32		
14:45	15	0.1	1	14.61	0.096	0.077	0.062	0.78	5.92	55
14:50	20	0.1	1.5	14.39	0.095	0.076	0.062	0.65	5.93	55
14:55	25	0.1	2	14.55	0.095	0.076	0.061	0.61	5.91	56
15:00	30	0.05	2.25	14.68	0.094	0.076	0.061	0.62	5.91	56
15:05	35	0.1	2.75	14.52	0.093	0.075	0.061	0.57	5.95	54
15:10	40	0.1	3.25	14.27	0.093	0.074	0.060	0.54	5.95	55
15:15	45	0.05	3.5	14.22	0.092	0.073	0.060	0.49	5.89	57

scale: 1 square=

LABORATORY RESULTS

Libby Environmental, Inc.

4139 Libby Road N.E., Olympia, WA 98506-2518

September 4, 2009

Rick Bieber
Robinson, Noble & Saltbush, Inc.
3011 Huson Street South
Suite A
Tacoma, WA 98409

Dear Mr. Bieber:

Please find enclosed the analytical data report for the Havens Property 411 93RD Project located in Tumwater, Washington. Mobile Lab Services were conducted on August 14, 2009. Soil samples were received and analyzed for VOC's by EPA Method 8260B, Gasoline by NWTPH-Gx, Diesel & Oil by NWTPH-Dx/Dx Extended, PCB's by EPA Method 8082, and MTCA 5 Metals by EPA Method 7000 Series.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is also enclosed. All soil samples are reported on a dry weight basis.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Env.Project No.L090814-30

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN SOIL

Sample Description		Method Blank	CTP6C
Date Extracted	Reporting	N/A	8/14/09
Date Analyzed	Limits	8/17/09	8/17/09
	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd
Chloromethane	0.06	nd	nd
Vinyl chloride *	0.02	nd	nd
Bromomethane	0.09	nd	nd
Chloroethane	0.06	nd	nd
Trichlorofluoromethane	0.05	nd	nd
1,1-Dichloroethene	0.05	nd	nd
Methylene chloride	0.02	nd	nd
Methyl *tert-* Butyl Ether (MTBE)	0.02	nd	nd
trans -1,2-Dichloroethene	0.02	nd	nd
1,1-Dichloroethane	0.02	nd	nd
2,2-Dichloropropane	0.05	nd	nd
cis -1,2-Dichloroethene	0.02	nd	nd
Chloroform	0.02	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd
Carbon tetrachloride	0.02	nd	nd
1,1-Dichloropropene	0.02	nd	nd
Benzene	0.02	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd
Trichloroethene (TCE)	0.03	nd	nd
1,2-Dichloropropane	0.02	nd	nd
Dibromomethane	0.04	nd	nd
Bromodichloromethane	0.02	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd
Toluene	0.02	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd
1,3-Dichloropropane	0.05	nd	nd
Dibromochloromethane	0.03	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd
Chlorobenzene	0.02	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd
Ethylbenzene	0.03	nd	nd
Total Xylenes	0.03	nd	nd
Styrenes	0.02	nd	nd

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Env.Project No.L090814-30

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN SOIL

Sample Description		Method Blank	CTP6C
Date Extracted	Reporting	N/A	8/14/09
Date Analyzed	Limits	8/17/09	8/17/09
	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.02	nd	nd
Isopropylbenzene	0.08	nd	nd
1,2,3-Trichloropropane	0.02	nd	nd
Bromobenzene	0.03	nd	nd
1,1,2,2-Tetrachloroethane	0.02	nd	nd
n-Propylbenzene	0.02	nd	nd
2-Chlorotoluene	0.02	nd	nd
4-Chlorotoluene	0.02	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd
tert-Butylbenzene	0.02	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd
sec-Butylbenzene	0.02	nd	nd
1,3-Dichlorobenzene	0.02	nd	nd
Isopropyltoluene	0.02	nd	nd
1,4-Dichlorobenzene	0.02	nd	nd
1,2-Dichlorobenzene	0.02	nd	nd
n-Butylbenzene	0.02	nd	nd
1,2-Dibromo-3-Chloropropane	0.03	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd
Naphthalene	0.03	nd	nd
1,2,3-Trichlorobenzene	1.0	nd	nd
Surrogate Recovery			
Dibromofluoromethane		108	108
1,2-Dichloroethane-d4		100	116
Toluene-d8		92.7	95.7
4-Bromofluorobenzene		102	98.2

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Deanna M. Donovan

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Env.Project No.L090814-30

QA/QC Data - EPA 8260B Analyses

Sample Identification: L090814-2

Matrix Spike

	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
1,1-Dichloroethene	0.50	0.50	100
Benzene	0.50	0.54	108
Toluene	0.50	0.57	114
Chlorobenzene	0.50	0.49	98
Trichloroethene (TCE)	0.50	0.55	110
Surrogate Recovery			
Dibromofluoromethane			105
1,2-Dichloroethane-d4			96.1
Toluene-d8			94.9
4-Bromofluorobenzene			99.3

Laboratory Control Sample

	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
1,1-Dichloroethene	0.50	0.49	98
Benzene	0.50	0.51	101
Toluene	0.50	0.51	101
Chlorobenzene	0.50	0.48	96
Trichloroethene (TCE)	0.50	0.51	102
Surrogate Recovery			
Dibromofluoromethane			104
1,2-Dichloroethane-d4			99.0
Toluene-d8			95.4
4-Bromofluorobenzene			95.3

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Deanna M. Donovan

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Project No.L090814-30

Analyses of Gasoline (NWTPH-Gx) & BTEX (EPA Method 8021B) in Soil

Sample Number	Date Analyzed	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Gasoline (mg/kg)	Surrogate Recovery (%)
Method Blank	8/17/09	nd	nd	nd	nd	nd	109
LCS	8/17/09	105%	104%				101
CTP6C	8/17/09	nd	nd	nd	nd	nd	109
MS L090814-2	8/17/09	112%	109%				109
Practical Quantitation Limit		0.02	0.10	0.05	0.15	10	

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Trifluorotoluene): 65% TO 135%

ANALYSES PERFORMED BY: Deanna M. Donovan

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Project No.L090814-30

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (mg/kg)	Mineral Oil (mg/kg)	Oil (mg/kg)
Method Blank	8/14/2009	116	nd	nd	nd
Method Blank	8/17/2009	98.3	nd	nd	nd
CTP6A	8/14/2009	99.8	nd	nd	nd
CTP6A dup	8/14/2009	116	nd	nd	nd
CTP1A	8/14/2009	89.6	nd	nd	nd
CTP1B	8/17/2009	127	nd	1020	nd
CTP1C	8/14/2009	110	nd	nd	nd
CTP6C	8/14/2009	119	nd	nd	nd
Practical Quantitation Limit			25	40	40

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Deanna M. Donovan

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Project No.L090814-30

Analyses of Mercury in Soil by EPA Method 7471

Sample Number	Date Analyzed	Mercury (mg/kg)
Method Blank	8/18/09	nd
CTP1B	8/18/09	nd
CTP6C	8/18/09	nd
CTP6C Dup	8/18/09	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Project No.L090814-30

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury (mg/kg)
LCS	8/18/09	108%
MS	8/18/09	116%
MSD	8/18/09	111%
RPD	8/18/09	4%
Practical Quantitation Limit		0.5

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Project No.L090814-30

Analyses of Metals in Soil by EPA Method 7000 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)	Copper (mg/kg)	Zinc (mg/kg)
Method Blank	8/18/09	nd	nd	nd	nd	nd	nd
CTP1B	8/18/09	nd	nd	nd	nd	9	35
CTP6C	8/18/09	nd	nd	nd	nd	11	42
CTP6C Dup	8/18/09	nd	nd	nd	nd	11	47
Practical Quantitation Limit		5.0	1.0	5.0	5.0	5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Project No.L090814-30

QA/QC for Metals in Soil by EPA Method 7000 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)	Copper (% Recovery)	Zinc (% Recovery)
LCS	8/18/09	106%	88%	104%	97%	122%	111%
MS	8/18/09	116%	106%	106%	112%	int	int
MSD	8/18/09	118%	106%	121%	108%	int	int
RPD	8/18/09	2%	0%	13%	4%	int	int
Practical Quantitation Limit		5.0	1.0	5.0	5.0	5.0	5.0

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Project No.L090814-30

Analyses of PCB (Polychlorinated Biphenyls) in Soil by EPA Method 8082

Sample Description	PQL	Method Blank	LCS	CTP6A	CTP1A	CTP1C	CTP6C
Date Extracted		N/A	8/25/09	8/25/09	8/25/09	8/25/09	8/25/09
Date Analyzed		8/25/09	8/25/09	8/25/09	8/25/09	8/25/09	8/25/09
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Aroclor 1016	0.05	nd	106%	nd	nd	nd	nd
Aroclor 1221	0.05	nd		nd	nd	nd	nd
Aroclor 1232	0.05	nd		nd	nd	nd	nd
Aroclor 1242	0.05	nd		nd	nd	nd	nd
Aroclor 1248	0.05	nd		nd	nd	nd	nd
Aroclor 1254	0.05	nd		nd	nd	nd	nd
Aroclor 1260	0.05	nd	108%	nd	nd	nd	nd
Surrogate Recovery							
TCMX		95	108	10	125	128	131
DCBP		98	95	98	99	104	79

"nd" Indicates not detected at listed detection limit.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Project No.L090814-30

Analyses of PCB (Polychlorinated Biphenyls) in Soil by EPA Method 8082

Sample Description	PQL	CTP6C Dup	CTP6C MS	CTP6C MSD
Date Extracted		8/25/09	8/25/09	8/25/09
Date Analyzed		8/25/09	8/25/09	8/25/09
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Aroclor 1016	0.05	nd	104%	111%
Aroclor 1221	0.05	nd		
Aroclor 1232	0.05	nd		
Aroclor 1242	0.05	nd		
Aroclor 1248	0.05	nd		
Aroclor 1254	0.05	nd		
Aroclor 1260	0.05	nd	112%	121%
Surrogate Recovery				
TCMX		106	107	123
DCBP		108	125	131

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

Fremont Analytical
2930 Westlake Ave N Suite 100
Seattle, WA 98109
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Attn: Sherry Chilcutt
4139 Libby Road NE
Olympia, WA 98506

RE: Haven's Property
Fremont Project No: CHM090819-3

August 24th, 2009

Sherry:

Enclosed are the analytical results for the ***Haven's Property*** soil samples received by Fremont Analytical on August 19th, 2009.

The samples were received in good condition – in the proper containers (5 – 4oz soil jars) properly sealed, labeled and within holding time. The samples were received in a cooler with gel ice with a cooler temperature of 8.5°C, which is within the laboratory recommended cooler temperature range (<4°C - 10°C). The samples were extracted, analyzed then stored in refrigeration units at the USEPA-recommended temperature of 4°C ± 2°C. There were no sample receipt or sample analysis issues to report.

Examination of these samples was conducted for the presence of the following:

- ***Polyaromatic Hydrocarbons in Soil by EPA Method 8270C***

This application was performed under Washington State Department of Ecology accreditation parameters. All appropriate Quality Assurance / Quality Control method parameters have been applied. Please contact the laboratory if you should have any questions about the report.

Thank you for using Fremont Analytical!

Sincerely,

MCD

Michael Dee
Sr. Chemist / Principal
mikedee@fremontanalytical.com

2930 Westlake Ave. N., Suite 100
Seattle, WA 98103

T: 206.352.3790
F: 206.352.7178
email: info@fremontanalytical.com

Analysis of Polyaromatic Hydrocarbons in Soil by EPA Method 8270C

Project: Haven's Property
Client: Libby Environmental
Client Project #: N/A
Lab Project #: CHM090819-3

EPA 8270C (SIM) (mg/kg)	MRL	Method Blank	LCS	CTP6A	CTP1A	CTP1C	CTP1B	Duplicate CTP1B	CTP6C
Date Extracted		8/19/09	8/19/09	8/19/09	8/19/09	8/19/09	8/19/09	8/19/09	8/19/09
Date Analyzed		8/19/09	8/19/09	8/20/09	8/20/09	8/20/09	8/20/09	8/20/09	8/20/09
Matrix				Soil	Soil	Soil	Soil	Soil	Soil
Acenaphthene	*0.05*	*nd*	*108%*						
Pyrene	*0.05*	*nd*	*100%*						
Benzo(a)anthracene	0.05	nd		nd	nd	nd	nd	nd	nd
Chrysene	0.05	nd		nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.05	nd		nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.05	nd		nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.05	nd		nd	nd	nd	nd	nd	nd
Indeno(1,2,3-cd)pyrene	0.05	nd		nd	nd	nd	nd	nd	nd
Dibenzo(a,h)anthracene	0.05	nd		nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.05	nd		nd	nd	nd	nd	nd	nd
Total PAH Carcinogens				0.0	0.0	0.0	0.0	0.0	0.0

Total PAH Carcinogens Defined as:
Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Ideno(1,2,3-cd)pyrene & Dibenzo(a,h)anthracene

Surrogate Recovery									
(Surr 1) 2-Fluorobiphenyl		79%	74%	86%	82%	93%	93%	90%	87%
(Surr 2) p-Terphenyl		86%	81%	87%	90%	89%	90%	92%	95%

"nd" Indicates not detected at listed reporting limits
"int" Indicates that interference prevents determination
"J" Indicates estimated value
"MRL" Indicates Method Reporting Limit
"LCS" Indicates Laboratory Control Sample
"MS" Indicates Matrix Spike
"MSD" Indicates Matrix Spike Duplicate
"RPD" Indicates Relative Percent Difference

Acceptable RPD is determined to be less than 30%
Acceptable Recovery Limits:
Surrogates = 65% to 135%
LCS, LCSD, MS, MSD = 50% to 150%
Surrogate Concentration = 0.5 mg/kg
Spike Concentration = 1.0 mg/kg

2930 Westlake Ave. N., Suite 100
Seattle, WA 98103

T: 206.352.3790
F: 206.352.7178
email: info@fremontanalytical.com

Analysis of Polyaromatic Hydrocarbons in Soil by EPA Method 8270C

Project: Haven's Property
Client: Libby Environmental
Client Project #: N/A
Lab Project #: CHM090819-3

EPA 8270C (SIM) (mg/kg)	MRL	MS Batch 090817-1-1	MSD Batch 090817-1-1	RPD %
Date Extracted		8/19/09	8/19/09	
Date Analyzed		8/20/09	8/20/09	
Matrix		Soil	Soil	
Acenaphthene	*0.05*	*135%*	*129%*	*5%*
Pyrene	*0.05*	*123%*	*123%*	*0%*
Benzo(a)anthracene	0.05			
Chrysene	0.05			
Benzo(b)fluoranthene	0.05			
Benzo(k)fluoranthene	0.05			
Benzo(a)pyrene	0.05			
Indeno(1,2,3-cd)pyrene	0.05			
Dibenzo(a,h)anthracene	0.05			
Benzo(g,h,i)perylene	0.05			
Total PAH Carcinogens				

Total PAH Carcinogens Defined as:
Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Ideno(1,2,3-cd)pyrene & Dibenzo(a,h)anthracene

Surrogate Recovery		MS	MSD	
(Surr 1) 2-Fluorobiphenyl		101%	104%	
(Surr 2) p-Terphenyl		96%	98%	

"nd" Indicates not detected at listed reporting limits
"int" Indicates that interference prevents determination
"J" Indicates estimated value
"MRL" Indicates Method Reporting Limit
"LCS" Indicates Laboratory Control Sample
"MS" Indicates Matrix Spike
"MSD" Indicates Matrix Spike Duplicate
"RPD" Indicates Relative Percent Difference

Acceptable RPD is determined to be less than 30%
Acceptable Recovery Limits:
Surrogates = 65% to 135%
LCS, LCSD, MS, MSD = 50% to 150%
Surrogate Concentration = 0.5 mg/kg
Spike Concentration = 1.0 mg/kg

SPECTRA Laboratories

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

08/25/2009

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project: Haven's Property
Sample Matrix: Soil
Date Sampled: 08/14/2009
Date Received: 08/18/2009
Spectra Project: 2009080290

Client ID	Spectra #	Analyte	Result	Units	Method
CTP1B	1	Total Nickel	25	mg/Kg	SW846 6010B
CTP6C	2	Total Nickel	21	mg/Kg	SW846 6010B

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

a7/scj

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

Client: RNS
Address: 3011 South Huson
Phone: 475-7711
Fax:
Client Project #: 2491-001C

Date: 8/14/09
Page: 1 of 1
Project Manager: RAB
Project Name: Havens Property
Location: 411 93RD Tumwater
Collector: RAB
Date of Collection: 8/14/09

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals Zn, Ni, Cu		RAB 8/14/09	Field Note/# Containers
1	CTP6A	1'	9:00	Soil	4oz								X		X				Hold CPAH
2	CTP1A	1'	9:50	Soil	4oz								X		X				Hold CPAH
3	CTP1C	1.5	10:30	Soil	4oz								X		X	DMW CD per RAB			Hold CPAH
4	CTP1B	2.0	10:15	Soil	4oz								X		~~X~~	X			Hold CPAH Zn, Ni, Cu
5	CTP6C	3.0	10:35	Soil	4oz			X			X		X		X	X			Hold CPAH Zn, Ni, Cu
6																			
7																			
8																			
9																			
10																			
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RUN DMW 8/14

Relinquished by:	Date / Time	Received by	Date / Time
[signature]	8/14/09 12:10	[signature]	8/14/09 1210
Relinquished by:	Date / Time	Received by	Date / Time
Relinquished by:	Date / Time	Received by	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
no PCB's on CTP1B as per a phone call w/RAB DMD 8/14/09

TAT 24HR 48HR 5-Day

Distribution White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.
4139 Libby Road N.E., Olympia, WA 98506-2518

September 4, 2009

Rick Bieber
Robinson, Noble & Saltbush, Inc.
3011 Huson Street South
Suite A
Tacoma, WA 98409

Dear Mr. Bieber:

Please find enclosed the analytical data report for the Havens Property 411 93RD Project located in Tumwater, Washington. Water samples were received and analyzed for MTCA 5 Metals by EPA Method 7000 Series on August 30, 2009.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is also enclosed.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Project No.L090825-4

Analyses of Total Metals in Water by EPA Method 7000 Series

Sample Number	Date Analyzed	Lead (ug/l)	Cadmium (ug/l)	Chromium (ug/l)	Arsenic (ug/l)	Copper (ug/l)	Zinc (ug/l)
Method Blanl	8/30/09	nd	nd	nd	nd	nd	nd
MW-1	8/30/09	nd	nd	nd	nd	nd	nd
MW-2	8/30/09	nd	nd	nd	nd	nd	nd
MW-3	8/30/09	nd	nd	nd	nd	nd	nd
MW-3 Dup	8/30/09	nd	nd	nd	nd	nd	nd
Practical Quantitation Lir		5.0	0.5	10.0	3.0	5.0	10.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C

QA/QC for Metals in Water by EPA Method 7000 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)	Copper (% Recovery)	Zinc (% Recovery)
LCS	8/30/09	119%	107%	107%	102%	116%	127%
MW-3 MS	8/30/09	95%	106%	102%	95%	120%	74%
MW-3 MSD	8/30/09	100%	99%	108%	89%	119%	78%
RPD	8/30/09	5.1	6.8	5.7	6.5	0.8	5.3

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C

Analyses of Dissolved Metals in Water by EPA Method 7000 Series

Sample Number	Date Analyzed	Lead (ug/l)	Cadmium (ug/l)	Chromium (ug/l)	Arsenic (ug/l)	Copper (ug/l)	Zinc (ug/l)
Method Blanl	8/30/09	nd	nd	nd	nd	nd	nd
MW-1	8/30/09	nd	nd	nd	nd	nd	nd
MW-2	8/30/09	nd	nd	nd	nd	nd	nd
MW-3	8/30/09	nd	nd	nd	nd	nd	nd
MW-3 Dup	8/30/09	nd	nd	nd	nd	nd	nd
Practical Quantitation Lin		5.0	0.5	10.0	3.0	5.0	10.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C
Libby Project No.L090825-4

Analyses of Total Mercury in Water by EPA Method 7471

Sample Number	Date Analyzed	Mercury (ug/l)
Method Blank	8/30/09	nd
MW-1	8/30/09	nd
MW-2	8/30/09	nd
MW-3	8/30/09	nd
MW-3 Dup	8/30/09	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury Percent Recovery
LCS	8/30/09	103%
MW-3 MS	8/30/09	95%
MW-3 MSD	8/30/09	105%
RPD	8/30/09	10

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

Haven's Property PROJECT
Tumawater, WA
Robinson, Noble & Saltbush
Client Project #2491-001C

Analyses of Dissolved Mercury in Water by EPA Method 7471

Sample Number	Date Analyzed	Mercury (ug/l)
Method Blank	8/30/09	nd
MW-1	8/30/09	nd
MW-2	8/30/09	nd
MW-3	8/30/09	nd
MW-3 Dup	8/30/09	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

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

08/31/2009

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project: Sertjes-Havens Property
Sample Matrix: Water
Date Sampled: 08/25/2009
Date Received: 08/27/2009
Spectra Project: 2009080465

Client ID	Spectra #	Analyte	Result	Units	Method
MW-1	1	Dissolved Nickel	< 0.015	mg/L	EPA 200.7
MW-1	1	Nickel	< 0.015	mg/L	EPA 200.7
MW-2	2	Dissolved Nickel	< 0.015	mg/L	EPA 200.7
MW-2	2	Nickel	< 0.015	mg/L	EPA 200.7
MW-3	3	Dissolved Nickel	< 0.015	mg/L	EPA 200.7
MW-3	3	Nickel	< 0.015	mg/L	EPA 200.7

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a7/scj

Libby Environmental, Inc. — Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: Robinson, Noble & Saltbush
Address: 3011 S. Huson St. Ste A Tacoma, WA 98409
Phone: (253)475-7711 Fax: (253)472-5846
Client Project # 2491-001A

Date: 8-25-09 Page: 1 of 1
Project Manager: RAB
Project Name: Wertjes - Havens Property
Location: Havens Property, Tumwater, WA
Collector: JJB Date of Collection: 8-25-09

Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals (Tot+Dissolved)				Field Note/# Containers
1 mw-1		13:10	H_2O	250 mL											X				2
2 mw-2		14:20	↓	Poly											↓				2
3 mw-3		15:15	↓												↓				2
4																			
5																			
6																			
7																			
8																			
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18																			

Relinquished by:	Date / Time	Received by	Date / Time
[signature]	8-25-09 16:00	Athanasius Shaw	8/25/09 16:00

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

TAT 24HR 48HR 5-Day

Distribution White - Lab, Yellow - File, Pink - Originator

SPECTRA Laboratories

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

08/31/2009

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project: Sertjes-Havens Property
Sample Matrix: Water
Date Sampled: 08/25/2009
Date Received: 08/27/2009
Spectra Project: 2009080465

Client ID	Spectra #	Analyte	Result	Units	Method
MW-1	1	Dissolved Nickel	< 0.015	mg/L	EPA 200.7
MW-1	1	Nickel	< 0.015	mg/L	EPA 200.7
MW-2	2	Dissolved Nickel	< 0.015	mg/L	EPA 200.7
MW-2	2	Nickel	< 0.015	mg/L	EPA 200.7
MW-3	3	Dissolved Nickel	< 0.015	mg/L	EPA 200.7
MW-3	3	Nickel	< 0.015	mg/L	EPA 200.7

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

a7/scj

2009080465

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: Libby Env.
Address: (seealone)
Phone: Fax:
Client Project #

Date: 8/26/09 Page: 1 of 1
Project Manager: Sherry Chilcutt
Project Name: Wertjes - Havens Property
Location:
Collector: Date of Collection:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Dissolved N.	Total N.		Field Note/# Containers
1	MW-1			H_2O	Poly												X	X		
2	MW-2			↓	↓												X	X		
3	MW-3																X	X		
4																				
5																				
6																				
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17																				
18																				

Relinquished by:	Date / Time	Received by	Date / Time
[signature]	8/26/09	UPS 8/26/09	
UPS		[signature]	08-27 1441

Sample Receipt:

Good Condition?	Y
Cold?	Y
Seals Intact?	NA
Total Number of Containers	6

Remarks: Std

TAT 24HR 48HR 5-Day

Distribution White - Lab, Yellow - File, Pink - Originator

WASTE DISPOSAL DOCUMENTS

Libby Environmental, Inc.
4139 Libby Road N.E., Olympia, WA 98506-2518

September 29, 2009

Rick Bieber
Robinson, Noble & Saltbush, Inc.
3011 Huson Street South
Suite A
Tacoma, WA 98409

Dear Mr. Bieber:

Please find enclosed the analytical data report for the Wertjes: Havens Property Project located in Tumwater, Washington. A product sample w as analyzed for Selected Volatile Organic Compounds by EPA Method 8260b, PCB's by EPA Method 8082b, TCLP RCRA8 Metals by EPA method 1311/6010b, Specific Gravity, Flashpoint and pH.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work was sent to Alan Wertjes, Attorney at Law.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

WERTJES: HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Client Project #2491-001A
Libby Env.Project No.L090922-5

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN PRODUCT

Sample Description		Method Blank	D-1
Date Sampled	Reporting	N/A	9/22/09
Date Analyzed	Limits	9/23/09	9/23/09
	(ug/l)	(ug/l)	(ug/l)
Dichlorodifluoromethane	200	nd	nd
Chloromethane	200	nd	nd
Vinyl chloride	20	nd	nd
Bromomethane	200	nd	nd
Chloroethane	200	nd	nd
Trichlorofluoromethane	200	nd	nd
1,1-Dichloroethene	200	nd	nd
Methylene chloride	100	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	500	nd	nd
trans-1,2-Dichloroethene	100	nd	nd
1,1-Dichloroethane	100	nd	nd
2,2-Dichloropropane	200	nd	nd
cis-1,2-Dichloroethene	100	nd	nd
Chloroform	100	nd	nd
1,1,1-Trichloroethane (TCA)	100	nd	nd
Carbon tetrachloride	100	nd	nd
1,1-Dichloropropene	100	nd	nd
Benzene	100	nd	115,000
1,2-Dichloroethane (EDC)	100	nd	nd
Trichloroethene (TCE)	100	nd	nd
1,2-Dichloropropane	100	nd	nd
Dibromomethane	100	nd	nd
Bromodichloromethane	100	nd	nd
cis-1,3-Dichloropropene	100	nd	nd
Toluene	100	nd	1,300,000
Trans-1,3-Dichloropropene	100	nd	nd
1,1,2-Trichloroethane	100	nd	nd
Tetrachloroethene (PCE)	100	nd	nd
1,3-Dichloropropane	100	nd	nd
Dibromochloromethane	100	nd	nd
1,2-Dibromoethane (EDB) *	1.0	nd	nd
Chlorobenzene	100	nd	nd
1,1,1,2-Tetrachloroethane	100	nd	nd
Ethylbenzene	100	nd	380,000
Total Xylenes	200	nd	2,770,000
Styrenes	100	nd	nd

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

WERTJES: HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Client Project #2491-001A
Libby Env.Project No.L090922-5

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B IN PRODUCT

Sample Description		Method Blank	D-1
Date Extracted	Reporting	N/A	9/22/09
Date Analyzed	Limits	9/23/09	9/23/09
	(ug/l)	(ug/l)	(ug/l)
Bromoform	100	nd	nd
Isopropylbenzene	400	nd	39,900
1,2,3-Trichloropropane	100	nd	nd
Bromobenzene	100	nd	nd
1,1,2,2-Tetrachloroethane	100	nd	nd
n-Propylbenzene	100	nd	153,000
2-Chlorotoluene	100	nd	nd
4-Chlorotoluene	100	nd	nd
1,3,5-Trimethylbenzene	100	nd	359,000
tert-Butylbenzene	100	nd	151,000
1,2,4-Trimethylbenzene	100	nd	1,270,000
sec-Butylbenzene	100	nd	28,600
1,3-Dichlorobenzene	100	nd	nd
Isopropyltoluene	100	nd	18,100
1,4-Dichlorobenzene	100	nd	nd
1,2-Dichlorobenzene	100	nd	nd
n-Butylbenzene	100	nd	nd
1,2-Dibromo-3-Chloropropane	100	nd	nd
1,2,4-Trichlorolbenzene	200	nd	nd
Hexachloro-1,3-butadiene	500	nd	nd
Naphthalene	500	nd	670,000
1,2,3-Trichlorobenzene	500	nd	nd
Surrogate Recovery			
Dibromofluoromethane		96.2	101
1,2-Dichloroethane-d4		93.7	110
Toluene-d8		93.7	98
4-Bromofluorobenzene		86.0	103

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

LIBBY ENVIRONMENTAL CHEMISTRY LABORATORY

WERTJES: HAVENS PROPERTY PROJECT
Tumwater, Washington
Robinson, Noble & Saltbush, Inc.
Client Project #2491-001A
Libby Env.Project No.L090922-5

QA/QC Data - EPA 8260B Analyses

	Laboratory Control Sample		
	Spiked Conc. (ug/l)	Measured Conc. (ug/l)	Spike Recovery (%)
1,1-Dichloroethene	10	7.3	73
Benzene	10	7.6	76
Toluene	10	7.5	75
Chlorobenzene	10	8.6	86
Trichloroethene (TCE)	10	7.8	78

Surrogate Recovery			
Dibromofluoromethane			103
1,2-Dichloroethane-d4			117
Toluene-d8			97
4-Bromofluorobenzene			96

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

SPECTRA Laboratories

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

09/25/2009

P.O.#:	2491-001A
Project:	Wertjes-Havens Property
Client ID:	D-1
Sample Matrix:	Oil
Date Sampled:	09/22/2009
Date Received:	09/22/2009
Spectra Project:	2009090450
Spectra Number:	1

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Analyte	Result	Units	Method
Specific Gravity at 60 °F	0.8911		ASTM D-287
Flashpoint (PMCC)	> 210	°F	ASTM D-93
TCLP Arsenic	< 0.05	mg/L	SW846 6010B
TCLP Barium	0.030	mg/L	SW846 6010B
TCLP Cadmium	0.021	mg/L	SW846 6010B
TCLP Chromium	< 0.007	mg/L	SW846 6010B
TCLP Lead	0.05	mg/L	SW846 6010B
TCLP Selenium	< 0.08	mg/L	SW846 6010B
TCLP Silver	< 0.007	mg/L	SW846 6010B
TCLP Mercury	< 0.0002	mg/L	SW846 7470A
pH	6.37	pH Units	SW846 9045

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

a5/snb

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: Robinson, Noble & Saltbush
Address: 3011 S. Huson St., Ste A, Tacoma, WA
Phone: (253) 475-7711 Fax: (253) 472-5846
Client Project # 2491-001A

Date: 9-22-09
Page: 1 of 1
Project Manager: RAB
Project Name: Worthies: Havens Property
Location: Tumwater
Collector: JJB
Date of Collection: 9-22-09

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	TCLP metals D004-D011	pH, specific gravity	Flash point	Field Note/# Containers
1	D-1	n/a	14:00	product	Voa/½ liter			X							X		X	X	X	3 voa / 1-½ litre glass
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				

Relinquished by:	Date / Time	Received by	Date / Time
[signature]	9-22-09 14:30	[signature]	9/22/09 14:30

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks: Std

TAT 24HR 48HR 5-Day

Distribution White - Lab, Yellow - File, Pink - Originator

ENVIRONMENTAL SERVICES
GROUP
Western Region

PLEASE REMIT TO
PSC ENVIRONMENTAL SERVICES LLC
P.O. BOX 3069
Houston, TX 77253-3069

Invoice # 22000131734
Invoice Date 10/30/2009
Customer 56766
Terms Net 30 days

SITE ADDRESS:
WERTJES
411 93RD AVE
TUMWATER, WA 98501

ATTN.: TOM SMITH
ROBINSON, NOBEL AND SALTBUSH
3011 S HUSON STREET, SUITE A
TACOMA, WA 98409

ORDER 1042631 WERTJES

Thank you for your business.

10/19/2009

Intra-State Transportation :

	LTL TRANSPORTATION MINIMUM	1.00 @ 100.000 / E	$100.00

10/19/2009 Doc No. 154203-09 Manifest 005605557JJK Waste Receipt KNT-7141P

1	427104-00 - NON REGULATED OIL	1.00 @ 167.000 / DM55	$167.00
2	428047-00 - EMPTY DRUMS	1.00 @ 30.000 / E	$30.00
		Sub Total	$297.00
		Energy Charge	$43.07
		INVOICE TOTAL	$340.07

Seattle Office (800) 228-7872 Fax (425) 204-7164 Portland Office (800) 547-2436 Fax (360) 835-8872

We honor the above merchant cards for payment. Please contact our local PSC billing office for payment instructions.

1042631 154203

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number
	CESQG	1	(877) 577-2669	005605557 JJK

5. Generator's Name and Mailing Address

ROBINSON, NOBLE & SALTBUSH, INC
3011 SOUTH HUSON, SUTIE A
TACOMA WA 98409 (253)475-7711

Generator's Phone:

Generator's Site Address (if different than mailing address)

WERTJES
411 93RD AVE
TUMWATER WA 98501 (253)475-7711

6. Transporter 1 Company Name: BURLINGTON ENVIRONMENTAL, LLC — U.S. EPA ID Number: WAR000001743

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address — U.S. EPA ID Number: WAD991281767

BURLINGTON ENVIRONMENTAL, LLC. KENT FACILITY
20245 77TH AVENUE SOUTH
Facility's Phone: KENT, WA 98032 (253) 872-8030

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. MATERIAL NOT REGUALTED BY DOT	1	DM	45	G	
	2. MATERIAL NOT REGULATED BY DOT	1	DM	20	P	
	3.					
	4.					

14. Special Handling Instructions and Additional Information

(1) 427104-00 - NON REGULATED OIL (2) 428047-00 - EMPTY DRUMS

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Jeremy Bush — Signature: [signature] — Month 10 Day 19 Year 09

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Steve Glenn — Signature: Steve Glenn — Month 10 Day 19 Year 09
Transporter 2 Printed/Typed Name — Signature — Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:
18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Christine Crisostomo — Signature: [signature] — Month 10 Day 19 Year 09

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

7141P

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete. DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

'09 OCT 19 PM 1:14

PSC
PNW - ESG - TRANSPORTATION GROUP

☐ **RESOURCE RECOVERY** 1629 East Alexander Ave., Tacoma WA 98421 (253) 383-3044
☑ **BEI PUGET SOUND** 1629 East Alexander Ave., Tacoma WA 98421 (253) 383-3044

BILL OF LADING

DATE 10-19-09	BEGINNING MILEAGE 287252		ON DUTY 7:00 AM / PM	
DRIVER NAME Steve Glenn	ENDING MILEAGE 287300		OFF DUTY AM / PM	
VEHICLE NO. 102	TRAILER NO.	BOX NO.	COST CENTER 1109	SHIPPERS NO. 154203 / ORDER NO. 1042631

SHIPPER / ORIGIN

NAME Wertjes
ADDRESS 411 93rd Ave.
CITY Tumwater STATE WA ZIP 98501

WEIGH INFORMATION

GROSS
TARE
NET

FOR OFFICE USE ONLY

MILEAGE / CONTAINER	RATE	FREIGHT
PLEASE PAY THIS AMOUNT ➡		

QUANTITY	DOT PROPER SHIPPING NAME
2pc	per manifest # 154203

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.

X [signature] DATE 10-19-09

DESTINATION

NAME BE Kent RECEIPT #
ADDRESS
CITY Kent STATE WA ZIP 98032
VEHICLE NO. 102 TRAILER NO. DATE
☐ LOADED ☑ UNLOADED ☐ RINSED

☐ **TACOMA** 1701 E. Alexander Ave., Tacoma, WA 98421 (253) 627-7568
☐ **WASHOUGAL** 625 South 32nd St. (P.O. Box 229) Washougal, WA 98671 (360) 835-8594
☑ **KENT** 20245 77th Ave. S., Kent, WA 98032 (253) 872-7859

ARRIVAL TIME: 3:30

LOAD TIME: START:	AM PM	___ HRS. FREE TIME	UNLOAD TIME: START:	AM PM	___ HRS. FREE TIME
FINISH:	AM PM	___ HRS. CHARGEABLE	FINISH:	AM PM	___ HRS. CHARGEABLE

REASON FOR LOAD DELAY: ______ REASON FOR LOAD DELAY: ______

SIGNATURE FOR DELAY: ______ SIGNATURE FOR DELAY: ______

DRIVER SIGNATURE Steve Glenn

COMMENTS:

Philip Services, Corporation

Generator's Waste Profile 427104-00

Starts : 05 OCT 2009
Expires: 31 OCT 2010
Printed: 07 OCT 2009

Status : PENDING
Sales Rep 0040 Jason R. Collins
Acct Mngr 035 Brenda Smithson

A: GENERATOR (137439) SITE INFORMATION

WERTJES
411 93RD AVE
TUMWATER, WA 98501
> Contact JEREMY BUSH

EPA CESQG
SIC 562998 N
Phone (253) 475-7711

B: CUSTOMER (57429) INFORMATION

ROBINSON, NOBLE & SALTBUSH, INC
3011 SOUTH HUSON, SUITE A
TACOMA, WA 98409

C: WASTE INFORMATION

On File > MSDS No Analysis Yes Sample No

Waste Name NON REGULATED OIL
Process SITE CLEANOUT

D: PHYSICAL CHARACTERISTICS OF WASTE

Phys States L-Liq
Top Color VARIES
Mid Color
Bot Color
Odor Mild oil
Layers Single Phased
Spec Grav <1
PH Range 6-7
Free Liq % 100
Flash Test Closed Cup
Flash Rnge >210F

E: CHEMICAL COMPOSITION OF WASTE

Information Provided By Generator

OIL (100 %)

PCB's NS Cyanides NS Phenolics NS Sulfides NS TOC >10% VOC <500 PPM

F: METALS METHOD Gen Knowledge

Arsenic	<5	Cadmium	<1	Chromium	<5	Silver	<5
Barium	<100	Merc TCLP	<0.2	Selenium	<1	Nickel	
		Lead	<5	Merc Tot		Thallium	

Zinc
Copper
Chrome-6

G: OTHER CHARACTERISTICS OF WASTE

Ign. Solid No Oxidizer No Explosive No Shock Sensitive No Water Reactive No Reactive No

H: EPA / STATE WASTE IDENTIFICATION

Dangerous / Hazardous No TSCA No Universal Waste No

Form W206 Source G19 Origin 1 SubPart CC No NESHAPS No CERCLA No Debris No Waste Water No

EPA Codes
State Codes

I: SHIPPING INFORMATION

Marine Pollutant No Dangerous Wet No Inhalation Hazard No Poison No

Containers DM Metal Drum DF Fiber Drum Qty to Ship Now Projected Volume Seasonal

DOT Descrip MATERIAL NOT REGUALTED BY DOT

J: SPECIAL HANDLING INFORMATION

CESQG: WOULD NOT OTHERWISE BE REGULATED;
Waste Categs AF01

GENERATOR CERTIFICATION

I hereby certify, as an authorized representative of the Generator named above, that PSC Environmental, LLC has been fully informed of all information known about this waste, including but not limited to, the waste's generation process, composition, and physical characteristics, necessary to identify proper treatment and disposal of waste and this information is true and accurate.

If this is an existing profile which is being renewed, I hereby certify that there have been no changes in this waste, chemical, physical, or regulatory designation since full characterization by sample testing.

Signature: [signature]
Printed Name: Richard Bibler
Title: Project Manager
Date: 10/7/09

PSC Environmental, LLC maintains the appropriate permits for and will accept the dangerous waste the generator is shipping as required by WAC 173-303-290(3).

August 18, 2009

Alan J. Wertjes
1800 Cooper Point Road, Bldg 3
Olympia, WA 98502

RE: Havens Property
411 – 93rd Ave SE, Tumwater, WA

Dear Mr. Wertjes:

Enclosed is the invoice for the recently completed remediation project at the Havens site in Tumwater, WA.

Billing for this project is based on the estimate letter dated June 4, 2009.

August 13, 2009
Mobilize labor and equipment to the Havens site in Tumwater, WA. Pump and dispose of numerous containers of used oil located throughout the site. Load +/- 50 – 5 gallon containers, 13 – 55 gallon drums, 1 – 500 gallon tank, 1 – 250 gallon tank, 1 – 275 gallon tank, 1 – 6' X 6' open top fuel tank (1300 gallons), 6 vehicle batteries, and 2 – large commercial fork lift type batteries for cleaning and disposal. The 6' X 6' open top tank appeared to have been utilized as a storage unit for contaminated soil from the site. The tank was full of oily water and approximately 2.5' – 3' of sludge/soil material. All containers and tanks required to be cleaned prior to disposal. Due to the overgrown vegetation and required access needed to get vac truck close to containers requiring pumping, an excavator was required. This dense material was very difficult to pump and this in turn is the explanation for the excess hours billed for the vac truck and site supervisor.

Mob to site	$ 300.00
8 hrs excavator/operator @ $125/hr	1000.00
8 hrs 5 yd dump truck (load & haul debris) @ $95/hr	760.00
8 hrs service truck (load & haul debris) @ $65/hr	520.00
8 hrs supervisor/foreman @ $95/hr	760.00

7517 Portland Avenue, Suite A, Tacoma, WA 98404 • Phone: (253) 536-6961 • Fax: (253) 548-0201
E-Mail: Langsethes@email.com

2 hrs supervisor/foreman @ $142.50/hr	285.00
8 hrs 2 – laborers @ $45/hr	720.00
8 hrs Vac truck @ $135/hr	1080.00
3 hrs Vac truck @ $202.50	607.50
800 gallons used oil for disposal @ .50/gal	400.00
3 tons sludge/soil for disposal @ $105/ton	315.00
Load, haul, dispose of +/- 50 – 5 gallons containers	380.00
Dispose 13 – 55 gallon drums @ $15/each	195.00
Dispose 1 – 250, 1 – 275, 1 – 500 gallon tanks	850.00
Dispose 1 – 1300 gallon tank	500.00
Dispose 2 – large commercial batteries & 4 small	250.00

August 14, 2009
On site to excavate, load, haul, and dispose of petroleum contaminated soil at the direction of Rick Bieber LG, Robinson & Noble Project Hydrogeologist.

6 hrs excavator @ $125/hr	750.00
6 hrs dump truck @ $130/hr	780.00
6 hrs supervisor @ $95/hr	570.00
6 hrs laborer @ $45/hr	270.00
PCS disposal @ $105/ton (4.8 tons)	504.00
Mob out	300.00
Total	$ 12,096.50

Thank you for the opportunity to work with you on this project. Please give me a call if I can answer any questions regarding this or any future projects.

Sincerely,

Tom Langseth
Langseth Environmental Services, Inc.

THURSTON CO PUBLIC WORKS WARC
2404-A1 HERITAGE CT SW
Olympia, WA 98502
(360)709-3076

Bill Acct:001226
LANGSETH ENVIRONMENTAL SVS INC
Haul Acct:

SITE:WA WARC Facility
DATE:08/14/09 TICKET#:4117107
TIME IN:12:56 ID IN: AK
TIME OUT:13:02 ID OUT: MK
TURNAROUND TIME: 6
TRUCK:101326
PO:

	LBS	TONS
GROSS:	30840	15.42
TARE:	21240	10.62
NET:	9600	4.80

VOL: 0

MATERIAL:

NOTE:

B.O.L. # 16446

SHIPPING PAPER

PRO-VAC

6622 112th Street East
Puyallup, WA 98373

	DELIVERY DATE 8-13-09 / JOB # 090811-006
SHIPPER / CUSTOMER: Langseth	POINT OF CONTACT
ADDRESS: 411 83rd Ave SE	PHONE #
CITY, STATE, ZIP: Tumwater WA	
CARRIER / TRANSPORTER: PRO-VAC	PHONE # 253 435-4328
CONSIGNEE / FACILITY: PRS	POINT OF CONTACT: G. Smith
ADDRESS: 3003 Taylor Way	PHONE # 253 383-4175
CITY, STATE, ZIP: Tacoma, WA 98421	

HM	US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	Containers No.	Containers Type	Total Quantity	UOM	CHLOR	pH
A	material not regulated by DOT water/oil	001	T.	1600	G		
B							
C							
D							

Special Handling Instruction and Additional Information:

Placards Provided YES________ NO √

SHIPPER'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway, vessel, and rail according to applicable international and national government regulations.

		MONTH	DAY	YEAR
(SHIPPER) PRINT OR TYPE NAME X Tod Langseth	SIGNATURE X [signature]	8	13	09
(CARRIER/TRANSPORTER) PRINT OR TYPE NAME X DAVID OLSON	SIGNATURE X [signature]	8	13	09
(CONSIGNEE/FACILITY) PRINT OR TYPE NAME X	SIGNATURE X			

CARRIER

PCRCD,LLC dba LRI
17925 MERIDIAN ST E
PUYALLUP, WA 98375

000985 LANGSETH ENVIRO SVCS, INC.
7517 PORTLAND AVE.E.
TACOMA WA 98404

SITE	TICKET	GRID	WEIGHMASTER
51	349643		Jo I

DATE IN	DATE OUT	TIME IN	TIME OUT	VEHICLE	ROLL OFF
08/14/09	08/14/09	15:21	15:34		

REFERENCE	ORIGIN

Scale 1 Gross Wt. 10020 LB
Scale 2 Tare Wt. 9240 LB
Net Weight 780 LB

Inbound - Charge ticket

QTY	UNIT	DESCRIPTION
0.39	TON	07 REGULAR DEMOLITIO

Operating hours 8AM to 5:45PM 7 days a week.
Hidden Valley Transfer Station

)2.TS TO REORDER CONTACT NORTH STAR FORMS, LLC (877) 499-0492

SIGNATURE

BATTERY SYSTEMS *The Single Source Solution!*

P.O. Box 90906
Long Beach, CA 90809-0906

249948

PICK UP MEMO

DATE 8/18/08

TO: Langseth Enviro

QTY	DESCRIPTION
2	Steel Case
4	Auto Batteries
	HAZARDOUS MATERIAL LICENSE #131148
	Batteries Disposed of at RSR, 720 S. 7th Ave., City of Industry, CA 91764, EPA #CAD066233966 or Exide, 2700 S. Indiana, Los Angeles, CA 90023, EPA #CAD097854541
	BATTERIES, WET, FILLED WITH ACID CLASS 8 • I.D. NO. UN2794, PG111 EMERGENCY PHONE NUMBER (800) 424-9300 CHEMTREC

RECEIVED BY

Pegasus Press (310) 615-0177

PRS Group, Inc
3003 Taylor Way
Tacoma, WA 98421
Phone #253 383-4175

Date
8/13/2009

Langseth Environmental
7517 Portland Ave. Suite A
Tacoma, WA 98404

PRS Job #	P.O. No.			Entry Log #
	Pro Vac			31496

Item	Quantity	Description		
Oily Water	800	Gallons		
Sludge	3	Ton(s)		

Hawen's
Site
411 - 93rd Ave E

APPENDIX B

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

August 23, 2011

Mr. Alan J. Wertjes
1800 Cooper Point Road, Building 3
Olympia, Washington 98502

Re: Further Action at the following Site:

- **Site Name:** John's Auto Wrecking
- **Site Address:** 411 93rd Avenue Southeast, Olympia, Washington 98501-9701
- **Facility/Site No.:** 57665495
- **VCP Project No.:** SW1127

Dear Mr. Wertjes:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your independent cleanup of the John's Auto Wrecking facility (Site). This letter provides our opinion. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

Issue Presented and Opinion

Is further remedial action necessary to clean up contamination at the Site?

> **YES. Ecology has determined that further remedial action is necessary to clean up contamination at the Site.**

This opinion is based on an analysis of whether the remedial action meets the substantive requirements of MTCA, Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC (collectively "substantive requirements of MTCA"). The analysis is provided below.

Description of the Site

This opinion applies only to the Site described below. The Site is defined by the nature and extent of contamination associated with the following releases:

- Total petroleum hydrocarbons (TPH) in the oil-range (TPH-O) into the Soil.
- Volatile Organic Compounds into the Soil.
- Glycol into the Soil.
- Polychlorinated Biphenyls (PCBs) into the Soil.

- Metals into the Soil.
- Petroleum Hydrocarbons into the Groundwater.
- Volatile Organic Compounds into the Groundwater.
- Glycol into the Groundwater.
- Metals into the Groundwater.

Enclosure A includes a detailed description and diagram of the Site, as currently known to Ecology.

Please note a parcel of real property can be affected by multiple sites. At this time, we have no information that the parcel(s) associated with this Site are affected by other sites.

Basis for the Opinion

This opinion is based on the information contained in the following documents:

1. Robinson Noble Saltbush, Inc., **Site Remediation of the Havens Property (aka Johns Auto Wrecking), 411 93rd Avenue SE, Olympia, Washington,** dated December 10, 2009.

2. Robinson Noble Saltbush, Inc., **Site Investigation/characterization, Havens Property (aka) Johns Auto Wrecking, 411 93rd Avenue SE, Olympia, Washington,** dated April 21, 2009.

3. Department of Ecology Response Letter, **Site Investigation Work Plan Johns Auto Wrecking, 411 93rd Avenue SE, Olympia, Washington prepared by Associated Environmental Group, LLC, dated June 15, 2006,** dated June 26, 2006.

4. Associated Environmental Group, LLC, **Site Investigation Work Plan Johns Auto Wrecking, 411 93rd Avenue SE, Olympia, Washington,** dated June 15, 2006.

5. Department of Ecology Opinion Letter, **Opinion Pursuant to WAC 173-340-515(5) on Proposed Remedial Action for the following Hazardous Waste Site: John's Auto Wrecking,** dated February 23, 2006.

6. Associated Environmental Group, LLC, **Site Investigation Work Plan Johns Auto Wrecking, 411 93rd Avenue SE, Olympia, Washington,** dated June 15, 2005.

7. EarthSafe Environmental**, Sampling and Analysis Plan, Johns Auto Wrecking and Towing,** received June 7, 2002.

Those documents are kept in the Central Files of the Southwest Regional Office of Ecology (SWRO) for review by appointment only. You can make an appointment by calling the SWRO resource contact at (360) 407-6365.

This opinion is void if any of the information contained in those documents is materially false or misleading.

Analysis of the Cleanup

Ecology has concluded that **further remedial action** is necessary to clean up contamination at the Site. That conclusion is based on the following analysis:

1. **Characterization of the Site.**

Ecology has determined your characterization of the Site is not sufficient to establish cleanup standards and select a cleanup action. The Site is described above and in **Enclosure A.**

The Site is located at 411 93rd Avenue SE in Olympia, Washington approximately 0.5 miles southeast of the Olympia Regional Airport. The 15-acre Site is comprised of six tax parcels, and operated as an automobile wrecking yard for approximately 22 years until its closure sometime in the early 2000s. A perennial creek named Hopkins Ditch (Salmon Creek) runs across the southern portion of the Site. Almost half the Site lies within the 300-foot High Groundwater Buffer, the Hopkins Ditch Wetland, or wetland buffer identified on the Thurston County GeoData Center Website. The Site has a shallow groundwater table and two areas of the Site are identified as High Groundwater Hazards, one in the southwest corner of parcel 12723210000 and the other in the southeast corner of parcel 12723210400 and the northeast corner of parcel 12723210700. Approximately 50 percent of the parcels were located within the High Groundwater Hazards buffer area. Groundwater hazard areas have a history of flooding events and impacting groundwater.

In March 2002, Thurston County Environmental Health Department (TCEH) issued a *Notice of Violation - Order to Correct* Letter to John's Auto Wrecking for several hazardous materials and state-regulated dangerous waste storage issues. TCEH subsequently performed a Site Hazard Assessment (SHA) and the Site was determined to have a ranking of 1 in February 2004. In June 2004, EarthSafe Environmental produced a remedial investigation and cleanup work plan, identifying six major areas of concern (AOCs). The Site was entered into the Voluntary Cleanup Program (VCP) under VCP account number SW0652 in March 2005. In June 2005, Associated Environmental

Group LLC (AEG) provided a Site characterization work plan for Ecology review. In February 2006, Ecology provided a Further Action Opinion Letter detailing deficiencies in the AEG work plan. In June 2006, AEG submitted another work plan for review. Also in June 2006, Ecology reviewed the plan and provided additional comments detailing the lack of response to Ecology's earlier 2006 comments. In September 2007, Ecology terminated the VCP agreement due to lack of activity.

Sometime around 2007, the Site was cleared of most of the wrecked vehicles, batteries, tires, hazardous material, dangerous waste, and other associated debris that resulted in the original 2002 TCEH complaint.

In April 2009, Robinson, Noble and Saltbush, Inc. (Robinson) conducted Site investigation activities. Robinson identified a total of nine AOCs based on the past locations of major Site operations. TPH-O soil contamination above the applicable MTCA Method A Soil Cleanup Level (CUL) for unrestricted land uses was identified in two areas: AOC 1 and AOC 6 (see Figure 2). Robinson also advanced 11 borings, B-1 through B-11. Borings B-2, B-4, B-8, and B-10 did not appear to be associated with any of the previously identified AOCs and no specific rationale was provided in the report to explain why those specific locations were selected.

In August 2009, Robinson conducted remediation activities at the Site. Robinson documented the removal of 800 gallons of "used" oil, 3 tons of sludge, two large industrial lead-acid batteries, four automotive batteries, and several empty containers ranging in volume from a 1,300-gallon steel above-ground storage tank to plastic 5-gallon buckets. The "used" oil and sludge were stored in these various containers around the Site. The wastes were characterized then disposed of at the appropriate disposal facilities. Robinson also excavated and removed petroleum-contaminated soil (PCS) exceeding the applicable MTCA Method A CULs from two locations on the Site. A total of 4.8 tons of PCS was excavated and transported to the Thurston County Public Works Waste and Recovery Center in Olympia, Washington. Robinson collected a soil confirmation sample from each location; however, the confirmation samples were not linked to any specific contaminated sample and the relationship to the original contaminated sample was ambiguous. The size of the excavation areas was not discussed and the number of samples collected may not have been adequate to delineating the PCS area.

In July 2010, the Estate of John Havens (former owner of John's Auto Wrecking) received a *Resolution of Notice of Violation* Letter from TCEH acknowledging the 2002 violations had been satisfactorily resolved. The Site was re-entered into the VCP in August 2010 and the two interim investigation reports by Robinson describing the

February 2011 and August 2010 remedial investigation activities were submitted to Ecology for review. Ecology understands that there is no current business or remedial activity of any kind occurring at the Site.

Based on a review of the available information, Ecology has the following comments:

1. Ecology has determined previous investigations were insufficient in determining the extent of potential contamination associated with the AOCs identified at the Site. The nature of the auto salvage operations, the longevity of those operations, the hazardous materials used and dangerous wastes generated by salvage activities, and the typical effects of those operations on the physical and environmental Site conditions requires a more comprehensive evaluation of all Site media. The approach used by Robinson to evaluate the Site appeared to be a focused environmental investigation of the 15-acre Site, with emphasis on smaller AOCs within the Site. Aerial imagery over a period of 14 years indicated extensive areas of each of the parcels on the Site had some aspect of automobile salvage or storage. Previous Site visits by Ecology personnel have documented extensive soil staining from fluids leaking out of salvage vehicles or containers and dangerous waste storage issues throughout the Site. During a Site visit in December 2010, the Ecology Site manager observed extensive dark soil staining across the Site, smaller piles of tires, several piles that included debris, empty propane cylinders, and rusting metal, partial salvaged car bodies, open surface water with no storm water runoff controls, two piles, one for creosoted timbers and one for galvanized metals, and oil-stained concrete floors and pads. These potential sources of contamination should be evaluated and removed. A comprehensive Site history needs to be developed for the Site to include activity, waste products and amounts generated, history of waste handling and storage practices, longevity of that operation at that location, spills, and types of activities and practices of previous owners. Ecology does not believe the Site has been sufficiently delineated to rule out possible contamination within the AOCs or at other areas of the Site. Ecology recommends that sufficient samples be collected to delineate the Site. The United States Environmental Protection Agency (EPA) recommends automobile salvage yard processes should be evaluated for the following compounds: acetylene gas, common solvents, rubber, compressed oxygen, automotive fluids, degreasing agents, gasoline, hydraulic oils, fuel additives, diesel fuels, common lubricants, asbestos, lead, and sulfuric acid. In areas where waste oil storage and burning of debris was known or suspected to have occurred, the soil should be evaluated for the presence of polycyclic aromatic hydrocarbons (PAHs). If the evaluation indicates the salvage processes used or produced one or more of the compounds listed above, then those compounds should be analyzed for during the Site characterization. Unless documentation can be provided to a disqualify specific constituents of concern

(COCs) from further evaluation, specific laboratory analysis should be run for the following COCs: cyanide, priority pollutant organic (volatiles, semi-volatiles, pesticide/PCBs), TPH, fuel additives, heavy metals (antimony, arsenic, beryllium, cadmium, chromium [hexavalent & total], copper, lead, mercury, nickel, selenium, silver, thallium, and zinc). Ecology recommends analysis of TPH for diesel and oil range hydrocarbons be conducted and reported to conform to *Technical Memoranda #4, Determining Compliance with Method A Cleanup Levels for Diesel and Heavy Oil*, which can be found at http://www.ecy.wa.gov/programs/tcp/policies/tcppoly.html.

2. According to the monitoring well logs in the December 2010 Robinson report, monitoring wells MW-1 and MW-2 were improperly screened to identify petroleum hydrocarbon contamination on the groundwater surface. The static water level was measured above the top of the well screens. Ecology recommends the well screen interval be corrected or the wells abandoned and re-installed with the correct well screen intervals.

3. Groundwater was sampled from all borings. Borings B-1 and B-6 analytical results indicated there was no groundwater contamination caused by the evaluated COCs; however, these two borings were not collocated with the contaminated locations (Test Pit TP1A and TP6A) where PCS above the applicable MTCA Method A Soil CULs was found. Ecology does not consider those groundwater analytical results representative of groundwater at those PCS locations (Please note that no logs or other details of the test pit investigations were provided for Ecology review). Ecology recommends that the groundwater at previous PCS locations TP1A and TP6A be evaluated.

4. Given the shallow groundwater table and concerns for potential impacts, Ecology recommends a minimum of six groundwater monitoring wells in addition to the three monitoring wells already on the Site. According to Ecology's *Guidance on Sampling and Data Analysis Methods* (Publication No. 94-49) "Ecology expects that a hydrogeological investigation will be conducted at any site where (1) soil contamination is found within 10 feet of the groundwater table and there is permeable soil, or (2) when a soil contaminant is potentially mobile considering the site's geological setting, particularly if there is a high concentration of contamination relative to the groundwater standard". As stated in comment 3 above, one well each should be installed at TP1A and TP6A. Ecology also recommends one well each for AOC 3, AOC 5, and AOC 9, and one well located on the east property boundary between parcels 12723210400 and 12723210700 in the identified High Groundwater Hazard area (MW-4). Groundwater should be evaluated via temporary monitoring wells or probes at AOC 2, AOC 4, AOC 7, and AOC 8.

5. AOC numbers 3 and 4 have not been adequately delineated. During a Site visit in December 2010, Ecology personnel observed a partially enclosed, lean-to shed attached to a dilapidated building that housed the former radiator repair and auto shop in AOC 3 and the former hazardous material storage area in AOC 4. While the interior condition of the former radiator repair and auto shop could not be observed, the shed area was open to inspection. The concrete floor of the shed was heavily stained with oils and the staining continued to the edges of the concrete pad. Discussions with other Ecology Waste 2 Resources personnel concerning the condition of the interior of the building provided anecdotal information describing the floor as being in poor condition and heavily stained. Ecology recommends a more detailed study in these two areas to include the soils on the perimeter of the concrete slabs floors and within the floors where conditions indicate a possible pathway to the soil underneath the slabs. Because these areas lie within the designated High Groundwater Hazards buffer, groundwater should be evaluated by at least two groundwater monitoring wells (one well in AOC 3 and the other at the MW-4 location).

   Also, Ecology does not believe AOC 1, AOC 2, AOC 5, AOC 7, AOC 8, and AOC 9 have been adequately investigated. Due to the size of those identified AOCs and the lack of details or information provided concerning the AOCs, Ecology determined the investigation was insufficient for Ecology to properly evaluate and make a determination on the environmental condition of those areas.

6. There is an intermittent pond on parcel 12723210700. In December 2010, Ecology personnel observed the pond and noticed indications that surface water flowed into the pond depression from the surrounding area. The pond had several pieces of metal and rubber debris protruding from the water surface and scattered around the perimeter of the pond. Ecology recommends this feature be evaluated for connectivity to groundwater as well as the surface water runoff pathway; the soil, sediment, and surface water associated this feature should be collected and analyzed for COCs listed in comment 1. Hopkins Ditch was not observed during the Site visit; however, if similar conditions exist at the stream channel, then the soil, sediments, and surface water should also be evaluated at that location.

7. In general, the Ecology reviewer had difficulty identifying the locations where individual soil samples were collected from with any great accuracy within any of the AOCs. The scale at which these areas were mapped and the description of the local conditions of a sample location was not sufficient to allow for a determination to be made on the rationale to choose a particular location versus another location as representative of the AOC. A Site conceptual model should be developed and potential vulnerable receptors be identified for the Site. For this Site, Ecology

recommends that two cross-sections be developed for the Site; one depicting the north-south orientation of the Site to include AOC 1, AOC 5, AOC 9, the shallow pond, AOC 9, and Hopkins Ditch. The other cross-section should be a east-west cross-section from MW-4 through AOC 5 to AOC 6. Furthermore, based on the size of the identified AOCs on Figure 2, the AOCs needed to be evaluated by more than just one or two soil samples. A greater level of map detail of the sampling areas is needed to properly evaluate the soil confirmation sample location and validity. Ecology recommends when conducting a focused investigation that the individual AOCs are presented at a sufficient level of detail with a greater resolution than of the Site Map scale. Please include all soil boring and test pit logs. A review of *Chapter 173-340-840 WAC – General Submittal Requirements* and Appendix A of Ecology's *Draft Guidance for Remediation of Petroleum Contaminated Sites* (Publication No. 10-09-057) may be helpful.

8. All sample analytical data should be provided in summary tables. Confirmation samples should be readily and easily linked to the sample they are supposed to validate, both on an applicable map and summary table. All groundwater data should be presented in a format that will allow for an easy review and comparison to all previous groundwater sampling events.

9. In February 2006, Ecology provided an Opinion Letter stating Ecology had determined the June 15, 2005 proposed work plan by AEG was not likely sufficient to meet the substantive requirements of MTCA. Ecology provided additional recommendations to address the sufficiency issues. Ecology has no record of a revised work plan being submitted for review and approval. Furthermore, the two latest Robinson reports did not implement those recommendations. Ecology recommends that the February 23, 2006 Opinion Letter (letter is attached in Enclosure A) be reviewed and those applicable comments implemented into a new work plan as necessary, in addition to the recommendations listed in this letter. Please provide Ecology with an updated work plan for the remedial activities identified above for review and approval to ensure that the proposed activities will likely meet the substantive requirements of MTCA.

10. In accordance with WAC 173-340-7490, a Terrestrial Ecological Evaluation (TEE) needs to be completed for the Site. Please fill out the TEE form and submit it (along with supporting information, as appropriate) to Ecology for review. The form can be found on our website at http://www.ecy.wa.gov/biblio/ecy090300.html.

11. In accordance with WAC 173-340-840(5) and Ecology Toxics Cleanup Program Policy 840 (Data Submittal Requirements), all data generated for Independent Remedial Actions shall be submitted <u>simultaneously</u> in both a written and electronic

format. For additional information regarding electronic format requirements, see the website http://www.ecy.wa.gov/eim. Be advised that according to the policy, any reports containing sampling data that are submitted for Ecology review are considered incomplete until the electronic data has been entered. Please ensure that data generated during on-site activities is submitted pursuant to this policy. **Data must be submitted to Ecology in this format for Ecology to issue a No Further Action determination.** Please be sure to submit all soil and groundwater data collected to date, as well as any future data, in this format. Data collected prior to August 2005 (effective date of this policy) is not required to be submitted; however, you are encouraged to do so if it is available. Be advised that Ecology requires up to two weeks to process the data once it is received.

2. Establishment of cleanup standards.

Ecology has determined the cleanup levels and points of compliance you established for the Site do not meet the substantive requirements of MTCA.

Method A CULs for soil and groundwater are being used to characterize the Site. If sediment and/or surface water data are collected, the applicable or relevant and appropriate requirements (such as sediment management standards and surface water criteria) should be used to establish CULs.

Standard points of compliance are being used for the Site. The point of compliance for protection of groundwater will be established in the soils throughout the Site. For soil cleanup levels based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway, the point of compliance shall be established in the soils throughout the Site from the ground surface to 15 feet below ground surface. In addition, the point of compliance for the groundwater is established throughout the Site from the uppermost level of the saturated zone extending vertically to the lowest most depth that could potentially be affected by the Site.

3. Selection of cleanup action.

Ecology has determined the cleanup action you selected for the Site does not meet the substantive requirements of MTCA.

The affected Site media must be fully characterized prior to conducting any final cleanup action. For a Site cleanup action to qualify for a no further action opinion, it must meet one or more of the minimum cleanup requirements in WAC 173-340-360(2). Once the full extent of the contamination has been defined, it will be necessary to develop a feasibility study based on the information collected in the characterization phase. The feasibility study should include all practicable methods of treatment in addressing the Site cleanup. Please note that monitored natural attenuation is a cleanup alternative that must be approved by Ecology before implementation.

4. **Cleanup.**

Ecology has determined the cleanup you performed does not meet any cleanup standards at the Site.

Ecology has determined cleanup actions at the Site are insufficient due to the inadequacy of the Site characterization. While much of the salvage material and some PCS have been removed from the Site, some material still remains. Visual observations suggest PCS in excess of the applicable MTCA CULs may still remain in place beneath several areas of the Site and there are many debris piles, some salvage vehicles, and salvage debris visible in the pond that may still contribute to on-going environmental contamination.

Limitations of the Opinion

1. **Opinion does not settle liability with the state.**

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Site. This opinion **does not**:

- Resolve or alter a person's liability to the state.
- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70.105D.040(4).

2. **Opinion does not constitute a determination of substantial equivalence.**

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you performed is substantially equivalent. Courts make that determination. *See* RCW 70.105D.080 and WAC 173-340-545.

3. State is immune from liability.

The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. *See* RCW 70.105D.030(1)(i).

Contact Information

Thank you for choosing to clean up the Site under the Voluntary Cleanup Program (VCP). After you have addressed our concerns, you may request another review of your cleanup. Please do not hesitate to request additional services as your cleanup progresses. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our web site: www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm. If you have any questions about this opinion, please contact me by phone at (360) 407-7404 or e-mail at erad461@ecy.wa.gov.

Sincerely,

Eugene Radcliff

Eugene Radcliff, L.G.
Site Manager
SWRO Toxics Cleanup Program

GER/ksc:Johns Auto Wrecking Site FA

Enclosures (4): A – Description and Diagrams of the Site
Figure 1 Vicinity Map
Figure 2 Aerial Photo and Identified Areas of Concern
Figure 3 Test Pits and Boring Locations Photo
Figure 2 Monitoring Well and Previous Test Pit and Boring Location Map
Letter Department of Ecology Opinion Letter

By certified mail: (7010 1670 0002 4158 8967)

cc: Mr. Richard A. Bieber, Robinson Noble Saltbush, Inc.
Mr. Patrick Soderberg, Thurston County Environmental Health Division
Scott Rose – Ecology
Dolores Mitchell – Ecology (without enclosures)

Enclosure A

Description and Diagrams of the Site

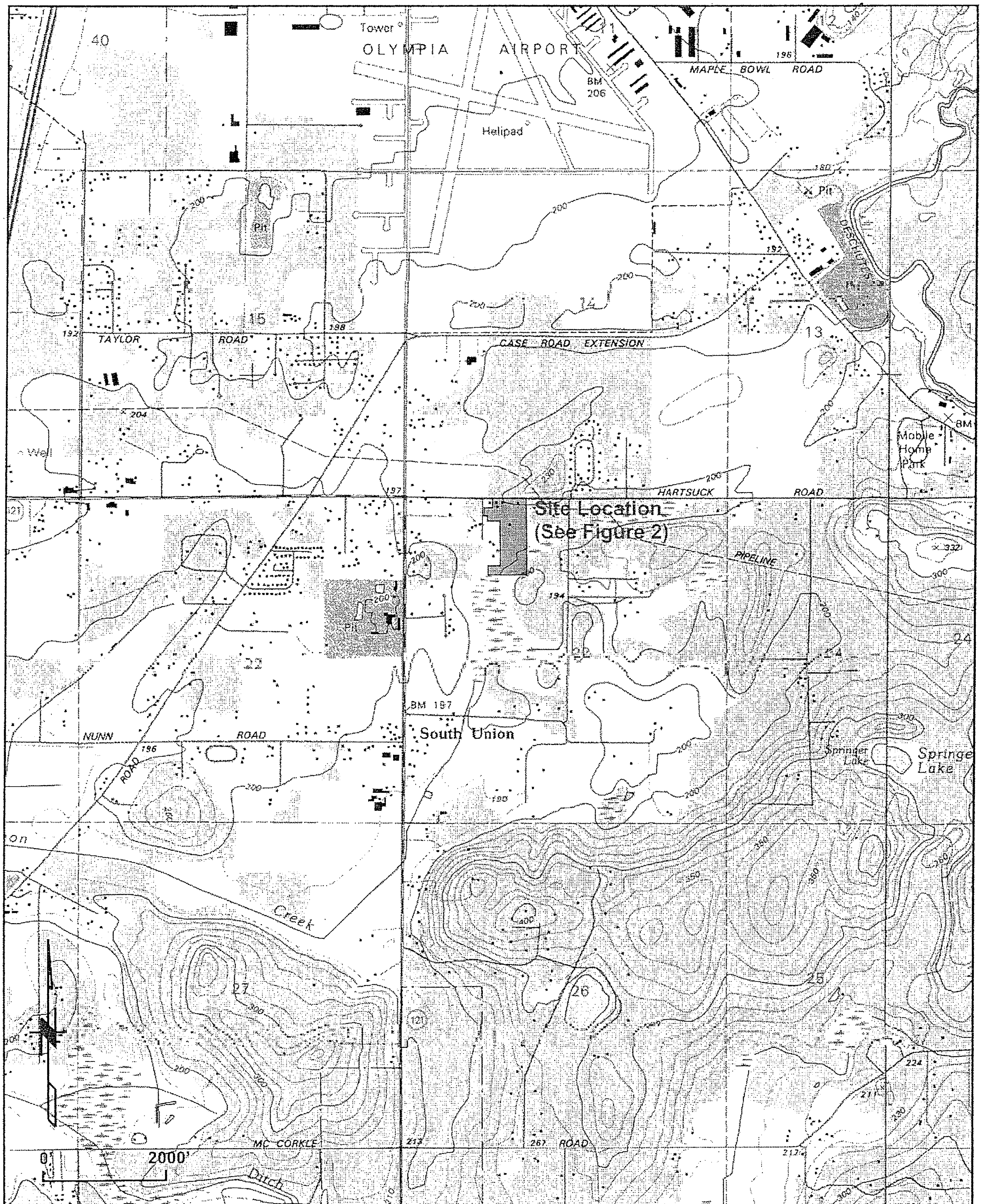
Site Description

Media of Concern: Soil and Groundwater

The John's Auto Wrecking (Site) is located at 411 93rd Avenue Southeast, Olympia, Thurston County, Washington (see Figure 1). The Site has been zoned for light industrial purposes and was as an auto salvage yard for approximately 22 years. The parcel on which the facility is located encompasses approximately 16 acres. The northern most area of the property contains five buildings used in the various salvage operations. In the middle portion of the Site, there was a large accumulation of tires taken from the salvage vehicles and a pond just to the southeast of the tires. Various other salvage operation areas were inadequately defined and scattered about the Site. A stream runs roughly east to west across the southern portion of the Site. The Site is bordered on the north by 93rd Avenue Southeast, on the east by undeveloped residential and light industrial properties, on the south by undeveloped residential properties, and on the West by residential and undeveloped light industrial properties. The Thurston County Assessor's office notes the John's Auto Wrecking Site has assigned tax parcel numbers of 12723210100, 12723210200, 12723210400, 12723210401, 12723210700, and 12723210000.

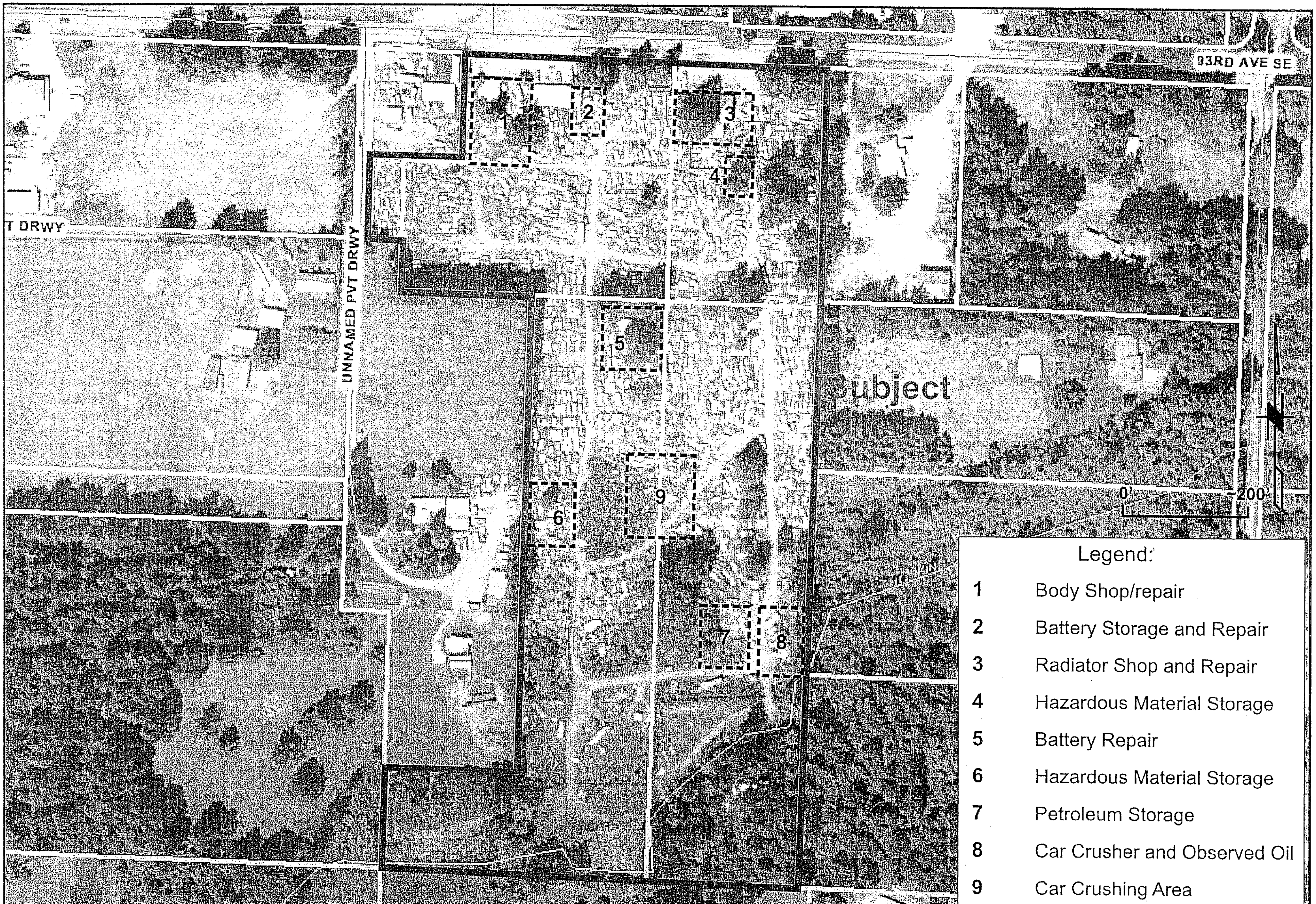
The Site lies in a glacial outwash plain about 0.5 miles southeast of the Olympia Regional Airport. The Site is located in the Upper Chehalis Watershed and is in the Salmon Creek sub-watershed. The Site soils are described as Nisqually loam soil that is typified by 0-3 percent slopes. The groundwater is reported to be less than 10 feet below ground surface and the Site is located in an identified high groundwater hazard area that is prone to flooding. Contaminated surface soil located at the above areas of concern has the potential to impact shallow groundwater beneath the Site.

The Site is currently not in use but still has some potential contamination sources present in the salvage yard. Previous investigations, that have been very limited in scope, have found petroleum contamination in the soil that exceeds the state cleanup standard and those areas of soil contamination have been reported to have been removed. Potential sources of contamination are easily observed when walking about the Site and those areas have not been reported as being subject to any environmental investigation. The eastern and southern boundary areas of the Site have not been adequately investigated to determine if contamination has left the salvage yard parcels.



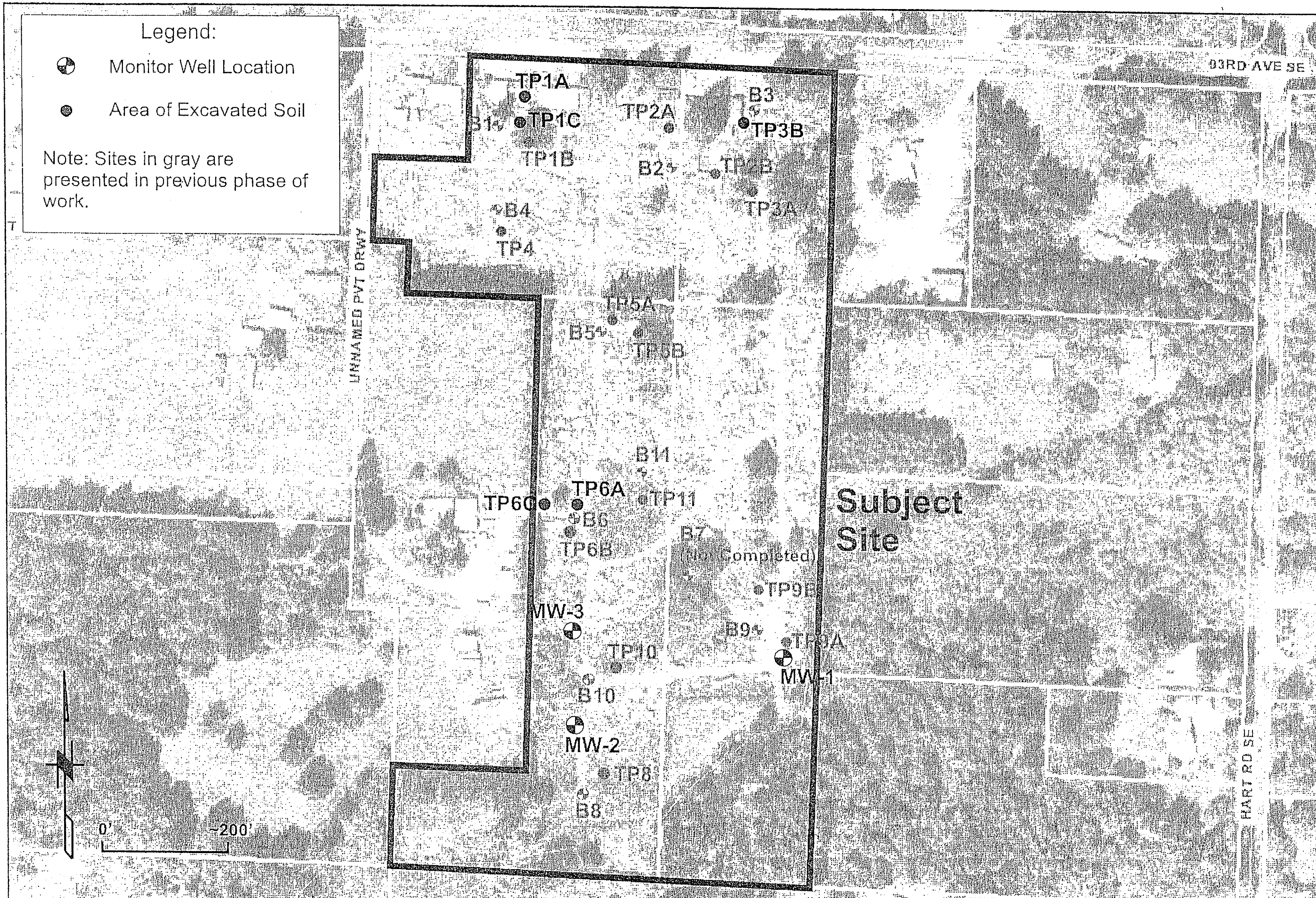
ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Basemap taken from USGS Maytown Quad.	PM: RAB April 2009	Thurston County 2491-001B	T 17 N/R 02 W - 23 Scale 1 " = 2000'	Figure 1 Vicinity Map

Havens Property: 93rd Ave SE, Oly/Site Characterization



ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Image taken from Thurston County GIS Website	PM: RAB April 2009 2491-001B	Thurston County T 17 N/R 02 W - 23 Scale 1" = ~200'	Figure 2 Aerial Photo and Identified Areas of Concern Havens Property: 93rd Ave SE, Oly/Site Characterization

ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Image taken from Thurston County GIS Website	PM: RAB April 2009 2491-001B	Thurston County T 17 N/R 02 W - 23 Scale 1" = ~200'	Figure 3 Test Pits and Boring Locations Photo Havens Property: 93rd Ave SE, Oly/Site Characterization



ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Image taken from Thurston County GIS Website	PM: RAB December 2009 2491-001C	Thurston County T 17 N/R 02 W - 23 Scale 1" = ~200'	Figure 2 Monitor Well and Previous Test Pit and Boring Location Map Havens Property: 93rd Ave SE, Olympia/Site Remediation

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

CERTIFIED MAIL

February 23, 2006

Mr. John Havens
8118 Spurgeon Creek Road
Olympia, WA 98513

Re: Opinion pursuant to WAC 173-340-515(5) on Proposed Remedial Action for the following Hazardous Waste Site:

- Name: John's Auto Wrecking
- Address: 411 93rd Avenue SE, Olympia, WA
- Facility/Site No.: 57665495
- VCP No.: SWO652

Dear Mr. Havens:

Thank you for submitting documents regarding your proposed remedial action for John's Auto Wrecking (Site) for review by the Washington State Department of Ecology (Ecology) under the Voluntary Cleanup Program (VCP). Ecology appreciates your initiative in pursuing this administrative option for cleaning up hazardous waste sites under the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

This letter constitutes an advisory opinion regarding whether your proposed remedial action is likely to be sufficient to meet the specific substantive requirements of MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the following release(s) at the Site:

- Petroleum Hydrocarbons in Soil
- Volatile Organic Compounds in Soil
- Glycol in Soil
- Polychlorinated Biphenyls in Soil
- Metals in Soil
- Petroleum Hydrocarbons in Groundwater
- Volatile Organic Compounds in Groundwater
- Glycol in Groundwater
- Metals in Groundwater

regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the following release(s) at the Site:

- Petroleum Hydrocarbons in Soil
- Volatile Organic Compounds in Soil
- Glycol in Soil
- Polychlorinated Biphenyls in Soil
- Metals in Soil
- Petroleum Hydrocarbons in Groundwater
- Volatile Organic Compounds in Groundwater
- Glycol in Groundwater
- Metals in Groundwater

Ecology requires determination of the lateral and vertical extent of contaminants in soil and groundwater in excess of the MTCA Cleanup Level. The Site Characterization Work Plan lacks adequate detail to achieve this requirement. Please submit a revised plan that also addresses the following comments:

a) The locations and number of samples are not sufficient to characterize the above 11 Areas of Concern (AOC). Constituents of concern (COCs) should be developed for each AOC and a summary table prepared that details the AOC, sample number, COCs, analyses methods selected for each sample, sample depths, sample collection method (e.g. hand auger, direct-push, etc.).

b) Soil samples should be collected using a grid system within each AOC. The density of the grid spacing should be appropriate to adequately characterize each of the AOCs. It is recognized that different grid spacing will probably be appropriate (e.g. crusher areas will require a denser grid than AOC-11 – car storage area).

c) Additional detail describing sample depths and the rationale for the depths chosen is necessary.

d) Soil sample, groundwater sample, and monitoring well locations should be shown on a map of the site. Sample locations within buildings should also be shown on detail maps.

e) Boring logs should be prepared for all borings (including hand auger borings).

Ecology is providing this advisory opinion under the specific authority of RCW 70.105D.030(1)(i) and WAC 173-340-515(5).

This opinion does not resolve a person's liability to the state under MTCA or protect a person from contribution claims by third parties for matters addressed by the opinion. The state does not have the authority to settle with any person potentially liable under MTCA except in accordance with RCW 70.105D.040(4). The opinion is advisory only and not binding on Ecology.

Ecology's Toxics Cleanup Program has reviewed the following information regarding your proposed remedial action(s):

1. June 15, 2005, Associated Environmental Group, LLC. Site Characterization Work Plan, John's Auto Wrecking, 437 93rd Avenue SE, Olympia, Washington.

The reports listed above will be kept in the Central Files of the Southwest Regional Office of Ecology (SWRO) for review by appointment only. Appointments can be made by calling the SWRO resource contact, Leslie Koziara, at (360) 407-6365.

The Site is defined by the extent of contamination caused by the following release(s):

- Petroleum Hydrocarbons in Soil
- Volatile Organic Compounds in Soil
- Glycol in Soil
- Polychlorinated Biphenyls in Soil
- Metals in Soil
- Petroleum Hydrocarbons in Groundwater
- Volatile Organic Compounds in Groundwater
- Glycol in Groundwater
- Metals in Groundwater

The Site is more particularly described in Enclosure A to this letter which includes a detailed Site diagram. The description of the Site is based solely on the information contained in the referenced documents.

Based on a review of your proposed remedial action and supporting documentation listed above, **Ecology has determined that the proposed remedial action <u>is not</u> likely to be sufficient to meet the specific substantive requirements contained in MTCA and its implementing** opinion under the VCP. **This letter also does not provide an opinion regarding the sufficiency of any other remedial action proposed for or conducted at the Site.**

Please note that this opinion is based solely on the information contained in the documents listed above. Therefore, if any of the information contained in those documents is materially false or misleading, then this opinion will automatically be rendered null and void.

The state, Ecology, and its officers and employees make no guarantees or assurances by providing this opinion, and no cause of action against the state, Ecology, its officers or employees may arise from any act or omission in providing this opinion.

Again, Ecology appreciates your initiative in conducting independent remedial action and requesting technical consultation under the VCP. As the cleanup of the Site progresses, you may request additional consultative services under the VCP, including assistance in identifying applicable regulatory requirements and opinions regarding whether remedial actions proposed for or conducted at the Site meet those requirements.

If you have any questions regarding this opinion, please contact me at (360) 407-6247 or via e-mail at stee461@ecy.wa.gov.

Sincerely,

SSTeel

Steve Teel, LHG
Hydrogeologist
Toxics Cleanup Program
Southwest Regional Office

ST/ksc:SW0652 Opinion on Proposed RA

Enclosures:

Cc: Michael S. Chun, General Manager/Principal, Associated Environmental Group LLC
Patrick Soderberg, Thurston County Health Department, Environmental Health Division
Gerald Tousley, Thurston County Health Department, Environmental Health Division
Chuck Cline – Ecology
Robert Warren – Ecology
Trish Akana – Ecology (SW0652)

f) It is recommended that soil samples for volatile organic compound analyses be collected and prepared using EPA Method 5035A.

g) Detail needs to be added discussing how wash/decontamination water will be disposed of.

h) Additional detail needs to be provided on how hand auger samples will be collected and transferred from the auger to the sample container.

i) How will permanent monitoring wells be surveyed? How many monitoring wells will be installed? What is the rationale for determining the location and number of monitoring wells?

j) The sampling plan only lists benzene, toluene, ethylbenzene, and total xylenes (BTEX), naphthalene and methyl tertiary butyl ether (MTBE) as constituents analyzed by EPA Method 8260. Because the site was used for car repairs, which could have utilized solvents, it will be necessary to include the full VOC constituent list in the sampling plan, particularly for the car repair and crusher areas. Glycol compounds need to also be added to the constituent list at any location suspected to contain radiator or brake fluids.

k) Metals analyses should include lead, arsenic, cadmium, chromium, mercury, nickel, zinc, and copper. Mercury was widely used in automobile convenience lighting switches from the early 1970s to 2002.

l) The site address in the title is incorrect and should be changed to "411" from "437".

In accordance with WAC 173-340-840(5) and Ecology Toxics Cleanup Program Policy 840 (Data Submittal Requirements), data generated for Independent Remedial Actions shall be submitted in both a written and electronic format. Additional information regarding electronic format requirements, see the website http://www.ecy.wa.gov/eim. All laboratory analyses shall be performed by the State of Washington Certified Laboratory for each analytical method used.

This opinion does not represent a determination by Ecology that the proposed remedial action will be sufficient to characterize and address the specified contamination at the Site or that no further remedial action will be required at the Site upon completion of the proposed remedial action. To obtain either of these opinions, you must submit an independent remedial action report to Ecology upon completion of the remedial action and request such an

ENCLOSURE A

The 15-acre site is located south of Tumwater and has been used as a wrecking yard supporting towing operations and related businesses for about 24 years. Site buildings/areas include a body/repair shop, possible battery storage area, former radiator shop, hazardous materials storage area, battery refurbishing shed, car crusher areas, and the car storage yard. A ditch (Hopkins Ditch) and a wetland are located in the southern portion of the property.

An inspection of the facility by Thurston County Environmental Health Division (TCEHD) in October 2001 concluded that the facility was out of compliance due to improper hazardous waste storage and improper disposal of solid waste. During a follow-up visit by TCEHD in February 2002, junk cars were observed in areas of standing water in the wetlands/ditch area. Drums containing crushing fluids (oil, gasoline, and hydraulic fluids) were also overflowing (from rain water) and discharging to the ground. A Site Hazard Assessment (SHA) was completed for the site and the ranking was determined to be a 1.

The following environmental concerns are present at the site:

Soil Contamination from Junkyard Past Practices: Limited June 2002 soil sampling results from a gasoline spill area showed gasoline and total xylenes concentrations above the MTCA Method A Cleanup Level for Unrestricted Uses. Based on observations from TCEHD staff and Ecology's review, 11 areas of concern are identified at the site: 1) body shop/repair area; 2) potential battery storage area; 3) old radiator shop/current repair area; 4) hazardous materials storage area "A"; 5) battery refurbishing/storage shed; 6) hazardous materials storage area "B"; 7) gasoline spill area; 8) former crusher area; 9) recent crusher area; 10) car storage area in the ditch/wetland; and, 11) general car storage area (north of the ditch/wetland).

Groundwater: Contaminated surface soil located at the above areas of concern has the potential to have impacted shallow groundwater beneath the site. Shallow groundwater is estimated to fluctuate seasonally from above the ground surface to less than ten feet below ground surface.

ATTACHMENTS (from consultant report)
"Proposed Work" Figure

[illegible]

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[illegible]

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ROBINSON
NOBLE

HAVENS PROPERTY
(aka) JOHNS AUTO WRECKING SITE
411 93RD AVENUE SE, OLYMPIA, WASHINGTON
DRAFT WORK PLAN
FOR SUPPLEMENTAL SITE INVESTIGATION

FEBRUARY 2012

by

Richard A. Bieber, LG
Senior Project Geologist

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HAVENS PROPERTY (aka) JOHNS AUTO WRECKING SITE
411 93RD AVENUE SE, OLYMPIA, WASHINGTON
DRAFT WORK PLAN FOR SUPPLEMENTAL SITE INVESTIGATION
February 2012

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411 93RD AVENUE SE, OLYMPIA, WASHINGTON
DRAFT WORK PLAN FOR SUPPLEMENTAL SITE INVESTIGATION
February 2012

Overview of Site and Purpose of Work Plan

The purpose of this document is to respond to the Washington State Department of Ecology's (Ecology) opinion letter dated August 23, 2011 concerning further cleanup actions at the subject site and also to propose a work plan for satisfying Ecology's requirements for supplemental site investigation and clean up.

The 15-acre subject site, which served as a wrecking yard and supported towing operations for approximately 22 years, was inspected by the Thurston County Environmental Health Division (County) in October 2001. The County identified nine distinct Areas of Concern (AOCs) for the site (Figure 1). A site hazard assessment was completed by the County, and the site was ranked as a "top priority" site. In 2005, the "Johns Auto Wrecking" site was listed in Ecology's Voluntary Cleanup Program (VCP) database as VCP Number SW1127. Figure 1 is a site plan layout showing the AOC and general site features.

The site has been characterized and sampled several times since 2001. To date, the only confirmed contaminant releases are TPH and PCBs in soil and several metals in both soil and groundwater. Other potential contaminants have not been detected in soil or groundwater. Souls previously identified with concentrations of target analytes which exceeded respective cleanup limits have been removed from the site. This work plan will be consistent with MTCA requirements (i.e., WAC 173-340-900 and Table 830-1) required testing for petroleum releases, but in light of the fact that considerable work has already been completed at the site, we are recommending a streamlined, abbreviated approach emphasizing known contaminants and the presence or absence of key "indicator" chemicals of concern. This plan also emphasizes further characterization of only a portion of the nine AOCs cited above.

The following discussion describes what tasks are being proposed for the site including each of the site AOC. Every effort has been made to streamline and combine tasks or AOCs where possible to eliminate unnecessary expenditure of cost or effort.

Task 1: Preconstruction Meeting and Site Clearing Support

Prior to initiation of drilling activities, we advise a project status or pre-construction meeting to include Ecology. It is our recommendation, given the site's history within the VCP program, that we allow time for Ecology to provide comments regarding the plan as proposed. Depending on the input from Ecology, adjustments to the drilling and sampling may need to be addressed. Having a pre-construction meeting will allow a chance for those changes to be discussed, finalized, and incorporated. The goal of this work plan is to set a strong baseline of understanding at the site to provide a clear pathway to regulatory closure.

To facilitate the proposed investigation, it is recommended the site be cleared of most of the standing invasive vegetation (Himalayan blackberry and scotch broom). In addition, it is recommended the remaining miscellaneous debris noted during our recent site visit be removed. It is anticipated that much, if not all, of the identified debris is considered solid waste rather than hazardous waste. As such, these removal activities can be performed by any suitable clearing and hauling company. While this material should be removed from the site, in general, it is not likely a source material. Special care should be taken to remove all debris, including timbers, metal roofing, and fencing, from the intermittent stream and wetland buffer. These materials, if left in place, could contribute to potential degradation of the stream and wetland ecosystems.

Ecology has requested that soil and groundwater samples be collected within the footprint of the main garage area on the northeast corner of the property. Therefore, it is recommended that the remaining structures on site be demolished and removed from the site. The buildings cover a large portion of the property that should be incorporated into the next phase of the investigation. While, in some cases, samples can be collected with the buildings in place, standing buildings will slow work progress and, in some cases, necessitate additional borings to be drilled to assess covered or inaccessible areas. Additionally, the buildings provide access and cover for the illegal dumping of material at the subject site. These illegal dumping activities have contributed several piles of solid waste and abandoned vehicle hulks in the northern portion of the property. It will be necessary, whether or not the buildings are removed, to better secure the site to prevent additional illegal dumping.

Task 2: Site Characterization

General Field Procedures

Field work described in this work plan should be completed in multiple phases or "tiers" to allow for a review of collected analytical data, thus allowing for more streamlined data collection for the remainder of the investigation. Given the nature of the sediments previously observed at the site, we plan to use a direct-push drilling rig for the advancement of soil borings, setting of temporary screens, and where proposed, the completion of monitoring wells. Given the relatively shallow nature of groundwater in the area, we propose that wells be completed with one- to two-inch PVC pre-packed screens. These screens will allow for proper well development and groundwater sample collection. Well screen diameter and length will be determined in the field depending on observed conditions and the capabilities of the drilling rig at each location. During groundwater sampling, field parameters including conductivity, DO, ORP, and pH will be measured using a field meter.

The direct-push drilling rig will provide a nearly continuous core of material encountered in each well bore. Soil sampling will generally be accomplished by selecting two soil samples from each bore hole. A shallow (near surface) sample above the vadose zone and a deeper sample from the top of the groundwater interface will be collected at each boring. Additional soil samples will be collected as and where field screening necessitates. Analysis of the samples will, in general, begin with analysis of the shallow sample, and depending on laboratory results, the deeper sample may or may not be analyzed. Again, this general plan will be adjusted where actual field conditions suggest running both is necessary for proper screening.

As a cost-savings measure going forward, we plan to use NWTPH-HCID as a semi-quantitative screening method for the presence or absence of petroleum hydrocarbons (PHCs) on site. This test will be employed prior to the completion and selection of either NWTPH Gx or NWTPH Dx. Depending on the results of the initial screening, additional analysis will or will not be necessary. We also plan to utilize a mobile laboratory for near real-time in-field analysis. Results collected while in the field can be used to refine the drilling and sampling plan should unexpected material be identified. Additionally, considering a majority of the proposed target analytes are petroleum hydrocarbons, there is a laboratory cost savings using a mobile laboratory. Location-specific changes to this general sampling and analysis plan are presented below.

Area of Concern Determinations

In response to Ecology's August 2011 response letter, we have reviewed the project file, including data collected to date, and propose the following series of investigations. Each of the following subtasks are associated with specific areas of concern as previously identified in our initial scope of work developed in 2008. Prior to our joining the investigation team, previous site activities included a site visit and collection of soil samples in 2002. According to Thurston County Health Department (TCHD) documents at that time, a series of four areas of concern were developed by another contractor in collaboration with TCHD personnel. The information presented in a January 27, 2004 TCHD worksheet (identified in Ecology files) suggests these areas were located on the southern half of the property near active car-crushing activities. It was suggested by TCHD that soil samples collected from the vicinity of these AOCs revealed elevated levels of gasoline-range hydrocarbons and gasoline additives. However, no report was ever submitted, and therefore, this work cannot be referenced or reviewed. Personal correspondence with Patrick Soderberg of TCHD identified these areas as AOCs 7 and 8 as shown in Figure 2 (attached).

Additional AOCs 1-6 and 9 (Figure 2) are located based on a review of previous work completed by AEG in 2006, the TCHD worksheet, and personal correspondence with Mr. Soderberg. During our initial site investigation, we adjusted the locations of some of the soil borings and test pits based on field observations and further discussions on site with Mr. Soderberg. For the purposes of this work plan, we will present the rationale for inclusion or removal of each AOC and subsequent target analytes on a case-by-case basis.

Area of Concern 1 – Body Shop/Auto Repair

Our review of available documents suggests this area was utilized for general auto repair and limited body shop activities. During our initial site walk and subsequent source removal activities, we observed numerous five-gallon buckets with lids (used to store waste oil) stacked along a small area between the house and garage (or outbuilding). A small area of soil staining and distressed vegetation was observed near the location of an overturned bucket. Following the removal of these miscellaneous buckets, we completed a test pit (TP1A) in the area of observed soil staining. At that time, site logistics and overhead utilities prevented us from mobilizing the drill rig to this location for the collection of a water sample. A soil boring (B1) was advanced to the southeast of the observed soil staining on the opposite side of the outbuilding in an area of distressed vegetation. A second test pit was completed in the vicinity of AOC 1 at TP1B in an apparent burn pile area.

From these three sampling locations, four soil samples and one groundwater sample were analyzed for volatile organics, gasoline- and diesel-range hydrocarbons, and metals (arsenic, mercury, cadmium, chromium, lead, nickel, copper and zinc). Only the surface sample collected from TP1A indicated any target analytes above MTCA Method A cleanup limits. Oil was measured in the TP1A surface of 66,700 mg/kg, which is well above MTCA guidelines. A sample collected at the same location at a depth of one foot indicated an oil concentration of 140 mg/kg, which is below the respective MTCA cleanup limit. A second mobilization to the site was scheduled to remove the indentified impacted soils from the TP1A area. During this field effort, a second area of stained soil was identified on the south side of the outbuilding and subsequently removed. Two confirmation samples were collected from the base of each excavation area. Laboratory results indicated that impacted soils had been successfully removed.

In their opinion letter, Ecology suggested additional investigation in this area. Specifically, they have requested that a monitoring well be completed at the TP-1A area. We have proposed that at least three additional soil borings be advanced in the area mapped as AOC 1. Two borings will be completed at the locations of the minor soil excavations. These borings will be advanced to groundwater. Two soil and a single groundwater sample will be collected at each location. The groundwater sample will be collected through a temporary screen set in one of the boreholes. A third boring is proposed for the area within the adjacent garage where concrete staining was observed. Depending on the status of the building at the time of the investigation, this boring may or may not be advanced. Target analytes at this location will be limited to volatile organics (due to potential body work completed at this location), gasoline- and diesel-range petroleum hydrocarbons, and BTEX (from vehicle repair). Should diesel-range petroleum hydrocarbons be identified, we will submit the sample for cPAH analysis, a commonly occurring toxic by-product of petroleum combustion. Should any groundwater impacts be observed, a monitoring well will be recommended at that specific location.

Area of Concern 2 – Battery Storage

Area of Concern 2 has been previously identified as a potential battery storage area. The first reference to this area as being utilized for battery storage is a copy of a faxed document dated December 5, 2005 between Patrick Soderberg (TCHD) and Mike Blum (Ecology). The fax appears to be a series of notations made by Mr. Soderberg to Mr. Blum regarding the proposed AOCs and suspected site uses. This specific AOC is listed as "*Battery Storage?*". Discussions with Mr. Soderberg during our initial site walk did not specifically locate the battery storage area. Therefore, during our initial site investigation, TP2A and B2 were completed near observed distressed vegetation and areas where visual observations suggested a former structure may have stood.

Ecology suggests this area has not been fully characterized. Additionally, they request a groundwater monitoring well be advanced at AOC 2. A further review of historic aerial photos suggests that much of the area identified as AOC 2, as previously described, was covered in cars except for a tree-covered portion along the northern boundary of the AOC. Limiting the AOC to this area reduces its overall size. Therefore, we propose a soil boring be advanced in this tree-covered area, extending to groundwater and two hand augers be advanced to three feet. Two soil samples will be collected at each location with field screening for pH conducted in the field. We propose completing the boring as a two-inch, PVC, pre-packed groundwater monitoring well. Following well development, a groundwater sample will be collected. Target analytes for AOC 2 are limited to a standard suite of metals common to wrecking yard activities (lead, arsenic, cadmium, chromium, mercury, zinc, copper, and nickel) and pH. This well will also provide a greater level of detail for subsequent groundwater flow discussions.

Area of Concern 3 – Radiator Shop/Auto Repair

AOC 3 was previously identified as an "old" radiator shop and auto repair area. During our research, it was determined that this location, and its associated garage structure, was the entry point for many of the cars to the wrecking yard. The area was also used for miscellaneous vehicle repair. Our initial investigation identified areas of suspected petroleum staining on the gravel area east of the associated garage. A surface sample (TP3 surf B) collected from the stained area revealed an oil concentration of 500 mg/kg, below the MTCA cleanup level of 2,000 mg/kg. Lead was detected in this sample at a concentration of 230 mg/kg. The MTCA cleanup levels for lead in soil are 250 mg/kg. Minor detections of zinc, copper, and nickel were also detected. A groundwater sample was collected from a temporary screen set in boring B3 at the location of TP 3B. Analytical results yielded no evidence of the target analytes above laboratory detection limits. Soil samples were analyzed for gasoline- and diesel-range hydrocarbons, metals, and volatile organics. In addition to the list above, the groundwater sample was analyzed for glycols.

Following our initial investigation, a separate field effort was conducted to remove the observed stained soils (even where identified concentrations did not exceed cleanup limits). During this second mobilization, shallow-stained soils were removed from AOC 3. Additionally, two trenches were completed along the edge of the western and southern edges of the concrete floor, beneath the garage structure. Field screening completed during the trench excavation did not identify any stained soils or petroleum odors associated with a potential release. During these excavations, a representative of TCHD was on site to observe the underlying site conditions. We did not collect a soil sample at this location due to an absence of field screening or other evidence of a suspected release to the observed soils.

Ecology requested additional soil samples be collected in response to observed stained concrete in the garage. Ecology requested at least one (preferably more) soil samples be collected beneath the concrete slab. Additionally, Ecology requests a monitoring well be completed at this location.

At this time, we recommend a series of three additional soil borings be advanced: the first to be advanced on the south side of the concrete floor, the second on the west side, and the third directly through the center of the floor. Depending on the status of the structure, this may not be possible until the building is demolished or stabilized. Two soil samples will be collected from each boring. Groundwater samples will be collected from each boring through temporary screens. Soil samples will be analyzed for gasoline- and diesel-range hydrocarbons, metals, and volatile organics. Groundwater samples will be analyzed for gasoline- and diesel-range hydrocarbons, metals, volatile organics, and glycols. Should diesel-range petroleum hydrocarbons be identified, we will submit the sample for cPAH analysis. A well will be recommended if any of the target analytes are found to exceed MTCA Method A cleanup limits in groundwater.

Area of Concern 4 – Hazardous Waste Storage

Area of Concern 4 formerly contained a small shed used to store hazardous materials. Information provided by Mr. Soderberg estimated the actual area covered by the shed was approximately 96 square feet (shed footprint 8 by 12 feet). Test pit TP3A was completed within the footprint of the former shed. Two soil samples were collected at this location at one and four-feet below ground surface. The soil samples were analyzed for gasoline- and diesel-range hydrocarbons, metals, and volatile organics. The only observed concentration which exceeded the laboratory detection limit was for nickel at 20 mg/kg. Considering the size of this AOC and the testing already completed, we do not recommend additional investigation at this location.

Area of Concern 5 – Battery Storage Shed

Area of Concern 5 is similar in area to AOC4 with a majority of the potential source material located within a small wooden shed or outbuilding. We conducted two test pits and a soil boring at this location. One test pit was completed on the back side of the shed near two large industrial lead acid batteries. The second was completed beneath the shed itself (the shed was accessible through one open side). The soil samples were analyzed for gasoline- and diesel-range hydrocarbons, metals, volatile organics, and PCBs. None of the analyzed samples were found to contain levels of target analytes above the respective cleanup limits. A surface soil sample collected at TP 5B was found to contain oil at a concentration of 340 mg/kg, below the applicable MTCA cleanup level. The sample was also analyzed for PCBs and results were below laboratory detection limits. The laboratory results from the groundwater sample collected from boring B5 did not contain any target analytes above applicable cleanup limits. Detections of lead and copper were found in the water at concentrations of 11 and 20 μg/L, respectively.

Ecology requests a monitoring well be placed at this location. However, considering the actual size of the potential source area and the results from the previous investigation, we do not consider the addition of a monitoring well at this location to be necessary. We propose that a single boring be advanced to groundwater on the east side of the existing shed for the collection of single soil and groundwater samples. The groundwater sample will be collected through a temporary screen. The soil and groundwater samples will be analyzed for diesel-range petroleum hydrocarbons, PCBs, and lead. Should diesel-range petroleum hydrocarbons be identified, we will submit the sample for cPAH analysis. As with AOC 2, we propose to collect soil pH values in the field during the drilling observations and field screening. If field screening suggests the presence of any target compounds or if laboratory results from an onsite mobile laboratory indicate the presence of target compounds the boring will be completed at a monitoring well. If field conditions and mobile laboratory results are not available and impacts are identified at this location a second mobilization and installation of a monitoring well may be necessary.

Area of Concern 6 – Hazardous Material Storage (Bunker)

Area of Concern 6 formerly contained what appears to be a former covered outbuilding that was used to store hazardous materials. The concrete building foundations are all that remain at the location. During our investigation, we completed two test pits and borings on the east side of the concrete slab. The northern, southern, and western foundation walls were intact with the eastern side missing, presumably to allow access. Sampling was conducted on the east side, assuming any runoff would have infiltrated the ground at this location. Soil sampling completed at test pit TP6A detected both oil and PCBs at concentrations of 61,900 and 0.9 mg/kg, respectively. A deeper sample collected at four feet from this same test pit did not detect oil at concentrations exceeding the laboratory detection limits. Soil samples were analyzed for gasoline- and diesel-range hydrocarbons, metals, volatile organics, and PCBs. A groundwater sample was collected from boring B6 completed adjacent to TP6A. The groundwater results did not indicate any target analytes above laboratory detection limits. Groundwater samples were analyzed for gasoline- and diesel-range hydrocarbons, metals, and volatile organics. The groundwater sample was not analyzed for PCBs.

A second mobilization was completed to remove identified soil hot spots. While soil was being removed from test pit TP6A, a small sump was found in the floor of the concrete bunker. The sump contained a 55-gallon drum cut down to approximately three-quarters size. The drum was used presumably to collect runoff from the concrete slab. Using a backhoe, the excavation contractor removed the drum and approximately one and a half feet of stained "suspect" soil for disposal. Once field screening indicated the suspect impacted material had been removed, a confirmation soil sample was collected from both the sump area (TP6C) and the TP6A locations. The soil sample from TP6A was analyzed for diesel-range petroleum hydrocarbons, PCBs, and cPAHs. There were no detections from the TP6A confirmation sample. The soil sample from the sump area was analyzed for gasoline- and diesel-range hydrocarbons, metals, cPAHs, PCBs, and volatile organics. The only target analytes detected above laboratory detection limits were copper and zinc, both well below applicable cleanup levels.

Ecology contends the soil boring completed at B6 is not at the same location as the material identified in TP6A. The boring was not completed in the excavation footprint of TP6A, but was completed between TP6A and TP6B which were 15 feet apart. We contend that the boring was as close as field conditions would allow. We do, however, propose that an additional groundwater sample be collected from the "sump" location at TP6C. We propose to field screen the observed soils and collect a groundwater sample from a temporary screen. The groundwater sample will be analyzed for gasoline- and diesel-range hydrocarbons, metals, PCBs, and volatile organics. Should diesel-range petroleum hydrocarbons be identified, we will submit the sample for cPAH analysis.

Area of Concern 7 and 8 – Petroleum Storage and Car Crushing

AOCs 7 and 8 were initially identified as areas with ongoing car-crushing activities and observed oil staining. Information provided by TCHD suggests soil sampling completed in the area identified that a release of petroleum hydrocarbons had occurred somewhere in the vicinity of AOCs 7 and 8. Our sampling in this area was limited to areas identified as potential locations for the car-crushing equipment areas where we observed distressed vegetation. Our initial investigation of the area identified potential metals contamination, and ultimately, a monitoring well was completed at the location of AOC 8. The well was installed and designed to assess metals contamination, as no other target analytes were identified at this location.

Ecology requests that additional soil and groundwater samples be collected from both AOC 7 and AOC 8. Considering the size of the AOCs as drawn, we concur. We propose that a series of three soil borings be completed as drawn on Figure 1. Two soil samples and a groundwater sample will be collected from each location. In addition to the three proposed borings, we propose that a series of four additional near-surface soil samples be collected using a hand auger. The depth of hand-auger drilling will be approximately three feet. Should the hand-auger samples from a particular location reveal target compounds exceeding applicable MTCA cleanup limits, a soil boring and or monitoring well will be completed at that location. Target compounds for these AOCs are gasoline- and diesel-range hydrocarbons and metals for both soil and groundwater. Should diesel-range petroleum hydrocarbons be identified, we will submit the sample for cPAH analysis.

Area of Concern 9 – Car Crushing

Area of Concern 9 was originally thought to be a site used for car-crushing activities. During our initial site walk, we thought evidence of these activities was readily observable. Our investigation was limited to one test pit and one soil boring at this location. Now additional information provided by TCHD records and Ecology files suggests that car-crushing activities may not have actually taken place at this location, but actually occurred further to the southwest. We have, therefore, adjusted the AOC to reflect this new information. Since there is still anecdotal evidence of car crushing at the original AOC 9 location, we have kept this site in the AOC. The AOC now contains two separate areas, which have been designated AOC 9A and AOC 9B.

Ecology requests that additional soil and groundwater samples be collected from this AOC. Considering the new size of AOC9 (A and B), and the numerous possible locations for the car crusher, we concur. We propose a series of four soil borings be completed as drawn on Figure 1, with at least one of the borings from AOC 9A being completed as a monitoring well. Two soil samples and a groundwater sample will be collected from each location. In addition to the four proposed borings, we propose that a series of four additional near-surface soil samples be collected using a hand auger. Should the hand-auger samples from a particular location reveal target compounds exceeding applicable cleanup limits, a soil boring or monitoring well will be completed at that location. Target compounds for this AOC are gasoline- and diesel-range hydrocarbons and metals for both soil and groundwater. Should diesel-range petroleum hydrocarbons be identified, we will submit the sample for cPAH analysis. The monitoring well will provide an additional monitoring point for the site-specific TEE investigation discussed below.

Terrestrial Ecological Evaluation – Data Considerations

MTCA requires that a Terrestrial Ecological Evaluation (TEE) be conducted at the site to evaluate the potential for contaminant exposure and risk associated with terrestrial wildlife and avian (bird) receptors. Based on our understanding of the site, we believe that a site-specific TEE will be required to satisfy Ecology's requirements due to the fact that each of the 9 AOCs are independent, and some of these areas represent a higher potential for toxicity or risk than others. The supplemental data collection proposed in this work plan has focused on the types of environmental data we will need to complete a site-specific TEE. We will address the AOCs discussed in this work plan with more emphasis on areas of specific concern to ecological receptors. The southernmost portion of the property supports higher quality habitat, including a mapped intermittent stream, a small pond, a wetland area and associated wetland buffer, and a wooded area. Other portions of the site also support some high-quality ecological habitat.

The site-specific TEE will emphasize potential ecological exposure pathways occurring in the upper few inches of stream/wetland sediment and terrestrial soils. Thus we recommend that four stream and four wetland sediment samples (total of eight) be collected in the southern portion of the site using a hand-held (Ponar or Ekman) dredge which will sample the upper six inches or so of sediments. Specific locations will be shown on sampling maps in the final work plan. The streams and wetland area is the site of greatest potential ecological concern.

Regarding chemicals of concern, we recommend that long-lived persistent contaminants such as PAHs, TPH, and metals be emphasized rather than less persistent chemicals (e.g., VOCs or glycols), which are less likely to cause exposure and potential hazard to receptors.

When key indicator chemicals are found on site, we will characterize the specific areas where they are found in a more detailed manner to understand nature and extent of contamination and the potential for ecological exposures to occur. Findings and conclusions from the site-specific TEE will be valuable in identifying whether any further investigation or follow up will be required, or whether the site had been adequately characterized and/or remediated.

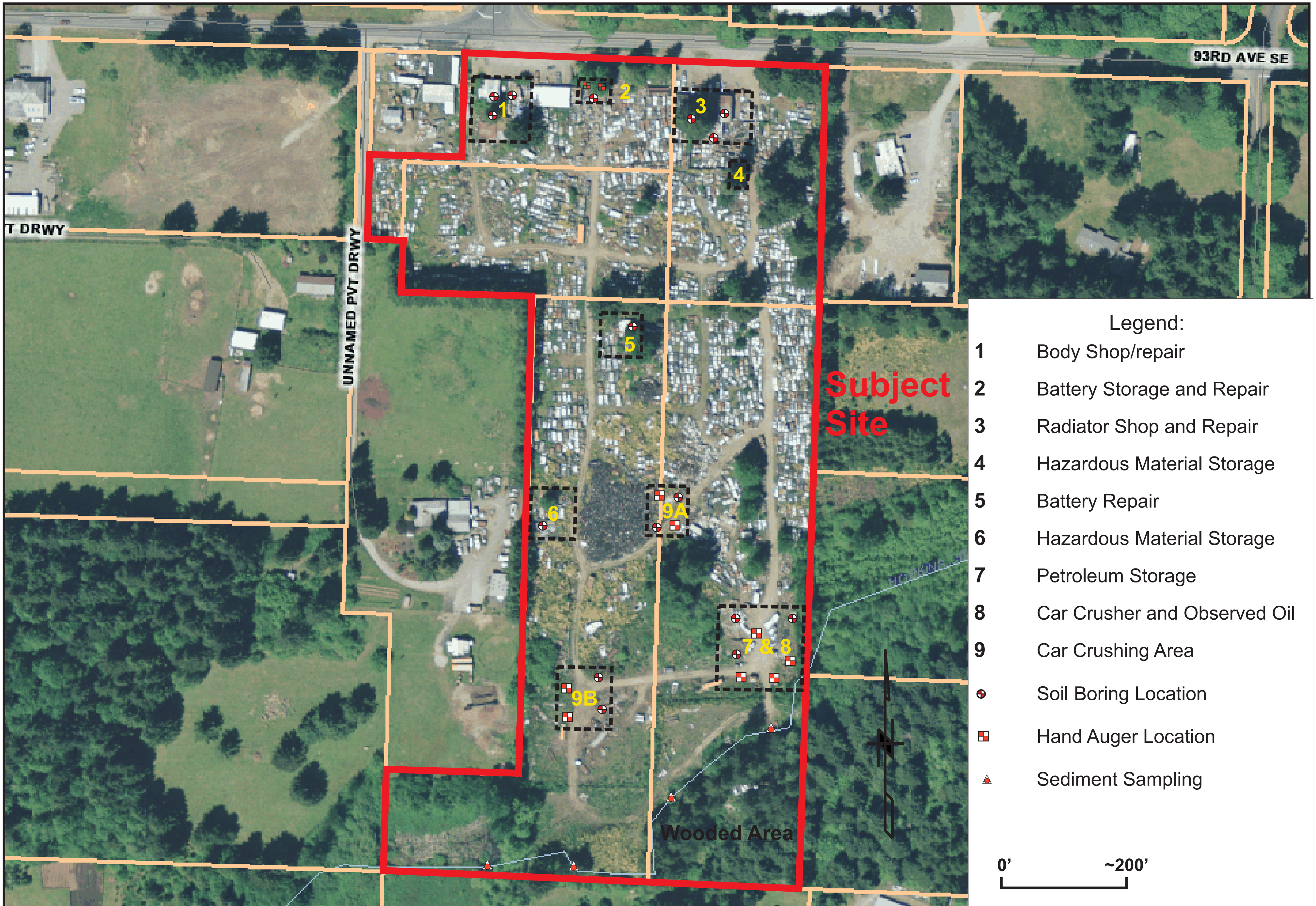
Task 3: Meeting and Report

Upon completion of the site characterization, we recommend a project status meeting (potentially including Ecology) for the purpose of presenting our findings and recommendations toward a path forward. Following this meeting, we will provide a technical report detailing findings and conclusions from the data collected (as specified in this work plan) and planned future work (if necessary).

Task 4: VCP Support and EIM Submission

Following the completion of each round of data gathering, we will provide guidance for data submissions within VCP including uploading all collected data to Ecology's Electronic Information Management system (EIM). As part of VCP, Ecology requires that all data collected on site be submitted via their EIM portal prior to issuance of any closure determination. It is our recommendation to enter all data into EIM as it is collected, from this point forward. This will help prevent any lengthy delays or fees.

> *The statements, conclusions, and recommendations provided in this report are to be exclusively used within the context of this document. They are based upon generally accepted hydrogeologic and environmental practices and are the result of analysis by Robinson Noble, Inc. staff. This report, and any attachments to it, is for the exclusive use of the Havens Estate. Unless specifically stated in the document, no warranty, expressed or implied, is made.*



ROBINSON NOBLE

Note: Image taken from Thurston County GIS Website

PM: RAB
Feburary 2012
2491-001D

Thurston County
T 17 N/R 02 W - 23
Scale 1" = ~200'

Figure 1
Areas of Concern and Proposed Drilling Locations
Havens Property: 93rd Ave SE, Olympia/Site Characterization

From: Radcliff, Eugene (ECY) [mailto:erad461@ECY.WA.GOV]
Sent: Thursday, June 28, 2012 4:15 PM
To: John F. Hildenbrand
Cc: Rose, Scott (ECY)
Subject: Havens Property Work Plan for Supplemental Investigation - SW1127

John:

Thank you for submitting the *Havens Property (aka) Johns Auto Wrecking Site Draft Work Plan* (Plan) dated February 2012 for Ecology review.

I have finished my review of the Plan and as per our telephone conversation, here are my comments. In general, I think the Plan will address most of Ecology's concerns outlined in the August 23, 2011 Further Action Opinion Letter. Here are my comments for the Plan:

- Task 1 – Accepted without comment.
- Task 2 – Accepted with the following comments:

- AOC 4 – Ecology accepts the Robinson Noble, Inc. recommendation to not further characterize this area *unles s* new information from downgradient locations would suggest potential groundwater concerns from that area. It should be noted that this area is in a recognized *High Ground Water Hazard* area.
- AOC 5 – Ecology would recommend the proposed soil/groundwater sample be collected from a downgradient location at the Battery Storage Shed.
- TEE – accepted when characterization of pond (see attached photo) between AOC 9A and AOCs 7 and 8 is considered for evaluation.

- Task 3 – Ecology would welcome the opportunity to provide Ecology's perspective (and comments as needed) for any future planning session concerning additional remedial work need at the Site.
- Task 4 – Accepted without comment.

If you have any questions or comments, please contact me.

Sincerely,

Eugene Radcliff, L.G.
Toxic Cleanup Program-Voluntary Cleanup Program
Washington Department of Ecology
(360) 407-7404
erad461@ecy.wa.gov

APPENDIX C

Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

April 19, 2013

Max Wills
Robinson Noble
17625 130th Avenue NE, Suite 102
Woodinville, WA 98072

Dear Mr. Wills:

Please find enclosed the analytical data report for the John Havens Estate Project located in Olympia, Washington. Soil and water samples were analyzed for Hydrocarbon Identification by NWTPH-HCID, Volatile Organic Compounds by EPA Method 8260C, Total & Dissolved Metals Arsenic, Cadmium, Chromium, Lead, Zinc and Copper by EPA Method 7010 Series and Mercury by EPA Method 7471, Ethylene & Propylene Glycol by Method GC-FID, Total Nickel by EPA Method SW846 6010B, Dissolved Nickel by EPA Method 200.7, PCB (Polychlorinated Biphenyls) by EPA Method 8082, TCLP Lead by EPA Method SW846 6010B and Polyaromatic Hydrocarbons (PAH) by EPA Method 8270 from February 25 - April 18, 2013.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. All soil samples are reported on a dry weight basis. An invoice for this analytical work has been sent to Alan Wertjes.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Jamie L Deyman

Jamie L. Deyman
President
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

www.LibbyEnvironmental.com

Libby Environmental, Inc.

4139 Libby Road NE
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HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130329-11
Client Project # 2491-001E

Hydrocarbon Identification by NWTPH-HCID for Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)	Diesel (mg/kg)	Mineral Oil (mg/kg)	Heavy Oil (mg/kg)
Method Blank	4/1/13	111	nd	nd	nd	nd
PS1	4/1/13	129	nd	nd	nd	nd
SS2	4/1/13	105	nd	nd	nd	nd
SS3	4/1/13	117	nd	nd	nd	nd
SS4	4/1/13	102	nd	nd	nd	nd
SS5	4/1/13	105	nd	nd	nd	nd
WS6	4/1/13	93	nd	nd	nd	nd
WS7	4/1/13	130	nd	nd	nd	nd
WS8	4/1/13	95	nd	nd	nd	nd
WS8 Dup	4/1/13	121	nd	nd	nd	nd
Practical Quantitation Limit			20	50	100	100

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

Libby Environmental, Inc.

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HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130329-11
Client Project # 2491-001E

Analyses of Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)
Method Blank	4/2/13	nd	nd	nd	nd
PS1	4/2/13	34	nd	nd	nd
SS2	4/2/13	40	nd	nd	nd
SS3	4/2/13	25	nd	nd	nd
SS4	4/2/13	6.2	nd	nd	nd
SS5	4/2/13	22	nd	nd	nd
WS6	4/2/13	1230	nd	9.7	nd
WS7	4/2/13	53	nd	nd	nd
WS8	4/2/13	525	nd	nd	nd
WS8 Dup	4/2/13	443	nd	nd	nd
Practical Quantitation Limit		5.0	1.0	5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

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HAVENS PROJECT
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Libby Project # L130329-11
Client Project # 2491-001E

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	4/2/13	109%	100%	116%	103%
WS8 MS	4/2/13	int	109%	int	111%
WS8 MSD	4/2/13	int	117%	int	117%
Post-Spike	4/2/13	97%	n/a	118%	n/a
RPD	4/2/13	int	7%	int	5%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RECOVERY LIMITS FOR POST-DIGESTION SPIKES: 80%-120%
ACCEPTABLE RESULT FOR 1/5 DILUTION: 90%-110% of expected value
ACCEPTABLE RPD IS 20%
"int" indicates an interference which requires the additional QC samples of a post-digestion spike and a 1/5 dilution

ANALYSES PERFORMED BY: Sherry Chilcutt

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HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130329-11
Client Project # 2491-001E

Analyses of Mercury in Soil by EPA Method 7471

Sample Number	Date Analyzed	Mercury (mg/kg)
Method Blank	4/2/13	nd
PS1	4/2/13	nd
SS2	4/2/13	nd
SS3	4/2/13	nd
SS4	4/2/13	nd
SS5	4/2/13	nd
WS6	4/2/13	nd
WS7	4/2/13	nd
WS8	4/2/13	nd
WS8 Dup	4/2/13	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Jamie Deyman & Ramses Osorio

Libby Environmental, Inc.

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HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130329-11
Client Project # 2491-001E

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	4/2/13	115%
WS8 MS	4/2/13	115%
WS8 MSD	4/2/13	115%
RPD	4/2/13	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Jamie Deyman & Ramses Osorio

Libby Environmental, Inc.

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HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130329-11
Client Project # 2491-001E

Analyses of Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (mg/kg)	Zinc (mg/kg)
Method Blank	4/2/13	nd	nd
PS1	4/2/13	11	40
SS2	4/2/13	8	47
SS3	4/2/13	nd	nd
SS4	4/2/13	nd	nd
SS5	4/2/13	nd	5.6
WS6	4/2/13	68	7.6
WS7	4/2/13	12	nd
WS8	4/2/13	40	156
WS8 Dup	4/2/13	35	141
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

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HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130329-11
Client Project # 2491-001E

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	4/2/13	93%	118%
WS8 MS	4/2/13	int	int
WS8 MSD	4/2/13	int	int
Post-Spike	4/2/13	97%	108%
RPD	4/2/13	int	int

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Sherry Chilcutt

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Robinson Noble
Olympia, Washington
Libby Project # L130329-11
Client Project # 2491-001E

Analyses of Total Arsenic in Water by EPA Method 7010

Sample Number	Date Analyzed	Arsenic µg/L
Method Blank	4/2/13	nd
MW1	4/2/13	5.2
MW1 Dup	4/2/13	5.4
Practical Quantitation Limit		5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130329-11
Client Project # 2491-001E

QA/QC for Arsenic in Water by EPA Method 7010

Sample Number	Date Analyzed	Arsenic (% Recovery)
LCS	4/2/13	106%
MW1 MS	4/2/13	104%
MW1 MSD	4/2/13	108%
RPD	4/2/13	4%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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Robinson Noble
Olympia, Washington
Libby Project # L130329-11
Client Project # 2491-001E

Analyses of Dissolved Arsenic in Water by EPA Method 7010

Sample Number	Date Analyzed	Arsenic µg/L
Method Blank	4/11/13	nd
MW1	4/11/13	nd
MW1 Dup	4/11/13	nd
Practical Quantitation Limit		5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

SPECTRA Laboratories

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

04/09/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project:	Havens
Sample Matrix:	Soil
Date Sampled:	03/29/2013
Date Received:	04/02/2013
Spectra Project:	2013040063

Client ID	Spectra #	Analyte	Result	Units	Method
PS-1	1	Total Nickel	10.0	mg/Kg	SW846 6010B
SS-2	2	Total Nickel	11.8	mg/Kg	SW846 6010B
SS-3	3	Total Nickel	7.6	mg/Kg	SW846 6010B
SS-4	4	Total Nickel	4.6	mg/Kg	SW846 6010B
SS-5	5	Total Nickel	2.6	mg/Kg	SW846 6010B
WS-6	6	Total Nickel	12.1	mg/Kg	SW846 6010B
WS-7	7	Total Nickel	12.5	mg/Kg	SW846 6010B
WS-8	8	Total Nickel	18.1	mg/Kg	SW846 6010B

Date Analyzed: 4-8-13 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

a7/scj

SPECTRA Laboratories

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4/8/2013

Libby Environmental
4139 Libby Rd. NE
Olympia, WA 98506

Units: mg/L
Spectra Project: 2013040063
Applies to Spectra #'s 1 thru 8

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Soil/Solid

Method Blank

Date Digested: 4/8/2013   Date Analyzed: 4/8/2013

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 4/8/2013   Date Analyzed: 4/8/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	1.881	94.1

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 4/8/2013   Date Analyzed: 4/8/2013
Sample Spiked: 2013040063-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.259	2.0	2.153	94.7	2.151	94.6	0.1

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

Libby Environmental, Inc.

Chain of Custody Record

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Fax: 360-352-4154
www.LibbyEnvironmental.com

Client: Libby Environmental, Inc.
Address:
City: State: Zip:
Phone: Fax:
Client Project #

Date: 4/1/13 Page: 1 of 1
Project Manager: Jamie Deyman
Project Name: Havens
Location: City, State:
Collector: Date of Collection:
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Ni		Field Notes
1	PS-1			Soil	4oz JAR												X		
2	SS-2																X		
3	SS-3																X		
4	SS-4																X		
5	SS-5																X		
6	WS-6																X		
7	WS-7																X		
8	WS-8																X		
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	4/2/13 1:20pm	Marie Holt	4-2-13 1:20pm
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Std

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Fremont Analytical

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Jamie Deyman
4139 Libby Rd. NE
Olympia, Washington 98506

RE: Havens
Lab ID: 1304024

April 09, 2013

Attention Jamie Deyman:

Fremont Analytical, Inc. received 8 sample(s) on 4/3/2013 for the analyses presented in the following report.

> ***Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)***
> ***Sample Moisture (Percent Moisture)***

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Michael Dee
Sr. Chemist / Principal

Fremont Analytical

Date: *04/09/2013*

CLIENT:	Libby Environmental	
Project:	Havens	
Lab Order:	1304024	

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1304024-001	PS1	03/29/2013 12:00 AM	04/03/2013 2:00 PM
1304024-002	SS2	03/29/2013 12:00 AM	04/03/2013 2:00 PM
1304024-003	SS3	03/29/2013 12:00 AM	04/03/2013 2:00 PM
1304024-004	SS4	03/29/2013 12:00 AM	04/03/2013 2:00 PM
1304024-005	SS5	03/29/2013 12:00 AM	04/03/2013 2:00 PM
1304024-006	WS6	03/29/2013 12:00 AM	04/03/2013 2:00 PM
1304024-007	WS7	03/29/2013 12:00 AM	04/03/2013 2:00 PM
1304024-008	WS8	03/29/2013 12:00 AM	04/03/2013 2:00 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Fremont Analytical

Case Narrative

WO#: **1304024**

Date: **4/9/2013**

CLIENT: Libby Environmental
Project: Havens

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Fremont Analytical

Analytical Report

WO#: **1304024**
Date Reported: **4/9/2013**

Client: Libby Environmental
Project: Havens
Lab ID: 1304024-001
Client Sample ID: PS1

Collection Date: 3/29/2013
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 4373		Analyst: PH
Naphthalene	ND	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
2-Methylnaphthalene	ND	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
1-Methylnaphthalene	ND	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Acenaphthylene	ND	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Acenaphthene	ND	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Fluorene	ND	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Phenanthrene	252	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Anthracene	ND	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Fluoranthene	528	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Pyrene	416	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Benz(a)anthracene	187	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Chrysene	212	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Benzo(b)fluoranthene	349	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Benzo(k)fluoranthene	103	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Benzo(a)pyrene	202	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Indeno(1,2,3-cd)pyrene	135	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Dibenz(a,h)anthracene	ND	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Benzo(g,h,i)perylene	115	85.7		µg/Kg-dry	1	4/6/2013 6:54:00 PM
Surr: 2-Fluorobiphenyl	91.2	50.4-142		%REC	1	4/6/2013 6:54:00 PM
Surr: Terphenyl-d14 (surr)	105	48.8-157		%REC	1	4/6/2013 6:54:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R7991		Analyst: JS
Percent Moisture	45.9			wt%	1	4/4/2013 9:15:02 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1304024**
Date Reported: **4/9/2013**

Client: Libby Environmental
Project: Havens
Lab ID: 1304024-002
Client Sample ID: SS2
Collection Date: 3/29/2013
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 4373		Analyst: PH
Naphthalene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
2-Methylnaphthalene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
1-Methylnaphthalene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Acenaphthylene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Acenaphthene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Fluorene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Phenanthrene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Anthracene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Fluoranthene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Pyrene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Benz(a)anthracene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Chrysene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Benzo(b)fluoranthene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Benzo(k)fluoranthene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Benzo(a)pyrene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Indeno(1,2,3-cd)pyrene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Dibenz(a,h)anthracene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Benzo(g,h,i)perylene	ND	88.4		µg/Kg-dry	1	4/6/2013 7:17:00 PM
Surr: 2-Fluorobiphenyl	75.0	50.4-142		%REC	1	4/6/2013 7:17:00 PM
Surr: Terphenyl-d14 (surr)	73.4	48.8-157		%REC	1	4/6/2013 7:17:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R7991		Analyst: JS
Percent Moisture	46.0			wt%	1	4/4/2013 9:15:02 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1304024**
Date Reported: **4/9/2013**

Client: Libby Environmental
Project: Havens
Lab ID: 1304024-003
Client Sample ID: SS3

Collection Date: 3/29/2013
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 4373		Analyst: PH
Naphthalene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
2-Methylnaphthalene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
1-Methylnaphthalene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Acenaphthylene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Acenaphthene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Fluorene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Phenanthrene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Anthracene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Fluoranthene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Pyrene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Benz(a)anthracene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Chrysene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Benzo(b)fluoranthene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Benzo(k)fluoranthene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Benzo(a)pyrene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Indeno(1,2,3-cd)pyrene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Dibenz(a,h)anthracene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Benzo(g,h,i)perylene	ND	90.6		µg/Kg-dry	1	4/6/2013 7:41:00 PM
Surr: 2-Fluorobiphenyl	84.1	50.4-142		%REC	1	4/6/2013 7:41:00 PM
Surr: Terphenyl-d14 (surr)	83.4	48.8-157		%REC	1	4/6/2013 7:41:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R7991		Analyst: JS
Percent Moisture	45.4			wt%	1	4/4/2013 9:15:02 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

Fremont Analytical

WO#: **1304024**
Date Reported: **4/9/2013**

Client: Libby Environmental
Project: Havens
Lab ID: 1304024-004
Client Sample ID: SS4

Collection Date: 3/29/2013
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 4373		Analyst: PH
Naphthalene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
2-Methylnaphthalene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
1-Methylnaphthalene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Acenaphthylene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Acenaphthene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Fluorene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Phenanthrene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Anthracene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Fluoranthene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Pyrene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Benz(a)anthracene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Chrysene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Benzo(b)fluoranthene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Benzo(k)fluoranthene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Benzo(a)pyrene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Indeno(1,2,3-cd)pyrene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Dibenz(a,h)anthracene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Benzo(g,h,i)perylene	ND	107		µg/Kg-dry	1	4/6/2013 8:04:00 PM
Surr: 2-Fluorobiphenyl	89.2	50.4-142		%REC	1	4/6/2013 8:04:00 PM
Surr: Terphenyl-d14 (surr)	101	48.8-157		%REC	1	4/6/2013 8:04:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R7991		Analyst: JS
Percent Moisture	53.8			wt%	1	4/4/2013 9:15:02 AM

Qualifiers:
B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
RL Reporting Limit
D Dilution was required
H Holding times for preparation or analysis exceeded
ND Not detected at the Reporting Limit
S Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1304024**
Date Reported: **4/9/2013**

Client: Libby Environmental
Project: Havens
Lab ID: 1304024-005
Client Sample ID: SS5

Collection Date: 3/29/2013
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 4373		Analyst: PH
Naphthalene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
2-Methylnaphthalene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
1-Methylnaphthalene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Acenaphthylene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Acenaphthene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Fluorene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Phenanthrene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Anthracene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Fluoranthene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Pyrene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Benz(a)anthracene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Chrysene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Benzo(b)fluoranthene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Benzo(k)fluoranthene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Benzo(a)pyrene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Indeno(1,2,3-cd)pyrene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Dibenz(a,h)anthracene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Benzo(g,h,i)perylene	ND	378		µg/Kg-dry	1	4/6/2013 8:27:00 PM
Surr: 2-Fluorobiphenyl	73.2	50.4-142		%REC	1	4/6/2013 8:27:00 PM
Surr: Terphenyl-d14 (surr)	90.3	48.8-157		%REC	1	4/6/2013 8:27:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R7991		Analyst: JS
Percent Moisture	86.9			wt%	1	4/4/2013 9:15:02 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1304024**
Date Reported: **4/9/2013**

Client: Libby Environmental
Project: Havens
Lab ID: 1304024-006
Client Sample ID: WS6

Collection Date: 3/29/2013
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 4373		Analyst: PH
Naphthalene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
2-Methylnaphthalene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
1-Methylnaphthalene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Acenaphthylene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Acenaphthene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Fluorene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Phenanthrene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Anthracene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Fluoranthene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Pyrene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Benz(a)anthracene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Chrysene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Benzo(b)fluoranthene	92.5	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Benzo(k)fluoranthene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Benzo(a)pyrene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Indeno(1,2,3-cd)pyrene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Dibenz(a,h)anthracene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Benzo(g,h,i)perylene	ND	81.5		µg/Kg-dry	1	4/6/2013 8:51:00 PM
Surr: 2-Fluorobiphenyl	86.7	50.4-142		%REC	1	4/6/2013 8:51:00 PM
Surr: Terphenyl-d14 (surr)	95.5	48.8-157		%REC	1	4/6/2013 8:51:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R7991		Analyst: JS
Percent Moisture	41.2			wt%	1	4/4/2013 9:15:02 AM

Qualifiers: B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1304024**
Date Reported: **4/9/2013**

Client: Libby Environmental
Project: Havens
Lab ID: 1304024-007
Client Sample ID: WS7

Collection Date: 3/29/2013

Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 4373		Analyst: PH
Naphthalene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
2-Methylnaphthalene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
1-Methylnaphthalene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Acenaphthylene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Acenaphthene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Fluorene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Phenanthrene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Anthracene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Fluoranthene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Pyrene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Benz(a)anthracene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Chrysene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Benzo(b)fluoranthene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Benzo(k)fluoranthene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Benzo(a)pyrene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Indeno(1,2,3-cd)pyrene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Dibenz(a,h)anthracene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Benzo(g,h,i)perylene	ND	76.8		µg/Kg-dry	1	4/6/2013 9:14:00 PM
Surr: 2-Fluorobiphenyl	89.4	50.4-142		%REC	1	4/6/2013 9:14:00 PM
Surr: Terphenyl-d14 (surr)	101	48.8-157		%REC	1	4/6/2013 9:14:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R7991		Analyst: JS
Percent Moisture	35.3			wt%	1	4/4/2013 9:15:02 AM

Qualifiers: B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1304024**
Date Reported: **4/9/2013**

Client: Libby Environmental
Project: Havens
Lab ID: 1304024-008
Client Sample ID: **WS8**

Collection Date: 3/29/2013

Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 4373		Analyst: PH
Naphthalene	ND	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
2-Methylnaphthalene	ND	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
1-Methylnaphthalene	ND	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Acenaphthylene	ND	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Acenaphthene	ND	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Fluorene	ND	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Phenanthrene	104	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Anthracene	ND	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Fluoranthene	216	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Pyrene	185	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Benz(a)anthracene	91.5	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Chrysene	99.6	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Benzo(b)fluoranthene	153	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Benzo(k)fluoranthene	ND	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Benzo(a)pyrene	85.0	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Indeno(1,2,3-cd)pyrene	ND	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Dibenz(a,h)anthracene	ND	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Benzo(g,h,i)perylene	ND	72.3		µg/Kg-dry	1	4/6/2013 10:24:00 PM
Surr: 2-Fluorobiphenyl	83.3	50.4-142		%REC	1	4/6/2013 10:24:00 PM
Surr: Terphenyl-d14 (surr)	93.9	48.8-157		%REC	1	4/6/2013 10:24:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R7991		Analyst: JS
Percent Moisture	39.0			wt%	1	4/4/2013 9:15:02 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 4/9/2013

Work Order: 1304024
CLIENT: Libby Environmental
Project: Havens

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **MB-4373** SampType: **MBLK** Units: **µg/Kg** Prep Date: **4/5/2013** RunNo: **8033**
Client ID: **MBLKS** Batch ID: **4373** Analysis Date: **4/6/2013** SeqNo: **160065**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	50.0									
2-Methylnaphthalene	ND	50.0									
1-Methylnaphthalene	ND	50.0									
Acenaphthylene	ND	50.0									
Acenaphthene	ND	50.0									
Fluorene	ND	50.0									
Phenanthrene	ND	50.0									
Anthracene	ND	50.0									
Fluoranthene	ND	50.0									
Pyrene	ND	50.0									
Benz(a)anthracene	ND	50.0									
Chrysene	ND	50.0									
Benzo(b)fluoranthene	ND	50.0									
Benzo(k)fluoranthene	ND	50.0									
Benzo(a)pyrene	ND	50.0									
Indeno(1,2,3-cd)pyrene	ND	50.0									
Dibenz(a,h)anthracene	ND	50.0									
Benzo(g,h,i)perylene	ND	50.0									
Surr: 2-Fluorobiphenyl	405		500.0		81.0	50.4	142				
Surr: Terphenyl-d14 (surr)	463		500.0		92.7	48.8	157				

Sample ID: **LCS-4373** SampType: **LCS** Units: **µg/Kg** Prep Date: **4/5/2013** RunNo: **8033**
Client ID: **LCSS** Batch ID: **4373** Analysis Date: **4/6/2013** SeqNo: **160066**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	989	50.0	1,000	0	98.9	74.3	115				
2-Methylnaphthalene	873	50.0	1,000	0	87.3	72.9	120				
1-Methylnaphthalene	1,020	50.0	1,000	0	102	74.1	116				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 4/9/2013

Work Order: 1304024
CLIENT: Libby Environmental
Project: Havens

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **LCS-4373** SampType: **LCS** Units: **µg/Kg** Prep Date: **4/5/2013** RunNo: **8033**
Client ID: **LCSS** Batch ID: **4373** Analysis Date: **4/6/2013** SeqNo: **160066**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthylene	950	50.0	1,000	0	95.0	69.8	123				
Acenaphthene	1,010	50.0	1,000	0	101	66.4	125				
Fluorene	982	50.0	1,000	0	98.2	64.7	122				
Phenanthrene	1,000	50.0	1,000	0	100	67.2	123				
Anthracene	1,020	50.0	1,000	0	102	65.5	127				
Fluoranthene	1,030	50.0	1,000	0	103	57.6	131				
Pyrene	1,070	50.0	1,000	0	107	58.1	131				
Benz(a)anthracene	936	50.0	1,000	0	93.6	46.5	143				
Chrysene	1,010	50.0	1,000	0	101	63	125				
Benzo(b)fluoranthene	805	50.0	1,000	0	80.5	47.7	139				
Benzo(k)fluoranthene	1,050	50.0	1,000	0	105	60.7	136				
Benzo(a)pyrene	802	50.0	1,000	0	80.2	50.6	133				
Indeno(1,2,3-cd)pyrene	840	50.0	1,000	0	84.0	57.9	133				
Dibenz(a,h)anthracene	827	50.0	1,000	0	82.7	52.8	135				
Benzo(g,h,i)perylene	946	50.0	1,000	0	94.6	55	132				
Surr: 2-Fluorobiphenyl	474		500.0		94.7	50.4	142				
Surr: Terphenyl-d14 (surr)	482		500.0		96.3	48.8	157				

Sample ID: **1303193-003BDUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **4/5/2013** RunNo: **8033**
Client ID: **BATCH** Batch ID: **4373** Analysis Date: **4/6/2013** SeqNo: **160068**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	50.8						0	0	30	
2-Methylnaphthalene	ND	50.8						0	0	30	
1-Methylnaphthalene	ND	50.8						0	0	30	
Acenaphthylene	ND	50.8						0	0	30	
Acenaphthene	ND	50.8						0	0	30	
Fluorene	ND	50.8						0	0	30	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Work Order: 1304024
CLIENT: Libby Environmental
Project: Havens

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **1303193-003BDUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **4/5/2013** RunNo: **8033**
Client ID: **BATCH** Batch ID: **4373** Analysis Date: **4/6/2013** SeqNo: **160068**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phenanthrene	62.3	50.8						58.76	5.93	30	
Anthracene	ND	50.8						0	0	30	
Fluoranthene	100	50.8						94.85	5.73	30	
Pyrene	107	50.8						107.7	0.946	30	
Benz(a)anthracene	ND	50.8						52.07	200	30	
Chrysene	69.2	50.8						75.30	8.49	30	
Benzo(b)fluoranthene	70.1	50.8						70.10	0.0249	30	
Benzo(k)fluoranthene	ND	50.8						0	0	30	
Benzo(a)pyrene	ND	50.8						0	0	30	
Indeno(1,2,3-cd)pyrene	ND	50.8						0	0	30	
Dibenz(a,h)anthracene	ND	50.8						0	0	30	
Benzo(g,h,i)perylene	ND	50.8						0	0	30	
Surr: 2-Fluorobiphenyl	454		508.1		89.4	50.4	142		0		
Surr: Terphenyl-d14 (surr)	509		508.1		100	48.8	157		0		

Sample ID: **1304025-001BMS** SampType: **MS** Units: **µg/Kg-dry** Prep Date: **4/5/2013** RunNo: **8033**
Client ID: **BATCH** Batch ID: **4373** Analysis Date: **4/6/2013** SeqNo: **160072**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	946	53.2	1,064	108.6	78.7	42.9	138				
2-Methylnaphthalene	920	53.2	1,064	45.47	82.2	42.8	151				
1-Methylnaphthalene	1,040	53.2	1,064	28.83	94.7	41.6	148				
Acenaphthylene	1,190	53.2	1,064	94.82	103	32.6	160				
Acenaphthene	1,060	53.2	1,064	24.48	96.9	46.3	142				
Fluorene	1,090	53.2	1,064	32.21	99.8	43.4	153				
Phenanthrene	1,340	53.2	1,064	286.0	99.2	45.5	140				
Anthracene	1,180	53.2	1,064	86.22	103	32.6	160				
Fluoranthene	1,660	53.2	1,064	467.3	112	44.6	161				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Work Order: 1304024
CLIENT: Libby Environmental
Project: Havens

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **1304025-001BMS** SampType: **MS** Units: **µg/Kg-dry** Prep Date: **4/5/2013** RunNo: **8033**
Client ID: **BATCH** Batch ID: **4373** Analysis Date: **4/6/2013** SeqNo: **160072**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pyrene	1,780	53.2	1,064	600.3	110	48.3	158				
Benz(a)anthracene	1,430	53.2	1,064	277.6	108	57.5	169				
Chrysene	1,250	53.2	1,064	274.1	91.9	45.2	146				
Benzo(b)fluoranthene	1,610	53.2	1,064	388.6	114	42.2	168				
Benzo(k)fluoranthene	1,240	53.2	1,064	131.2	104	48	161				
Benzo(a)pyrene	1,400	53.2	1,064	329.5	100	34.4	179				
Indeno(1,2,3-cd)pyrene	1,350	53.2	1,064	213.7	107	41.1	165				
Dibenz(a,h)anthracene	1,240	53.2	1,064	40.04	113	38.1	166				
Benzo(g,h,i)perylene	1,170	53.2	1,064	220.0	89.1	45.6	157				
Surr: 2-Fluorobiphenyl	334		532.0		62.8	50.4	142				
Surr: Terphenyl-d14 (surr)	542		532.0		102	48.8	157				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**1304024**
Logged by:	**Clare Griggs**	Date Received:	**4/3/2013 2:00:00 PM**

Chain of Custody

1.	Were custodial seals present?	Yes ☑	No ☐	Not Required ☐
2.	Is Chain of Custody complete?	Yes ☐	No ☑	Not Present ☐
3.	How was the sample delivered?	UPS		

Log In

4.	Coolers are present?	Yes ☑	No ☐	NA ☐
5.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
6.	Were all coolers received at a temperature of >0° C to 10.0°C	Yes ☑	No ☐	NA ☐
7.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
8.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
9.	Are samples properly preserved?	Yes ☑	No ☐	
10.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
11.	Is there headspace present in VOA vials?	Yes ☐	No ☐	NA ☑
12.	Did all sample containers arrive in good condition?(unbroken)	Yes ☑	No ☐	
13.	Does paperwork match bottle labels?	Yes ☑	No ☐	
14.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
15.	Is it clear what analyses were requested?	Yes ☑	No ☐	
16.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

17. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

18. Additional remarks/Disrepancies

Pulled sample dates from sample label, not noted on COC.

Item Information

Item #	Temp °C	Condition
Cooler	9.6	Good

Libby Environmental, Inc. 4139 Libby Road NE, Olympia, WA 98506 Ph: 360-352-2110 Fax: 360-352-4154

Chain of Custody Record

1304024

www.LibbyEnvironmental.com

Client: Libby Environmental, Inc.
Address:
City: State: Zip:
Phone: Fax:
Client Project #

Date: 4/1/13 Page: 1 of 1
Project Manager: Jamie Deyman
Project Name: Havens
Location: City, State:
Collector: Date of Collection:
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals				Field Notes
1	PS1			S	4oz Jar								X							
2	SS2												X							
3	SS3												X							
4	SS4												X							
5	SS5												X							
6	WS6												X							
7	WS7												X							
8	WS8												X							
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	4/2/13 8:15	[signature]	4/3/13 2:00PM
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks:
STD

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

SPECTRA Laboratories

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

04/18/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project:	Haven
Client ID:	WS6
Sample Matrix:	Soil
Date Sampled:	03/29/2013
Date Received:	04/11/2013
Spectra Project:	2013040360
Spectra Number:	1

Analyte	Result	Units	Method
TCLP Lead	9.67	mg/L	SW846 6010B

Date Analyzed: 4-18-13 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a6/scj

SPECTRA Laboratories

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

04/18/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project:	Haven
Client ID:	WS8
Sample Matrix:	Soil
Date Sampled:	03/29/2013
Date Received:	04/11/2013
Spectra Project:	2013040360
Spectra Number:	2

Analyte	Result	Units	Method
TCLP Lead	0.25	mg/L	SW846 6010B

Date Analyzed: 4-18-13 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a6/scj

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

4/18/2013

Libby Environmental, Inc
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013040360
Applies to Spectra #'s	1 and 2

QUALITY CONTROL RESULTS
ICP Metals SW846 6010B - TCLP

Method Blank

Date Digested: 4/18/2013 Date Analyzed: 4/18/2013

Element	Result
Lead	< 0.04

Blank Spike (LCS)

Date Digested: 4/18/2013 Date Analyzed: 4/18/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Lead	1.0	1.027	102.7

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 4/18/2013 Date Analyzed: 4/18/2013
Sample Spiked: 2013040360-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Lead	9.668	1.0	10.480	81.2	10.520	85.2	4.8

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

201304 0360

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: Libby Environmental, Inc		Date: 4-11-13	Page: 1 of 1
Address: (See above)		Project Manager: Jamie Deyman	
City:	State: Zip:	Project Name: Haven	
Phone:	Fax:	Location:	City, State: Olympia, WA
Client Project #		Collector:	Date of Collection: 3-29-13
		Email:	

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	TCLP Pb			Field Notes
1	WS6	Ø	1350	soil	Jar												X			
2	WS8	Ø	1420	soil	Jar												X			
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
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17																				

Relinquished by:	Date / Time	Received by:	Date / Time	Sample Receipt:		Remarks:
[signature]	4/11/13 12:03pm	[signature]	4/11/13 @ 1204			Standard
Relinquished by:	Date / Time	Received by:	Date / Time	Good Condition?		
				Cold?		
Relinquished by:	Date / Time	Received by:	Date / Time	Seals Intact?		need EDD please
				Total Number of Containers		TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 3/29/2013 Page: 1 of 1

Client: ROBINSON NOBLE
Project Manager: MAX WILLS
Address: 3011 S. HUSON ST SUITE A
Project Name: HAJINS
City: TACOMA State: W Zip: 98409
Location: 411 93rd AVE SE City, State: OLYMPIA WA
Phone: (253) 475-7711 Fax:
Collector: MTW / ACY Date of Collection: 3/29/13
Client Project # 2491-001E
Email: MWILLS @ ROBINSON-NOBLE.COM

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	ARSENIC-TOTAL	ZINC COPPER NICKEL	TCLP Pb	Field Notes
1	MW 1	–	1320	WTR	POLY												X			~~RUN~~ FOR DISSOLVED
2	PS 1	Ø	1220	SED	4 oz					X				X		X		X		
3	SS 2	Ø	1240							X				X		X		X		
4	SS 3	Ø	1250							X				X		X		X		4-10-13 STD per Max
5	SS 4	Ø	1305							X				X		X		X		via phone + email
6	SS 5	Ø	1335							X				X		X		X		run diss As, TCLP Pb
7	WS 6	Ø	1350							X				X		X		X	X	
8	WS 7	Ø	1400							X				X		X		X		
9	WS 8	Ø	1420							X				X		X		X	X	
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	3-29-13 15:05	[signature]	3/29/13 15:25
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
STD TURN
NEED EIM

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

4139 Libby Road NE
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FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Hydrocarbon Identification by NWTPH-HCID for Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)	Diesel (mg/kg)	Light Oil (mg/kg)	Heavy Oil (mg/kg)
Method Blank	2/26/13	103	nd	nd	nd	nd
Method Blank	2/27/13	90	nd	nd	nd	nd
B18-3	2/26/13	111	nd	nd	nd	nd
B18-6	2/26/13	93	nd	nd	nd	nd
B18-6 Dup	2/26/13	89	nd	nd	nd	nd
B20-6	2/26/13	114	nd	nd	nd	nd
B20-6 Dup	2/26/13	96	nd	nd	nd	nd
B21-2	2/26/13	123	nd	nd	nd	nd
B21-5	2/26/13	108	nd	nd	nd	nd
B22-6	2/26/13	104	nd	nd	nd	nd
MW-5-3	2/26/13	99	nd	nd	nd	nd
MW-5-6	2/26/13	87	nd	nd	nd	nd
MW-5-6 Dup	2/26/13	102	nd	nd	nd	nd
B23-2	2/27/13	90	nd	nd	nd	nd
B23-4	2/27/13	85	nd	nd	nd	nd
B23-4 Dup	2/27/13	92	nd	nd	nd	nd
Practical Quantitation Limit			20	50	100	100

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke & Jamie Deyman

Libby Environmental, Inc.

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Analyses of PCB (Polychlorinated Biphenyls) in Soil by EPA Method 8082

Sample Description	PQL	Method Blank	LCS	B18-3	B18-3 Dup	B18-6	B18-6 MS
Date Sampled		N/A	2/26/13	2/26/13	2/26/13	2/26/13	2/26/13
Date Analyzed		2/28/13	2/28/13	2/28/13	2/28/13	2/28/13	2/28/13
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Aroclor 1016	0.02	nd	85%	nd	nd	nd	86%
Aroclor 1221	0.02	nd		nd	nd	nd	
Aroclor 1232	0.02	nd		nd	nd	nd	
Aroclor 1242	0.02	nd		nd	nd	nd	
Aroclor 1248	0.02	nd		nd	nd	nd	
Aroclor 1254	0.02	nd		nd	nd	nd	
Aroclor 1260	0.02	nd	80%	nd	nd	nd	106%
Surrogate Recovery							
TCMX		100	90	74	80	80	101
DCBP		100	90	108	86	106	95

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

Libby Environmental, Inc.

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Olympia, WA 98506
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Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Analyses of Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)
Method Blank	3/2/13	nd	nd	nd	nd
B20-6	3/2/13	nd	nd	nd	nd
B21-2	3/2/13	5.5	nd	8.7	8.1
B21-5	3/17/13	nd	nd	13.2	nd
B22-6	3/2/13	nd	nd	7.2	6.6
MW5-3	3/2/13	nd	nd	13	8.6
MW5-6	3/17/13	nd	nd	17.4	6.7
MW5-6 Dup	3/17/13	nd	nd	18.6	6.4
B23-2	3/2/13	nd	nd	6.6	7.8
Practical Quantitation Limit		5.0	1.0	5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	3/2/13	92%	101%	99%	88%
L130225-10 MS	3/2/13	86%	96%	101%	86%
L130225-10 MSD	3/2/13	96%	99%	89%	83%
RPD	3/2/13	11%	3%	13%	3%
LCS	3/17/13	109%	103%	92%	103%
MW5-6 MS	3/17/13	105%	90%	92%	86%
MW5-6 MSD	3/17/13	94%	93%	85%	92%
RPD	3/17/13	11%	3%	8%	7%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Analyses of Mercury in Soil by EPA Method 7471

Sample Number	Date Analyzed	Mercury (mg/kg)
Method Blank	2/27/13	nd
B20-6	2/27/13	nd
B21-2	2/27/13	nd
B22-6	2/27/13	nd
MW5-3	2/27/13	nd
B23-2	3/4/13	nd
B21-5	3/19/13	nd
MW5-6	3/19/13	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	2/27/13	112%
L130225-10 MS	2/27/13	103%
L130225-10 MSD	2/27/13	103%
RPD	2/27/13	0%
LCS	3/4/13	112%
L130227-1 MS	3/4/13	103%
L130227-1 MSD	3/4/13	103%
RPD	3/4/13	0%
LCS	3/19/13	106%
L130315-6 MS	3/19/13	106%
L130315-6 MSD	3/19/13	106%
RPD	3/19/13	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Analyses of Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (mg/kg)	Zinc (mg/kg)
Method Blank	3/2/13	nd	nd
B20-6	3/2/13	5.9	nd
B21-2	3/2/13	6.1	5.8
B21-5	3/17/13	6.0	12
B22-6	3/2/13	6.9	nd
MW5-3	3/2/13	23	20
MW5-6	3/17/13	34	20
MW5-6 Dup	3/17/13	33	19
B23-2	3/2/13	9.6	nd
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	3/2/13	95%	89%
L130225-10 MS	3/2/13	91%	92%
L130225-10 MSD	3/2/13	92%	99%
RPD	3/2/13	1%	8%
LCS	3/17/13	106%	116%
MW5-6 MS	3/17/13	95%	85%
MW5-6 MSD	3/17/13	85%	91%
RPD	3/17/13	11%	7%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Analyses of Lead in Soil by EPA Method 7421

Sample Number	Date Analyzed	Lead (mg/kg)
Method Blank	3/2/13	nd
B18-3	3/2/13	nd
B18-6	3/2/13	nd
Practical Quantitation Limit		5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

QA/QC for Lead by EPA Method 7421

Sample Number	Date Analyzed	Lead (% Recovery)
LCS	3/2/13	92%
L130227-1 MS	3/2/13	103%
L130227-1 MSD	3/2/13	111%
RPD	3/2/13	8%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Hydrocarbon Identification by NWTPH-HCID for Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (µg/l)	Diesel (µg/l)	Mineral Oil (µg/l)	Heavy Oil (µg/l)
Method Blank	2/26/13	103	nd	nd	nd	nd
Method Blank	2/27/13	84	nd	nd	nd	nd
B18-W	2/26/13	101	nd	nd	nd	nd
B19-W	2/26/13	106	nd	nd	nd	nd
B19-W Dup	2/26/13	87	nd	nd	nd	nd
B20-W	2/26/13	93	nd	nd	nd	nd
B20-W Dup	2/26/13	112	nd	nd	nd	nd
B21-W	2/26/13	123	nd	nd	nd	nd
B22-W	2/26/13	110	nd	nd	nd	nd
B23-W	2/27/13	98	nd	nd	nd	nd
B23-W Dup	2/27/13	96	nd	nd	nd	nd
Practical Quantitation Limit			200	500	500	500

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke & Jamie Deyman

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Volatile Organic Compounds by EPA Method 8260C in Water

Sample Description		Method Blank	B19-W
Date Sampled	Reporting	N/A	2/26/13
Date Analyzed	Limits	2/28/13	2/28/13
	(µg/l)	(µg/l)	(µg/l)
Dichlorodifluoromethane	2.0	nd	nd
Chloromethane	2.0	nd	nd
Vinyl chloride	0.2	nd	nd
Bromomethane	2.0	nd	nd
Chloroethane	2.0	nd	nd
Trichlorofluoromethane	2.0	nd	nd
1,1-Dichloroethene	2.0	nd	nd
Methylene chloride	1.0	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	5.0	nd	nd
trans -1,2-Dichloroethene	1.0	nd	nd
1,1-Dichloroethane	1.0	nd	nd
2,2-Dichloropropane	2.0	nd	nd
cis -1,2-Dichloroethene	1.0	nd	nd
Chloroform	1.0	nd	nd
1,1,1-Trichloroethane (TCA)	1.0	nd	nd
Carbon tetrachloride	1.0	nd	nd
1,1-Dichloropropene	1.0	nd	nd
Benzene	1.0	nd	nd
1,2-Dichloroethane (EDC)	1.0	nd	nd
Trichloroethene (TCE)	1.0	nd	nd
1,2-Dichloropropane	1.0	nd	nd
Dibromomethane	1.0	nd	nd
Bromodichloromethane	1.0	nd	nd
cis-1,3-Dichloropropene	1.0	nd	nd
Toluene	1.0	nd	nd
Trans-1,3-Dichloropropene	1.0	nd	nd
1,1,2-Trichloroethane	1.0	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd
1,3-Dichloropropane	1.0	nd	nd
Dibromochloromethane	1.0	nd	nd
1,2-Dibromoethane (EDB) *	0.01	nd	nd
Chlorobenzene	1.0	nd	nd
1,1,1,2-Tetrachloroethane	1.0	nd	nd
Ethylbenzene	1.0	nd	nd
Total Xylenes	2.0	nd	nd
Styrene	1.0	nd	nd

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Volatile Organic Compounds by EPA Method 8260C in Water

Sample Description		Method Blank	B19-W
Date Sampled	Reporting	N/A	2/26/13
Date Analyzed	Limits	2/28/13	2/28/13
	(µg/l)	(µg/l)	(µg/l)
Bromoform	1.0	nd	nd
Isopropylbenzene	4.0	nd	nd
1,2,3-Trichloropropane	1.0	nd	nd
Bromobenzene	1.0	nd	nd
1,1,2,2-Tetrachloroethane	1.0	nd	nd
n-Propylbenzene	1.0	nd	nd
2-Chlorotoluene	1.0	nd	nd
4-Chlorotoluene	1.0	nd	nd
1,3,5-Trimethylbenzene	1.0	nd	nd
tert-Butylbenzene	1.0	nd	nd
1,2,4-Trimethylbenzene	1.0	nd	nd
sec-Butylbenzene	1.0	nd	nd
1,3-Dichlorobenzene	1.0	nd	nd
Isopropyltoluene	1.0	nd	nd
1,4-Dichlorobenzene	1.0	nd	nd
1,2-Dichlorobenzene	1.0	nd	nd
n-Butylbenzene	1.0	nd	nd
1,2-Dibromo-3-Chloropropane	1.0	nd	nd
1,2,4-Trichlorolbenzene	2.0	nd	nd
Hexachloro-1,3-butadiene	5.0	nd	nd
Naphthalenes	5.0	nd	nd
1,2,3-Trichlorobenzene	5.0	nd	nd
Surrogate Recovery			
Dibromofluoromethane		104	117
1,2-Dichloroethane-d4		121	122
Toluene-d8		97	91
4-Bromofluorobenzene		97	99

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

QA/QC Data - EPA 8260C Analyses

Sample Identification: L130226-3	Matrix Spike			Matrix Spike Duplicate			RPD
	Spiked Conc. (µg/l)	Measured Conc. (µg/l)	Spike Recovery (%)	Spiked Conc. (µg/l)	Measured Conc. (µg/l)	Spike Recovery (%)	(%)
1,1-Dichloroethene	10	7.5	75	10	7.7	77	2.4
Benzene	10	9.4	94	10	9.3	93	1.8
Toluene	10	8.1	81	10	8.4	84	3.3
Chlorobenzene	10	8.6	86	10	8.7	87	1.7
Trichloroethene (TCE)	10	9.0	90	10	8.8	88	2.5
Surrogate Recovery							
Dibromofluoromethane			107			110	
1,2-Dichloroethane-d4			122			125	
Toluene-d8			95			99	
4-Bromofluorobenzene			91			95	

Laboratory Control Sample	Spiked Conc. (µg/l)	Measured Conc. (µg/l)	Spike Recovery (%)
Benzene	10	9.4	94
Toluene	10	8.9	89
Chlorobenzene	10	9.0	90
Trichloroethene (TCE)	10	9.5	95
Surrogate Recovery			
Dibromofluoromethane			101
1,2-Dichloroethane-d4			110
Toluene-d8			105
4-Bromofluorobenzene			96

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Kyle Williams

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Analyses of PCB (Polychlorinated Biphenyls) in Water by EPA Method 8082

Sample Description	PQL	Method Blank	LCS	B18-W	B18-W Dup	B19-W	B19-W MS
Date Sampled		N/A	2/26/13	2/26/13	2/26/13	2/26/13	2/26/13
Date Analyzed		2/28/13	2/28/13	2/28/13	2/28/13	2/28/13	2/28/13
	(μg/L)	(μg/L)	(μg/L)	(μg/L)	(μg/L)	(μg/L)	(μg/L)
Aroclor 1016	0.02	nd	85%	nd	nd	nd	83%
Aroclor 1221	0.02	nd		nd	nd	nd	
Aroclor 1232	0.02	nd		nd	nd	nd	
Aroclor 1242	0.02	nd		nd	nd	nd	
Aroclor 1248	0.02	nd		nd	nd	nd	
Aroclor 1254	0.02	nd		nd	nd	nd	
Aroclor 1260	0.02	nd	80%	nd	nd	nd	108%
Surrogate Recovery							
TCMX		100	90	80	89	87	100
DCBP		100	90	98	83	99	108

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Analyses of Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead µg/L	Cadmium µg/L	Chromium µg/L	Arsenic µg/L
Method Blank	3/2/13	nd	nd	nd	nd
B19-W	3/2/13	33	nd	83	111
B20-W	3/2/13	24	nd	105	8.7
B21-W	3/2/13	106	0.6	93	114
B22-W	3/2/13	158	5.8	116	112
B23-W	3/2/13	13	nd	20	nd
Practical Quantitation Limit		5.0	0.5	10.0	3.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson & Jamie Deyman

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	3/2/13	103%	101%	99%	95%
L130301-9 MS	3/2/13	102%	92%	89%	93%
L130301-9 MSD	3/2/13	107%	94%	77%	97%
RPD	3/2/13	5%	2%	14%	4%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson & Jamie Deyman

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
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Client Project # 2491-001E

Analyses of Mercury in Water by EPA Method 7470

Sample Number	Date Analyzed	Mercury µg/L
Method Blank	3/4/13	nd
B19-W	3/4/13	nd
B20-W	3/4/13	nd
B21-W	3/4/13	nd
B22-W	3/4/13	nd
B23-W	3/4/13	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

QA/QC for Mercury by EPA Method 7470

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	3/4/13	112%
L130227-30 MS	3/4/13	94%
L130227-30 MSD	3/4/13	94%
RPD	3/4/13	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Analyses of Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper µg/L	Zinc µg/L
Method Blank	3/2/13	nd	nd
B19-W	3/2/13	285	119
B20-W	3/2/13	233	64
B21-W	3/2/13	136	110
B22-W	3/2/13	4450	28
B23-W	3/2/13	23	70
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	3/2/13	106%	100%
L130301-9 MS	3/2/13	111%	106%
L130301-9 MSD	3/2/13	119%	112%
RPD	3/2/13	7%	6%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Analyses of Lead in Water by EPA Method 7421

Sample Number	Date Analyzed	Lead µg/L
Method Blank	3/2/13	nd
B18-W	3/2/13	18
Practical Quantitation Limit		5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson & Jamie Deyman

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Robinson Noble
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Libby Project # L130226-30
Client Project # 2491-001E

QA/QC for Lead by EPA Method 7421

Sample Number	Date Analyzed	Lead (% Recovery)
LCS	3/2/13	103%
L130301-9 MS	3/2/13	102%
L130301-9 MSD	3/2/13	107%
RPD	3/2/13	5%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson & Jamie Deyman

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Robinson Noble
Olympia, Washington
Libby Project # L130226-30
Client Project # 2491-001E

Analyses of Dissolved Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead µg/L	Cadmium µg/L	Chromium µg/L	Arsenic µg/L	Copper µg/L
Method Blank	3/17/13	nd	nd	nd	nd	nd
LCS	3/17/13	115%	99%	107%	119%	106%
B18-W	3/17/13	nd	-	-	-	-
B19-W	3/17/13	nd	-	nd	nd	-
B20-W	3/17/13	nd	-	nd	nd	-
B21-W	3/17/13	nd	-	nd	nd	-
B22-W	3/17/13	6	nd	nd	8.0	69
Practical Quantitation Limit		5.0	0.5	10.0	3.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

SPECTRA Laboratories

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

03/06/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project: John Havens Estate
Sample Matrix: Soil
Date Sampled: 02/26/2013
Date Received: 02/28/2013
Spectra Project: 2013020625

Client ID	Spectra #	Analyte	Result	Units	Method
B20-6	1	Total Nickel	16	mg/Kg	SW846 6010B
B21-2	2	Total Nickel	20.1	mg/Kg	SW846 6010B
B22-6	3	Total Nickel	11.7	mg/Kg	SW846 6010B
MW-5-3	4	Total Nickel	21.7	mg/Kg	SW846 6010B
B20-W	5	Nickel	0.201	mg/L	SW846 6010B
B19-W	6	Nickel	0.199	mg/L	SW846 6010B
B21-W	7	Nickel	0.422	mg/L	SW846 6010B
B22-W	8	Nickel	1.27	mg/L	SW846 6010B
B23-W	9	Nickel	0.054	mg/L	SW846 6010B

Date Analyzed - 3-5-13 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a7/scj

SPECTRA Laboratories

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3/5/2013

Libby Environmental
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013020625
Applies to Spectra #'s	1 thru 4

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Soil/Solid

Method Blank

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	2.098	104.9

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013
Sample Spiked: 2013030045-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.156	2.0	2.008	92.6	1.994	91.9	0.8

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

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3/5/2013

Libby Environmental, Inc
4139 Libby Rd. NE
Olympia, WA 98506

Units: mg/L
Spectra Project: 2013020625
Applies to Spectra #'s 5 thru 9

QUALITY CONTROL RESULTS
ICP Metals SW846 6010B - Water/Liquid

Method Blank

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	1.0	0.963	96.3

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013
Sample Spiked: 2013030044-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.047	1.0	0.956	90.9	0.949	90.2	0.8

Recovery Limits 75-125%
RPD Limit 20

Spectra Laboratories

Steven G. Hibbs
Laboratory Manager

2013020625

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

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Client: Libby Environmental INC
Address: SEE ABOVE
City: State: Zip:
Phone: Fax:
Client Project #

Date: 2-27-13 Page: 1 of 1
Project Manager: Jamie Deyman
Project Name: John Havens estate
Location: City, State:
Collector: Date of Collection: 2-26-13
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Nickle		Field Notes
1	B20-6			Soil	4oz JAR											X			
2	B21-2			Soil	4oz JAR														
3	B22-6			Soil	4oz JAR														
4	MW-5-3			Soil	4oz JAR														
5	B20-W			H2O	Poly														
6	B19-W			H2O	Poly														
7	B21-W			H2O	Poly														
8	B22-W			H2O	Poly														
9	B23-W			H2O	Poly											X			
10																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	2-27-13 10:30AM	[signature]	2/28/13 @1000
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Record pH here:

STD

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

SPECTRA Laboratories

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03/07/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project:	John Havens Estate
Client ID:	B23-2
Sample Matrix:	Soil
Date Sampled:	02/26/2013
Date Received:	03/01/2013
Spectra Project:	2013030009
Spectra Number:	1

Analyte	Result	Units	Method
Total Nickel	7.1	mg/Kg	SW846 6010B

Date Analyzed: 3-5-13 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a6/mlh

SPECTRA Laboratories

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3/5/2013

Libby Environmental
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013030009
Applies to Spectra #'s	1 thru 4

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Soil/Solid

Method Blank

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	2.098	104.9

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013
Sample Spiked: 2013030045-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.156	2.0	2.008	92.6	1.994	91.9	0.8

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

SPECTRA Laboratories

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

3/5/2013

Libby Environmental, Inc
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013030009
Applies to Spectra #'s	5 and 6

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Water/Liquid

Method Blank

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	1.0	0.963	96.3

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013
Sample Spiked: 2013030044-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.047	1.0	0.956	90.9	0.949	90.2	0.8

Recovery Limits 75-125%
RPD Limit 20

Spectra Laboratories

Steven G. Hibbs
Laboratory Manager

201303009

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Client: Libby Environmental	Date: 2-28-13
Address: SEE ABOVE	Page: 1 of 1
City: State: Zip:	Project Manager: Jaime Deyman
Phone: Fax:	Project Name: John Havens Estate
Client Project #	Location: City, State:
	Collector: Date of Collection: 2/26/13 - 2/27/13
	Email:

Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Nickle			Field Notes
2/26/13 1 B23-2			SOIL	4oz JAR												X			
2 B24-1			SOIL																
3 B25-2			SOIL																
4 HB7-2			SOIL																
5 B24-W			H2O	Poly															
6 B25-W			H2O																
7																			
8																			
9																			
10																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	2/28/13 9:30	[signature]	3/1/13 @ 1000
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:	
Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Record pH here:

5 DAY
STD

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

SPECTRA Laboratories

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03/21/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project: John Havens Estate
Date Received: 03/15/2013
Spectra Project: 2013030343

Client ID	Spectra #	Analyte	Result	Units	Method	Matrix	Date Sampled
B21-W	1	Dissolved Nickel	< 0.015	mg/L	EPA 200.7	Water	02/26/2013
B22-W	2	Dissolved Nickel	< 0.015	mg/L	EPA 200.7	Water	02/26/2013
B21-5	3	Total Nickel	8.3	mg/Kg	SW846 6010B	Soil	02/26/2013
MW5-6	4	Total Nickel	21.4	mg/Kg	SW846 6010B	Soil	02/26/2013

Dated analyzed: 3-20-13 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a8/scj

SPECTRA Laboratories
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March 20, 2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013030343
Applies to Spectra #'s	1 and 2

QUALITY CONTROL RESULTS

ICP Dissolved Metals - EPA Method 200.7 - Water

Dissolved Filter Blank

Date Digested: 3/20/2013 Date Analyzed: 3/20/2013

Element	Result
Nickel	< 0.015

Initial Calibration Verification (ICV)

Date Digested: 3/20/2013 Date Analyzed: 3/20/2013

Element	ICV Conc.	ICV Result	ICV %Rec
Nickel	1.0	0.973	97.3

ICV Recovery limits 95-105%

Spectra Laboratories

Steve Hibbs
Laboratory Manager

SPECTRA Laboratories

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3/20/2013

Libby Environmental
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013030343
Applies to Spectra #'s	3 and 4

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Soil/Solid

Method Blank

Date Digested: 3/20/2013 Date Analyzed: 3/20/2013

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/20/2013 Date Analyzed: 3/20/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	1.965	98.3

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/20/2013 Date Analyzed: 3/20/2013

Sample Spiked: 2013030386-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.462	2.0	2.206	87.2	2.185	86.2	1.2

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

L01303043

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506

Ph: 360-352-2110
Fax: 360-352-4154

Date: 3-14-13 Page: 1 of 1

Client: Libby Environmental, Inc.

Project Manager: Jamie Deyman

Address: (see above)

Project Name: John Havens Estate

City: State: Zip:

Location: City, State: Olympia, WA

Phone: Fax:

Collector: Date of Collection: 2-26-13

Client Project #

Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Dissolved Ni	Total Ni		Field Notes
1	B21-W	—	1400	H2O	Poly												X			
2	B22-W	—	1440	H2O	Poly												X			
3	B21-5	5	1350	Soil	Jar													X		
4	MW5-6	6	1540	Soil	Jar													X		
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	3-14-13	[signature]	3/15/13 @ 0935
Relinquished by:	Date / Time	Received by: [signature]	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Standard
EDD

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 2/26/13 Page: 1 of ~~2~~ 1

Client: ROBINSON & NOBLE
Project Manager: MAX WILLS

Address: 3011 S HUSON SUITE A, TACOMA
Project Name: JOHN HAVENS ESTATE

Phone: (253)475-7711 Fax:
Location: 911 93rd AVE SE City: OLYMPIA

Client Project # 2491-001E
Collector: ACY Date of Collection: 2/26/13

#	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	ZINC, COPPER, NICKEL	LEAD	See notes	Field Notes
1	B18-3	3	940	SOIL	4oz					X					X			X		
2	B18-6	6	950	SOIL	4oz					X					X			X		
3	B18-W	—	1000	WTR	AMB					X					X			X	X	Pb - Diss
4	B19-W	—	1050	WTR	AMB/POLY/VOA			X		X					X	X	X		X	Pb, Cr, As - Diss
5	B20-6	6	1150	SOIL	4oz					X						X	X			
6	~~B20~~			~~SOIL~~	~~4oz~~					~~X~~						~~X~~	~~X~~			~~HOLD FOR METALS~~
7	B20-W	—	1200	WTR	AMB/POLY					X						X	X		X	Pb, Cr, As - Diss
8	B21-2	2	1345	SOIL	4oz					X						X	X			
9	B21-5	5	1350	SOIL	4oz					X						X	X			~~HOLD FOR METALS~~ Run Metals
10	B21-W	—	1400	WTR	AMB/POLY					X						X	X		X	Pb, Cr, As, Ni - Diss
11	B22-6	6	1430	SOIL	4oz					X						X	X			
12	~~B22~~			~~SOIL~~	~~4oz~~					~~X~~						~~X~~	~~X~~			~~HOLD FOR METALS~~
13	B22-W	—	1440	WTR	AMB/POLY					X						X	X		X	Pb, Cd, Cr, As, Cu, Ni - Diss
14	MW5-3	3	1530	SOIL	4oz					X						X	X			
15	MW5-6	6	1540	SOIL	4oz					X						X	X			~~HOLD FOR METALS~~ Run Metals
16	B23-2	2	1600	SOIL	4oz					X						X	X			
17	B23-4	4	1605	SOIL	4oz					X						X	X			HOLD FOR METALS
18	B23-W	—	1615	WTR	AMB/POLY					X						X	X			

3-14-13 dissolved metals added per Max via email. STD

3-14-13 Run selected metals per Max STD

Relinquished by:	Date / Time	Received by:	Date / Time
Aaron Young	2-26-13 1624	[signature]	2-26-13 16:24
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
STD TURN
NEED EIM
We need EIM

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

Hydrocarbon Identification by NWTPH-HCID for Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)	Diesel (mg/kg)	Mineral Oil (mg/kg)	Heavy Oil (mg/kg)
Method Blank	2/27/13	90	nd	nd	nd	nd
B24-1	2/27/13	91	nd	nd	nd	nd
B24-2	2/27/13	92	nd	nd	nd	nd
B24-2 Dup	2/27/13	91	nd	nd	nd	nd
B25-2	2/27/13	93	nd	nd	nd	nd
HB7-2	2/27/13	95	nd	nd	nd	nd
Practical Quantitation Limit			20	50	100	100

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

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Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

Analyses of Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)
Method Blank	3/2/13	nd	nd	nd	nd
B24-1	3/2/13	nd	nd	9.0	6.5
B25-2	3/2/13	nd	nd	7.9	nd
HB7-2	3/2/13	nd	nd	9.2	6.5
Practical Quantitation Limit		5.0	1.0	5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	3/2/13	92%	101%	99%	88%
L130225-10 MS	3/2/13	86%	96%	101%	86%
L130225-10 MSD	3/2/13	96%	99%	89%	83%
RPD	3/2/13	11%	3%	13%	3%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

Analyses of Mercury in Soil by EPA Method 7471

Sample Number	Date Analyzed	Mercury (mg/kg)
Method Blank	3/4/13	nd
B24-1	3/4/13	nd
B25-2	3/4/13	nd
HB7-2	3/4/13	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	3/4/13	112%
L130227-1 MS	3/4/13	103%
L130227-1 MSD	3/4/13	103%
RPD	3/4/13	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

Analyses of Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (mg/kg)	Zinc (mg/kg)
Method Blank	3/2/13	nd	nd
B24-1	3/2/13	6.3	6.3
B25-2	3/2/13	nd	6.1
HB7-2	3/2/13	10	nd
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	3/2/13	95%	89%
L130225-10 MS	3/2/13	91%	92%
L130225-10 MSD	3/2/13	92%	99%
RPD	3/2/13	1%	8%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

Hydrocarbon Identification by NWTPH-HCID for Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (μg/l)	Diesel (μg/l)	Mineral Oil (μg/l)	Heavy Oil (μg/l)
Method Blank	2/27/13	84	nd	nd	nd	nd
B24-W	2/27/13	97	nd	nd	nd	nd
B25-W	2/27/13	97	nd	nd	nd	nd
Practical Quantitation Limit			200	500	500	500

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

Analyses of Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead µg/L	Cadmium µg/L	Chromium µg/L	Arsenic µg/L
Method Blank	3/2/13	nd	nd	nd	nd
B24-W	3/2/13	98	2.4	42	24
B25-W	3/2/13	17	nd	50	nd
Practical Quantitation Limit		5.0	0.5	10.0	3.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson & Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	3/2/13	103%	101%	99%	95%
L130301-9 MS	3/2/13	102%	92%	89%	93%
L130301-9 MSD	3/2/13	107%	94%	77%	97%
RPD	3/2/13	5%	2%	14%	4%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson & Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
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Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

Analyses of Mercury in Water by EPA Method 7470

Sample Number	Date Analyzed	Mercury µg/L
Method Blank	3/4/13	nd
B24-W	3/4/13	nd
B25-W	3/4/13	nd
B25-W Dup	3/4/13	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
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Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

QA/QC for Mercury by EPA Method 7470

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	3/4/13	112%
B25-W MS	3/4/13	94%
B25-W MSD	3/4/13	94%
RPD	3/4/13	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

Analyses of Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper µg/L	Zinc µg/L
Method Blank	3/2/13	nd	nd
B24-W	3/2/13	868	106
B25-W	3/2/13	89	124
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

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4139 Libby Road NE
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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	3/2/13	106%	100%
L130301-9 MS	3/2/13	111%	106%
L130301-9 MSD	3/2/13	119%	112%
RPD	3/2/13	7%	6%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-30
Client Project # 2491-001E

Analyses of Dissolved Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead µg/L	Cadmium µg/L	Chromium µg/L	Arsenic µg/L	Copper µg/L
Method Blank	3/17/13	nd	nd	nd	nd	nd
LCS	3/17/13	115%	99%	107%	119%	106%
B24-W	3/17/13	nd	-	-	nd	nd
B25-W	3/17/13	nd	-	nd	-	-
Practical Quantitation Limit		5.0	0.5	10.0	3.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

SPECTRA Laboratories

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

03/08/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project:	John Havens Estate
Client ID:	B24-1
Sample Matrix:	Soil
Date Sampled:	02/27/2013
Date Received:	03/01/2013
Spectra Project:	2013030009
Spectra Number:	2

Analyte	Result	Units	Method
Total Nickel	15.4	mg/Kg	SW846 6010B

Date Analyzed: 3-5-13 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a6/mlh

SPECTRA Laboratories

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

03/08/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project:	John Havens Estate
Client ID:	B25-2
Sample Matrix:	Soil
Date Sampled:	02/27/2013
Date Received:	03/01/2013
Spectra Project:	2013030009
Spectra Number:	3

Analyte	Result	Units	Method
Total Nickel	< 1.5	mg/Kg	SW846 6010B

Date Analyzed: 3-5-13 SCJ

SPECTRA LABORATORIES

Marie Holt for
Steve Hibbs, Laboratory Manager
a6/mlh

SPECTRA Laboratories

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03/08/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project:	John Havens Estate
Client ID:	HB7-2
Sample Matrix:	Soil
Date Sampled:	02/27/2013
Date Received:	03/01/2013
Spectra Project:	2013030009
Spectra Number:	4

Analyte	Result	Units	Method
Total Nickel	15	mg/Kg	SW846 6010B

Date Analyzed: 3-5-13 SCJ

SPECTRA LABORATORIES

Marie Holt for

Steve Hibbs, Laboratory Manager

a6/mlh

SPECTRA Laboratories

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03/08/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project:	John Havens Estate
Client ID:	B24-W
Sample Matrix:	Water
Date Sampled:	02/27/2013
Date Received:	03/01/2013
Spectra Project:	2013030009
Spectra Number:	5

Analyte	Result	Units	Method
Nickel	0.639	mg/L	EPA 200.7

Date Analyzed: 3-5-13 SCJ

SPECTRA LABORATORIES

Marie Nolt for

Steve Hibbs, Laboratory Manager

s6/mlh

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03/08/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project:	John Havens Estate
Client ID:	B25-W
Sample Matrix:	Water
Date Sampled:	02/27/2013
Date Received:	03/01/2013
Spectra Project:	2013030009
Spectra Number:	6

Analyte	Result	Units	Method
Nickel	0.174	mg/L	EPA 200.7

Date Analyzed: 3-5-13 SCJ

SPECTRA LABORATORIES

Marie Holt for

Steve Hibbs, Laboratory Manager

a6/mlh

SPECTRA Laboratories

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3/5/2013

Libby Environmental
4139 Libby Rd. NE
Olympia, WA 98506

Units: mg/L
Spectra Project: 2013030009
Applies to Spectra #'s 1 thru 4

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Soil/Solid

Method Blank

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	2.098	104.9

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013
Sample Spiked: 2013030045-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.156	2.0	2.008	92.6	1.994	91.9	0.8

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

SPECTRA Laboratories

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3/5/2013

Libby Environmental, Inc
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013030009
Applies to Spectra #'s	5 and 6

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Water/Liquid

Method Blank

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	1.0	0.963	96.3

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013
Sample Spiked: 2013030044-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.047	1.0	0.956	90.9	0.949	90.2	0.8

Recovery Limits 75-125%
RPD Limit 20

Spectra Laboratories

Steven G. Hibbs
Laboratory Manager

201303009

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Client: Libby Environmental
Address: SEE ABOVE
City: State: Zip:
Phone: Fax:
Client Project #

Date: 2-28-13
Page: 1 of 1
Project Manager: Jaime Deyman
Project Name: John Havens Estate
Location: City, State:
Collector: Date of Collection: 2/26/13 - 2/27/13
Email:

Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Nickle			Field Notes
2/26/13 1 B23-2			SOIL	4oz JAR											X				
2 B24-1			SOIL																
3 B25-2			SOIL																
4 HB7-2			SOIL																
5 B24-W			H2O	Poly															
6 B25-W			H2O																
7																			
8																			
9																			
10																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	2/28/13 9:30	[signature]	3/1/13 @ 1000
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Record pH here:
5 DAY
STD

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

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03/21/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project:	John Havens Estate
Client ID:	B24-W
Sample Matrix:	Water
Date Sampled:	02/27/2013
Date Received:	03/15/2013
Spectra Project:	2013030344
Spectra Number:	1

Analyte	Result	Units	Method
Dissolved Nickel	< 0.015	mg/L	EPA 200.7

Dated analyzed: 3-20-13 SCJ

SPECTRA LABORATORIES

For

Steve Hibbs, Laboratory Manager
a6/scj

SPECTRA Laboratories

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March 20, 2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013030344
Applies to Spectra #'s	1

QUALITY CONTROL RESULTS

ICP Dissolved Metals - EPA Method 200.7 - Water

Dissolved Filter Blank

Date Digested: 3/20/2013 Date Analyzed: 3/20/2013

Element	Result
Nickel	< 0.015

Initial Calibration Verification (ICV)

Date Digested: 3/20/2013 Date Analyzed: 3/20/2013

Element	ICV Conc.	ICV Result	ICV %Rec
Nickel	1.0	0.973	97.3

ICV Recovery limits 95-105%

Spectra Laboratories

Steve Hibbs
Laboratory Manager

2018030344

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Client: Libby Environmental, Inc.
Address: (see above)
City: State: Zip:
Phone: Fax:
Client Project #

Date: 3-14-13 Page: 1 of 1
Project Manager: Jamie Deyman
Project Name: John Havens Estate
Location: City, State: Olympia, WA
Collector: Date of Collection: 2-27-13
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Dissolved Ni	Field Notes
1	B24-W	–	930	H2O	Poly												✓	
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	3-14-13	[signature]	3/15/13 @ 0935

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks:
Standard
EDD

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: ~~2/26/13~~ 2/27/13 ~~day~~

Page: ~~2~~ 1 of ~~2~~ 1

Client: ROBINSON NOBLE	Project Manager: MAX WILLS
Address: 3011 S HUSON SUITE A	Project Name: JOHN HAWKINS ESTATE
City: TACOMA State: WA Zip: 98409	Location: 411 93rd AVE SE City, State: OLYMPIA WA
Phone: (253) 475-7711 Fax:	Collector: ACY Date of Collection: ~~2/26/13~~
Client Project # 2491-001E	Email: MWILLS@ROBINSON-NOBLE.COM 2-27-13

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Zinc, Copper, Nickel	see notes	3-14-13 dissolved metals added per Max via email. STD	Field Notes
1	B24-1	1	914	SOIL	4oz					X						X	X			
2	B2~~4~~-2	2	920	SOIL	4oz					X						X	X			HOLD FOR METALS
3	B24-W	—	930	WTR	AMB/POLY					X						X	X	X		Pb, As, Cu, Ni - Diss
4	B25-2	2	1010	SOIL	4oz					X						X	X			
~~5~~	~~B25~~			~~SOIL~~	~~4oz~~					~~X~~						~~X~~	~~X~~			~~HOLD FOR METALS~~
6	B25-W	—	1020	WTR	AMB/POLY					X						X	X	X		Pb, Cr - Diss
7	HB7-2	2	1305	Soil	4oz					X						X	X			
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time	Sample Receipt:		Remarks:
[signature]	2-27-13	[signature] Deyman	2/27/13 130pm	Good Condition?		SD TURN
Relinquished by:	Date / Time	Received by:	Date / Time	Cold?		NEED EIM
Relinquished by:	Date / Time	Received by:	Date / Time	Seals Intact?		
				Total Number of Containers		TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-1
Client Project # 2491-001E

Hydrocarbon Identification by NWTPH-HCID for Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)	Diesel (mg/kg)	Mineral Oil (mg/kg)	Heavy Oil (mg/kg)
Method Blank	3/4/13	101	nd	nd	nd	nd
HB8-3	3/4/13	103	nd	nd	nd	nd
HB1-3	3/4/13	117	nd	nd	nd	nd
HB2-3	3/4/13	96	nd	nd	nd	nd
HB4-3	3/4/13	113	nd	nd	nd	nd
HB3-3	3/4/13	97	nd	nd	nd	nd
HB3-3 Dup	3/4/13	118	nd	nd	nd	nd
Practical Quantitation Limit			20	50	100	100

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-1
Client Project # 2491-001E

Analyses of Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)
Method Blank	3/2/13	nd	nd	nd	nd
HB8-3	3/2/13	nd	nd	7.9	6.3
HB1-3	3/2/13	nd	nd	8.0	8.9
HB2-3	3/2/13	nd	nd	8.4	8.2
HB4-3	3/2/13	nd	nd	7.6	nd
HB3-3	3/2/13	nd	nd	7.7	6.1
HB3-3 Dup	3/2/13	nd	nd	7.8	5.9
Practical Quantitation Limit		5.0	1.0	5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-1
Client Project # 2491-001E

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	3/2/13	92%	101%	99%	88%
HB3-3 MS	3/2/13	103%	98%	88%	114%
HB3-3 MSD	3/2/13	111%	99%	89%	99%
RPD	3/2/13	8%	1%	1%	14%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-1
Client Project # 2491-001E

Analyses of Mercury in Soil by EPA Method 7471

Sample Number	Date Analyzed	Mercury (mg/kg)
Method Blank	3/4/13	nd
HB8-3	3/4/13	nd
HB1-3	3/4/13	nd
HB2-3	3/4/13	nd
HB4-3	3/4/13	nd
HB3-3	3/4/13	nd
HB3-3 Dup	3/4/13	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-1
Client Project # 2491-001E

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	3/4/13	112%
HB3-3 MS	3/4/13	103%
HB3-3 MSD	3/4/13	103%
RPD	3/4/13	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-1
Client Project # 2491-001E

Analyses of Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (mg/kg)	Zinc (mg/kg)
Method Blank	3/2/13	nd	nd
HB8-3	3/2/13	13	nd
HB1-3	3/2/13	12	25
HB2-3	3/2/13	13	nd
HB4-3	3/2/13	nd	nd
HB3-3	3/2/13	11	nd
HB3-3 Dup	3/2/13	10	nd
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130227-1
Client Project # 2491-001E

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	3/2/13	95%	89%
HB3-3 MS	3/2/13	93%	90%
HB3-3 MSD	3/2/13	82%	97%
RPD	3/2/13	13%	8%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

SPECTRA Laboratories

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03/07/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project: John Havens Estate
Sample Matrix: Soil
Date Sampled: 02/27/2013
Date Received: 03/01/2013
Spectra Project: 2013030010

Client ID	Spectra #	Analyte	Result	Units	Method
HB8-3	1	Total Nickel	22.2	mg/Kg	SW846 6010B
HB1-3	2	Total Nickel	20.0	mg/Kg	SW846 6010B
HB2-3	3	Total Nickel	18.6	mg/Kg	SW846 6010B
HB4-3	4	Total Nickel	9.5	mg/Kg	SW846 6010B
HB3-3	5	Total Nickel	19.9	mg/Kg	SW846 6010B

Date Analyzed - 3-5-13 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

a7/scj

SPECTRA Laboratories

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3/5/2013

Libby Environmental
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013030010
Applies to Spectra #'s	1 thru 5

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Soil/Solid

Method Blank

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	2.098	104.9

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013
Sample Spiked: 2013030045-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.156	2.0	2.008	92.6	1.994	91.9	0.8

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

2013 030010

Libby Environmental, Inc. — Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE — Ph: 360-352-2110
Olympia, WA 98506 — Fax: 360-352-4154

Client: Libby Environmental, Inc.
Address: (see above)
City: State: Zip:
Phone: Fax:
Client Project #

Date: 2-28-13 Page: 1 of 1
Project Manager: Jamie Deyman
Project Name: John Havens Estate
Location: City, State: Olympia, WA
Collector: Date of Collection: 2-27-13
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Nickel			Field Notes
1	HB8-3	3	1410	Soil	Jar												X			
2	HB1-3	3	1445	↓	↓												X			
3	HB2-3	3	1500	↓	↓												X			
4	HB4-3	3	1530	↓	↓												X			
5	HB3-3	3	1545	↓	↓												X			
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	2/28/13 9:30	[signature]	3/1/13 @ 1000

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks:

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 2-27-13 Page: 1 of 1

Client: Robinson Noble
Address: 3011 S Huson Suite A
City: Tacoma State: WA Zip: 98409
Phone: 253-475-7711 Fax:
Client Project # 2491-001E

Project Manager: Max Wills
Project Name: John Havens Estate
Location: 411 93rd Ave SE City, State: Olympia
Collector: ACY Date of Collection: 2-27-13
Email: mwills@robinson-noble.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Zinc, copper, nickel			Field Notes
1	HB8-3	3	1410	Soil	4 oz					X						X	X			
2	HB1-3	3	1445	↓	↓					X						X	X			
3	HB2-3	3	1500	↓	↓					X						X	X			
4	HB4-3	3	1530	↓	↓					X						X	X			
5	HB3-3	3	1545	↓	↓					X						X	X			
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	2-27-13 15:14	[signature]	2-27-13 1515
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks: EIM Please

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130228-3
Client Project # 2491-001E

Hydrocarbon Identification by NWTPH-HCID for Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)	Diesel (mg/kg)	Mineral Oil (mg/kg)	Heavy Oil (mg/kg)
Method Blank	3/5/13	100	nd	nd	nd	nd
HB5-1	3/5/13	92	nd	nd	nd	nd
HB6-1	3/5/13	80	nd	nd	nd	nd
HB9-1	3/5/13	92	nd	nd	nd	nd
HB10-1	3/5/13	87	nd	nd	nd	nd
HB10-1 Dup	3/5/13	93	nd	nd	nd	nd
Practical Quantitation Limit			20	50	100	100

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

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Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130228-3
Client Project # 2491-001E

Analyses of Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)
Method Blank	3/2/13	nd	nd	nd	nd
HB5-1	3/2/13	nd	nd	nd	nd
HB6-1	3/2/13	nd	nd	nd	nd
HB9-1	3/2/13	nd	nd	nd	nd
HB10-1	3/2/13	43	nd	6.1	5.6
Practical Quantitation Limit		5.0	1.0	5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130228-3
Client Project # 2491-001E

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	3/2/13	92%	101%	99%	88%
L130225-10 MS	3/2/13	86%	96%	101%	86%
L130225-10 MSD	3/2/13	96%	99%	89%	83%
RPD	3/2/13	11%	3%	13%	3%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
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Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130228-3
Client Project # 2491-001E

Analyses of Mercury in Soil by EPA Method 7471

Sample Number	Date Analyzed	Mercury (mg/kg)
Method Blank	3/4/13	nd
HB5-1	3/4/13	nd
HB6-1	3/4/13	nd
HB9-1	3/4/13	nd
HB10-1	3/4/13	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130228-3
Client Project # 2491-001E

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	3/4/13	112%
L130227-1 MS	3/4/13	103%
L130227-1 MSD	3/4/13	103%
RPD	3/4/13	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130228-3
Client Project # 2491-001E

Analyses of Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (mg/kg)	Zinc (mg/kg)
Method Blank	3/2/13	nd	nd
HB5-1	3/2/13	nd	nd
HB6-1	3/2/13	nd	nd
HB9-1	3/2/13	nd	nd
HB10-1	3/2/13	5.5	nd
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130228-3
Client Project # 2491-001E

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	3/2/13	95%	89%
L130225-10 MS	3/2/13	91%	92%
L130225-10 MSD	3/2/13	92%	99%
RPD	3/2/13	1%	8%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

SPECTRA Laboratories

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

03/06/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project: John Havens Estate
Sample Matrix: Soil
Date Sampled: 02/28/2013
Date Received: 03/01/2013
Spectra Project: 2013030012

Client ID	Spectra #	Analyte	Result	Units	Method
HB5-1	1	Total Nickel	15.7	mg/Kg	SW846 6010B
HB6-1	2	Total Nickel	< 1.5	mg/Kg	SW846 6010B
HB9-1	3	Total Nickel	209	mg/Kg	SW846 6010B
HB10-1	4	Total Nickel	< 1.5	mg/Kg	SW846 6010B

Date analyzed: 3-5-13 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a7/scj

SPECTRA Laboratories
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3/5/2013

Libby Environmental
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013030012
Applies to Spectra #'s	1 thru 4

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Soil/Solid

Method Blank

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	2.098	104.9

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013
Sample Spiked: 2013030045-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.156	2.0	2.008	92.6	1.994	91.9	0.8

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

2013030012

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Date: 3-1-13 | Page: 1 of 1

Client: Libby Environmental, Inc
Address: (see above)
City: | State: | Zip:
Phone: | Fax:
Client Project #

Project Manager: Jamie Deyman
Project Name: John Havens Estate
Location: | City, State: Olympia, WA
Collector: | Date of Collection: 2-28-13
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Nickel		Field Notes
1	HB5-1	1	907	Soil	Jar														
2	HB6-1	1	945	↓	↓														
3	HB9-1	1	1045	↓	↓														
4	HB10-1	1	1100	↓	↓														
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	3/1/13 10:25	[signature]	3/1/13 @ 1025

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks:

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 2-28-13 Page: 1 of 1

Client: Robinson Noble

Project Manager: Max Wills

Address: 3011 South Huson, Suite A

Project Name: John Havens Estate

City: Tacoma State: WA Zip: 98409

Location: 411 93rd Ave SE City, State: Olympia

Phone: 253-475-7711 Fax:

Collector: ACY Date of Collection: 2-28-13

Client Project # 2491-001 E

Email:

Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	zinc, copper, nickel			Field Notes
1 HB 5-1	1	9:07	Soil	4 oz					X						X	X			
2 HB 6-1	1	9:45	↓	↓					X						X	X			
3 HB 9-1	1	10:45	↓	↓					X						X	X			
4 HB 10-1	1	11:00	↓	↓					X						X	X			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
Aaron Young	2-28-13	[signature]	2-28-13 4:43 pm
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks: EIM please

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130301-9
Client Project # 2491-001E

Hydrocarbon Identification by NWTPH-HCID for Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (μg/l)	Diesel (μg/l)	Mineral Oil (μg/l)	Heavy Oil (μg/l)
Method Blank	3/4/13	101	nd	nd	nd	nd
MW-5	3/4/13	98	nd	nd	nd	nd
MW-4	3/4/13	106	nd	nd	nd	nd
Practical Quantitation Limit			200	500	500	500

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130301-9
Client Project # 2491-001E

Analyses of Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead µg/L	Cadmium µg/L	Chromium µg/L	Arsenic µg/L
Method Blank	3/2/13	nd	nd	nd	nd
MW-5	3/2/13	11	nd	nd	nd
MW-4	3/2/13	nd	nd	nd	nd
MW-4 Dup	3/2/13	nd	nd	nd	nd
Practical Quantitation Limit		5.0	0.5	10.0	3.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson & Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130301-9
Client Project # 2491-001E

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	3/2/13	103%	101%	99%	95%
MW-4 MS	3/2/13	102%	92%	89%	93%
MW-4 MSD	3/2/13	107%	94%	77%	97%
RPD	3/2/13	5%	2%	14%	4%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson & Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130301-9
Client Project # 2491-001E

Analyses of Mercury in Water by EPA Method 7470

Sample Number	Date Analyzed	Mercury µg/L
Method Blank	3/6/13	nd
MW-5	3/6/13	nd
MW-4	3/6/13	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130301-9
Client Project # 2491-001E

QA/QC for Mercury by EPA Method 7470

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	3/6/13	113%
L130225-10 MS	3/6/13	113%
L130225-10 MSD	3/6/13	113%
RPD	3/6/13	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130301-9
Client Project # 2491-001E

Analyses of Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper µg/L	Zinc µg/L
Method Blank	3/2/13	nd	nd
MW-5	3/2/13	5.1	7.9
MW-4	3/2/13	nd	5.9
MW-4 Dup	3/2/13	nd	6.0
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

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Olympia, WA 98506
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FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130301-9
Client Project # 2491-001E

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	3/2/13	106%	100%
MW-4 MS	3/2/13	111%	106%
MW-4 MSD	3/2/13	119%	112%
RPD	3/2/13	7%	6%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

SPECTRA Laboratories

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

03/11/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project:	John Havens Estate
Sample Matrix:	Water
Date Sampled:	03/01/2013
Date Received:	03/05/2013
Spectra Project:	2013030074

Client ID	Spectra #	Analyte	Result	Units	Method
MW-5	1	Nickel	< 0.015	mg/L	EPA 200.7
MW-4	2	Nickel	< 0.015	mg/L	EPA 200.7

Date Anaylzed: 3-11-13 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a7/scj

SPECTRA Laboratories

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

March 11, 2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013030074
Applies to Spectra #'s	1 and 2

QUALITY CONTROL RESULTS

ICP Metals - EPA Method 200.7 - Water

Method Blank

Date Digested: 3/11/2013 Date Analyzed: 3/11/2013

Element	Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/11/2013 Date Analyzed: 3/11/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	1.0	1.011	101.1

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/11/2013 Date Analyzed: 3/11/2013
Sample Spiked: 2013030077-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.072	1.0	0.840	76.8	0.833	76.1	0.9

Recovery Limits 75-125%
RPD Limit 20

Spectra Laboratories

Steve Hibbs
Laboratory Manager

2013030074

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

www.LibbyEnvironmental.com

Client: Libby Environmental, Inc.	Date: 3/6/13
Address: (see above)	Project Manager: Jamie Deyman
City: State: Zip:	Project Name: John Havens Estate
Phone: Fax:	Location: City, State: Olympia, WA
Client Project #	Collector: Date of Collection: 3-1-13
	Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Nickel			Field Notes
1	MW-5		12:45	Water	poly												X			
2	MW-4		14:40	↓	poly												X			
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	3/5/13 2:30pm	Marie Holt	3-5-13 2:30
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506

Ph: 360-352-2110
Fax: 360-352-4154

Date: 3-1-13
Page: 1 of 1

Client: Robinson Noble
Address: 3011 South Huson Street, Suite A
City: Tacoma State: WA Zip: 98409
Phone: 253-475-7711 Fax:
Client Project # 2491-001 E

Project Manager: Max Wills
Project Name: John Havens
Location: 411 93rd Ave SE City, State: Olympia
Collector: ACY Date of Collection: 3-1-13
Email:

Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Zinc, copper, nickel			Field Notes
1 MW-5		12:45	water	1 amber 4 poly					X						X	X			
2 MW-4		14:40	↓	↓					X						X	X			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
Aaron Young	3-1-13 1536	Ez 2k	3-1-13 1536

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks: EIM please

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

Hydrocarbon Identification by NWTPH-HCID for Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)	Diesel (mg/kg)	Light Oil (mg/kg)	Heavy Oil (mg/kg)
Method Blank	2/25/13	100	nd	nd	nd	nd
B12-3	2/25/13	101	nd	nd	nd	nd
B12-8	2/25/13	98	nd	nd	nd	nd
B13-3	2/25/13	100	nd	nd	nd	nd
B13-8	2/25/13	96	nd	nd	nd	nd
B14-3	2/25/13	100	nd	nd	nd	nd
B14-3 Dup	2/25/13	112	nd	nd	nd	nd
B14-8	2/25/13	92	nd	nd	nd	nd
MW-4-3	2/25/13	102	nd	nd	nd	nd
MW-4-9	2/25/13	100	nd	nd	nd	nd
B15-3	2/25/13	88	nd	nd	nd	nd
B15-10	2/25/13	99	nd	nd	nd	nd
B16-3	2/25/13	106	nd	nd	nd	nd
B16-10	2/25/13	89	nd	nd	nd	nd
B17-3	2/25/13	91	nd	nd	nd	nd
B17-9	2/25/13	91	nd	nd	nd	nd
B17-9 Dup	2/25/13	94	nd	nd	nd	nd
Practical Quantitation Limit			20	50	100	100

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		Method Blank	B12-3	B12-3 Dup	B12-8	B13-3	B13-8
Date Sampled	Reporting	N/A	2/25/13	2/25/13	2/25/13	2/25/13	2/25/13
Date Analyzed	Limits	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd	nd	nd	nd	nd
Chloromethane	0.06	nd	nd	nd	nd	nd	nd
Vinyl chloride	0.02	nd	nd	nd	nd	nd	nd
Bromomethane	0.09	nd	nd	nd	nd	nd	nd
Chloroethane	0.06	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd
Methylene chloride	0.02	nd	nd	nd	nd	nd	nd
Methyl *tert-* Butyl Ether (MTBE)	0.02	nd	nd	nd	nd	nd	nd
trans -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	0.02	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
Chloroform	0.02	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Benzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.03	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.02	nd	nd	nd	nd	nd	nd
Dibromomethane	0.04	nd	nd	nd	nd	nd	nd
Bromodichloromethane	0.02	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Toluene	0.02	nd	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
Dibromochloromethane	0.03	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd	nd	nd	nd
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd	nd
Ethylbenzene	0.03	nd	nd	nd	nd	nd	nd
Total Xylenes	0.03	nd	nd	nd	nd	nd	nd
Styrene	0.02	nd	nd	nd	nd	nd	nd

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Robinson Noble
Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		Method Blank	B12-3	B12-3 Dup	B12-8	B13-3	B13-8
Date Sampled	Reporting	N/A	2/25/13	2/25/13	2/25/13	2/25/13	2/25/13
Date Analyzed	Limits	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.02	nd	nd	nd	nd	nd	nd
Isopropylbenzene	0.08	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.02	nd	nd	nd	nd	nd	nd
Bromobenzene	0.03	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.02	nd	nd	nd	nd	nd	nd
n-Propylbenzene	0.02	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
Isopropyltoluene	0.02	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
n-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.03	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd	nd	nd	nd	nd
Naphthalenes	0.03	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	1.0	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		102	106	105	104	103	100
1,2-Dichloroethane-d4		111	112	112	114	117	108
Toluene-d8		109	107	103	102	100	100
4-Bromofluorobenzene		101	96	100	100	97	99

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

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Robinson Noble
Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		B14-3	B14-8	B15-3	B15-10	B16-3	B16-10
Date Sampled	Reporting	2/25/13	2/25/13	2/25/13	2/25/13	2/25/13	2/25/13
Date Analyzed	Limits	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd	nd	nd	nd	nd
Chloromethane	0.06	nd	nd	nd	nd	nd	nd
Vinyl chloride	0.02	nd	nd	nd	nd	nd	nd
Bromomethane	0.09	nd	nd	nd	nd	nd	nd
Chloroethane	0.06	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd
Methylene chloride	0.02	nd	nd	nd	nd	nd	nd
Methyl *tert-* Butyl Ether (MTBE)	0.02	nd	nd	nd	nd	nd	nd
trans -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	0.02	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
Chloroform	0.02	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Benzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.03	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.02	nd	nd	nd	nd	nd	nd
Dibromomethane	0.04	nd	nd	nd	nd	nd	nd
Bromodichloromethane	0.02	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Toluene	0.02	nd	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
Dibromochloromethane	0.03	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd	nd	nd	nd
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd	nd
Ethylbenzene	0.03	nd	nd	nd	nd	nd	nd
Total Xylenes	0.03	nd	nd	nd	nd	nd	nd
Styrene	0.02	nd	nd	nd	nd	nd	nd

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Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		B14-3	B14-8	B15-3	B15-10	B16-3	B16-10
Date Sampled	Reporting	2/25/13	2/25/13	2/25/13	2/25/13	2/25/13	2/25/13
Date Analyzed	Limits	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.02	nd	nd	nd	nd	nd	nd
Isopropylbenzene	0.08	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.02	nd	nd	nd	nd	nd	nd
Bromobenzene	0.03	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.02	nd	nd	nd	nd	nd	nd
n-Propylbenzene	0.02	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
Isopropyltoluene	0.02	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd
n-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.03	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd	nd	nd	nd	nd
Naphthalenes	0.03	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	1.0	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		106	108	110	105	107	103
1,2-Dichloroethane-d4		116	122	123	118	118	109
Toluene-d8		106	102	104	97	97	96
4-Bromofluorobenzene		96	98	98	99	100	95

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
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Libby Project # L130225-10
Client Project # 2491-001E

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		B17-3	B17-9	B17-9 Dup
Date Sampled Date Analyzed	Reporting Limits (mg/kg)	2/25/13 2/27/13 (mg/kg)	2/25/13 2/27/13 (mg/kg)	2/25/13 2/27/13 (mg/kg)
Dichlorodifluoromethane	0.06	nd	nd	nd
Chloromethane	0.06	nd	nd	nd
Vinyl chloride	0.02	nd	nd	nd
Bromomethane	0.09	nd	nd	nd
Chloroethane	0.06	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd
Methylene chloride	0.02	nd	nd	nd
Methyl *tert-* Butyl Ether (MTBE)	0.02	nd	nd	nd
trans -1,2-Dichloroethene	0.02	nd	nd	nd
1,1-Dichloroethane	0.02	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd
cis -1,2-Dichloroethene	0.02	nd	nd	nd
Chloroform	0.02	nd	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd	nd
Carbon tetrachloride	0.02	nd	nd	nd
1,1-Dichloropropene	0.02	nd	nd	nd
Benzene	0.02	nd	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd
Trichloroethene (TCE)	0.03	nd	nd	nd
1,2-Dichloropropane	0.02	nd	nd	nd
Dibromomethane	0.04	nd	nd	nd
Bromodichloromethane	0.02	nd	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd	nd
Toluene	0.02	nd	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd
Dibromochloromethane	0.03	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd
Chlorobenzene	0.02	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd	nd
Ethylbenzene	0.03	nd	nd	nd
Total Xylenes	0.03	nd	nd	nd
Styrene	0.02	nd	nd	nd

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Client Project # 2491-001E

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		B17-3	B17-9	B17-9 Dup
Date Sampled	Reporting	2/25/13	2/25/13	2/25/13
Date Analyzed	Limits	2/27/13	2/27/13	2/27/13
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.02	nd	nd	nd
Isopropylbenzene	0.08	nd	nd	nd
1,2,3-Trichloropropane	0.02	nd	nd	nd
Bromobenzene	0.03	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.02	nd	nd	nd
n-Propylbenzene	0.02	nd	nd	nd
2-Chlorotoluene	0.02	nd	nd	nd
4-Chlorotoluene	0.02	nd	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd	nd
tert-Butylbenzene	0.02	nd	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd	nd
sec-Butylbenzene	0.02	nd	nd	nd
1,3-Dichlorobenzene	0.02	nd	nd	nd
Isopropyltoluene	0.02	nd	nd	nd
1,4-Dichlorobenzene	0.02	nd	nd	nd
1,2-Dichlorobenzene	0.02	nd	nd	nd
n-Butylbenzene	0.02	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.03	nd	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd	nd
Naphthalenes	0.03	nd	nd	nd
1,2,3-Trichlorobenzene	1.0	nd	nd	nd
Surrogate Recovery				
Dibromofluoromethane		108	102	106
1,2-Dichloroethane-d4		123	113	115
Toluene-d8		98	97	97
4-Bromofluorobenzene		99	100	98

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

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QA/QC Data - EPA 8260C Analyses

Sample Identification: B12-8

	Matrix Spike			Matrix Spike Duplicate			RPD
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	Spiked Conc. (µg/l)	Measured Conc. (µg/l)	Spike Recovery (%)	
1,1-Dichloroethene	0.50	0.439	88	0.50	0.4	89	1.8
Benzene	0.50	0.5	107	0.50	0.5	110	3.0
Toluene	0.50	0.5	101	0.50	0.5	103	2.4
Chlorobenzene	0.50	0.5	97	0.50	0.5	98	0.8
Trichloroethene (TCE)	0.50	0.5	102	0.50	0.5	105	2.9
Surrogate Recovery							
Dibromofluoromethane			101			106	
1,2-Dichloroethane-d4			105			125	
Toluene-d8			101			105	
4-Bromofluorobenzene			93			97	

	Laboratory Control Sample		
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
1,1-Dichloroethene	0.50	0.4	88
Benzene	0.50	0.5	98
Toluene	0.50	0.5	94
Chlorobenzene	0.50	0.4	90
Trichloroethene (TCE)	0.50	0.5	98
Surrogate Recovery			
Dibromofluoromethane			97
1,2-Dichloroethane-d4			98
Toluene-d8			107
4-Bromofluorobenzene			98

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Kyle Williams

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Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

Analyses of Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)
Method Blank	3/2/13	nd	nd	nd	nd
MW-4-3	3/2/13	nd	nd	7.3	8.3
B15-3	3/2/13	nd	nd	nd	8.8
B16-3	3/2/13	nd	nd	7.6	8.6
B17-3	3/2/13	nd	nd	nd	9.7
B17-3 Dup	3/2/13	nd	nd	nd	9.9
B17-9	3/17/13	nd	nd	14.1	nd
Practical Quantitation Limit		5.0	1.0	5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

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Libby Project # L130225-10
Client Project # 2491-001E

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	3/2/13	92%	101%	99%	88%
B17-3 MS	3/2/13	86%	96%	101%	86%
B17-3 MSD	3/2/13	96%	99%	89%	83%
RPD	3/2/13	11%	3%	13%	3%
LCS	3/17/13	109%	103%	92%	103%
L130226-30 MS	3/17/13	105%	90%	92%	86%
L130226-30 MSD	3/17/13	94%	93%	85%	92%
RPD	3/17/13	11%	3%	8%	7%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

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Robinson Noble
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Libby Project # L130225-10
Client Project # 2491-001E

Analyses of Mercury in Soil by EPA Method 7471

Sample Number	Date Analyzed	Mercury (mg/kg)
Method Blank	2/27/13	nd
MW-4-3	2/27/13	nd
B15-3	2/27/13	nd
B16-3	2/27/13	nd
B17-3	2/27/13	nd
B17-3 Dup	2/27/13	nd
B17-9	3/19/13	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	2/27/13	112%
B17-3 MS	2/27/13	103%
B17-3 MSD	2/27/13	103%
RPD	2/27/13	0%
LCS	3/19/13	106%
B17-3 MS	3/19/13	106%
B17-3 MSD	3/19/13	106%
RPD	3/19/13	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

Analyses of Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (mg/kg)	Zinc (mg/kg)
Method Blank	3/2/13	nd	nd
MW-4-3	3/2/13	12	nd
B15-3	3/2/13	13	nd
B16-3	3/2/13	14	5.3
B17-3	3/2/13	12	nd
B17-3 Dup	3/2/13	12	nd
B17-9	3/17/13	20	16
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

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QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	3/2/13	95%	89%
B17-3 MS	3/2/13	91%	92%
B17-3 MSD	3/2/13	92%	99%
RPD	3/2/13	1%	8%
LCS	3/17/13	116%	106%
L130226-30 MS	3/17/13	85%	95%
L130226-30 MSD	3/17/13	91%	85%
RPD	3/17/13	7%	11%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

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Hydrocarbon Identification by NWTPH-HCID for Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (µg/l)	Diesel (µg/l)	Mineral Oil (µg/l)	Heavy Oil (µg/l)
Method Blank	2/25/13	100	nd	nd	nd	nd
B12-W	2/25/13	103	nd	nd	nd	nd
B13-W	2/25/13	93	nd	nd	nd	nd
B14-W	2/25/13	93	nd	nd	nd	nd
B14-W Dup	2/25/13	109	nd	nd	nd	nd
B15-W	2/25/13	98	nd	nd	nd	nd
B16-W	2/25/13	106	nd	nd	nd	nd
B16-W Dup	2/25/13	89	nd	nd	nd	nd
B17-W	2/25/13	101	nd	nd	nd	nd
Practical Quantitation Limit			200	500	500	500

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

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JOHN HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

Volatile Organic Compounds by EPA Method 8260C in Water

Sample Description		Method Blank	B12-W	B12-W Dup	B13-W	B14-W	B15-W
Date Sampled	Reporting	N/A	2/25/13	2/25/13	2/25/13	2/25/13	2/25/13
Date Analyzed	Limits	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13
	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)
Dichlorodifluoromethane	2.0	nd	nd	nd	nd	nd	nd
Chloromethane	2.0	nd	nd	nd	nd	nd	nd
Vinyl chloride	0.2	nd	nd	nd	nd	nd	nd
Bromomethane	2.0	nd	nd	nd	nd	nd	nd
Chloroethane	2.0	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	2.0	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	2.0	nd	nd	nd	nd	nd	nd
Methylene chloride	1.0	nd	nd	nd	nd	nd	nd
Methyl *tert-* Butyl Ether (MTBE)	5.0	nd	nd	nd	nd	nd	nd
trans -1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	1.0	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	2.0	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
Chloroform	1.0	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	1.0	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	1.0	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	1.0	nd	nd	nd	nd	nd	nd
Benzene	1.0	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	1.0	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	1.0	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	1.0	nd	nd	nd	nd	nd	nd
Dibromomethane	1.0	nd	nd	nd	nd	nd	nd
Bromodichloromethane	1.0	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	1.0	nd	nd	nd	nd	nd	nd
Toluene	1.0	nd	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	1.0	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	1.0	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd	nd	1.90	nd	nd
1,3-Dichloropropane	1.0	nd	nd	nd	nd	nd	nd
Dibromochloromethane	1.0	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.01	nd	nd	nd	nd	nd	nd
Chlorobenzene	1.0	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	1.0	nd	nd	nd	nd	nd	nd
Ethylbenzene	1.0	nd	nd	nd	nd	nd	nd
Total Xylenes	2.0	nd	nd	nd	nd	nd	nd
Styrene	1.0	nd	nd	nd	nd	nd	nd

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Robinson Noble
Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

Volatile Organic Compounds by EPA Method 8260C in Water

Sample Description		Method Blank	B12-W	B12-W Dup	B13-W	B14-W	B15-W
Date Sampled	Reporting	N/A	2/25/13	2/25/13	2/25/13	2/25/13	2/25/13
Date Analyzed	Limits	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13	2/27/13
	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)
Bromoform	1.0	nd	nd	nd	nd	nd	nd
Isopropylbenzene	4.0	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	1.0	nd	nd	nd	nd	nd	nd
Bromobenzene	1.0	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	1.0	nd	nd	nd	nd	nd	nd
n-Propylbenzene	1.0	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	1.0	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	1.0	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	1.0	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	1.0	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	1.0	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	1.0	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	1.0	nd	nd	nd	nd	nd	nd
Isopropyltoluene	1.0	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	1.0	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	1.0	nd	nd	nd	nd	nd	nd
n-Butylbenzene	1.0	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	1.0	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	2.0	nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	5.0	nd	nd	nd	nd	nd	nd
Naphthalenes	5.0	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	5.0	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		99	100	98	97	97	94
1,2-Dichloroethane-d4		95	107	107	103	110	108
Toluene-d8		103	103	102	103	103	102
4-Bromofluorobenzene		104	104	105	106	101	105

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

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Robinson Noble
Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

Volatile Organic Compounds by EPA Method 8260C in Water

Sample Description		B16-W	B17-W
Date Sampled	Reporting	2/25/13	2/25/13
Date Analyzed	Limits	2/27/13	2/27/13
	(µg/l)	(µg/l)	(µg/l)
Dichlorodifluoromethane	2.0	nd	nd
Chloromethane	2.0	nd	nd
Vinyl chloride	0.2	nd	nd
Bromomethane	2.0	nd	nd
Chloroethane	2.0	nd	nd
Trichlorofluoromethane	2.0	nd	nd
1,1-Dichloroethene	2.0	nd	nd
Methylene chloride	1.0	nd	nd
Methyl *tert-* Butyl Ether (MTBE)	5.0	nd	nd
trans -1,2-Dichloroethene	1.0	nd	nd
1,1-Dichloroethane	1.0	nd	nd
2,2-Dichloropropane	2.0	nd	nd
cis -1,2-Dichloroethene	1.0	nd	nd
Chloroform	1.0	nd	nd
1,1,1-Trichloroethane (TCA)	1.0	nd	nd
Carbon tetrachloride	1.0	nd	nd
1,1-Dichloropropene	1.0	nd	nd
Benzene	1.0	nd	nd
1,2-Dichloroethane (EDC)	1.0	nd	nd
Trichloroethene (TCE)	1.0	nd	nd
1,2-Dichloropropane	1.0	nd	nd
Dibromomethane	1.0	nd	nd
Bromodichloromethane	1.0	nd	nd
cis-1,3-Dichloropropene	1.0	nd	nd
Toluene	1.0	nd	nd
Trans-1,3-Dichloropropene	1.0	nd	nd
1,1,2-Trichloroethane	1.0	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd
1,3-Dichloropropane	1.0	nd	nd
Dibromochloromethane	1.0	nd	nd
1,2-Dibromoethane (EDB) *	0.01	nd	nd
Chlorobenzene	1.0	nd	nd
1,1,1,2-Tetrachloroethane	1.0	nd	nd
Ethylbenzene	1.0	nd	nd
Total Xylenes	2.0	nd	nd
Styrene	1.0	nd	nd

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Volatile Organic Compounds by EPA Method 8260C in Water

Sample Description		B16-W	B17-W
Date Sampled	Reporting	2/25/13	2/25/13
Date Analyzed	Limits	2/27/13	2/27/13
	(μg/l)	(μg/l)	(μg/l)
Bromoform	1.0	nd	nd
Isopropylbenzene	4.0	nd	nd
1,2,3-Trichloropropane	1.0	nd	nd
Bromobenzene	1.0	nd	nd
1,1,2,2-Tetrachloroethane	1.0	nd	nd
n-Propylbenzene	1.0	nd	nd
2-Chlorotoluene	1.0	nd	nd
4-Chlorotoluene	1.0	nd	nd
1,3,5-Trimethylbenzene	1.0	nd	nd
tert-Butylbenzene	1.0	nd	nd
1,2,4-Trimethylbenzene	1.0	nd	nd
sec-Butylbenzene	1.0	nd	nd
1,3-Dichlorobenzene	1.0	nd	nd
Isopropyltoluene	1.0	nd	nd
1,4-Dichlorobenzene	1.0	nd	nd
1,2-Dichlorobenzene	1.0	nd	nd
n-Butylbenzene	1.0	nd	nd
1,2-Dibromo-3-Chloropropane	1.0	nd	nd
1,2,4-Trichlorolbenzene	2.0	nd	nd
Hexachloro-1,3-butadiene	5.0	nd	nd
Naphthalenes	5.0	nd	nd
1,2,3-Trichlorobenzene	5.0	nd	nd
Surrogate Recovery			
Dibromofluoromethane		97	95
1,2-Dichloroethane-d4		111	106
Toluene-d8		104	102
4-Bromofluorobenzene		105	104

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Kyle Williams

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QA/QC Data - EPA 8260C Analyses

Sample Identification: B13-W							
	Matrix Spike			Matrix Spike Duplicate			RPD
	Spiked Conc. (µg/l)	Measured Conc. (µg/l)	Spike Recovery (%)	Spiked Conc. (µg/l)	Measured Conc. (µg/l)	Spike Recovery (%)	(%)
1,1-Dichloroethene	10	8.0	80	10	7.8	78	2.4
Benzene	10	9.5	95	10	9.2	92	3.0
Toluene	10	9.6	96	10	9.3	93	3.3
Chlorobenzene	10	8.5	85	10	8.3	83	2.9
Trichloroethene (TCE)	10	9.1	91	10	8.8	88	3.3
Surrogate Recovery							
Dibromofluoromethane			99			96	
1,2-Dichloroethane-d4			111			111	
Toluene-d8			104			103	
4-Bromofluorobenzene			101			104	

Laboratory Control Sample			
	Spiked Conc. (µg/l)	Measured Conc. (µg/l)	Spike Recovery (%)
Benzene	10	9.4	94
Toluene	10	9.5	95
Chlorobenzene	10	8.6	86
Trichloroethene (TCE)	10	9.1	91
Surrogate Recovery			
Dibromofluoromethane			99
1,2-Dichloroethane-d4			105
Toluene-d8			104
4-Bromofluorobenzene			104

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Kyle Williams

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Robinson Noble
Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

Analyses of Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead µg/L	Cadmium µg/L	Chromium µg/L	Arsenic µg/L
Method Blank	3/2/13	nd	nd	nd	nd
B15-W	3/2/13	30	1.5	65	136
B16-W	3/2/13	20	0.8	79	59
B17-W	3/2/13	14	nd	60	17
Practical Quantitation Limit		5.0	0.5	10.0	3.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson & Jamie Deyman

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Client Project # 2491-001E

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	3/2/13	103%	101%	99%	95%
L130301-9 MS	3/2/13	102%	92%	89%	93%
L130301-9 MSD	3/2/13	107%	94%	77%	97%
RPD	3/2/13	5%	2%	14%	4%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson & Jamie Deyman

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Client Project # 2491-001E

Analyses of Mercury in Water by EPA Method 7470

Sample Number	Date Analyzed	Mercury µg/L
Method Blank	3/6/13	nd
B15-W	3/6/13	nd
B16-W	3/6/13	nd
B16-W Dup	3/6/13	nd
B17-W	3/6/13	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

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Robinson Noble
Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

QA/QC for Mercury by EPA Method 7470

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	3/6/13	113%
B16-W MS	3/6/13	113%
B16-W MSD	3/6/13	113%
RPD	3/6/13	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

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Client Project # 2491-001E

Analyses of Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper µg/L	Zinc µg/L
Method Blank	3/2/13	nd	nd
B15-W	3/2/13	1160	90
B16-W	3/2/13	297	81
B17-W	3/2/13	126	115
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

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Robinson Noble
Olympia, Washington
Libby Project # L130225-10
Client Project # 2491-001E

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	3/2/13	106%	100%
L130301-9 MS	3/2/13	111%	106%
L130301-9 MSD	3/2/13	119%	112%
RPD	3/2/13	7%	6%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

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Client Project # 2491-001E

Analyses of Dissolved Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead µg/L	Chromium µg/L	Copper µg/L	Arsenic µg/L
Method Blank	3/17/13	nd	nd	nd	nd
LCS	3/17/13	115%	107%	106%	119%
B15-W	3/17/13	nd	nd	nd	nd
B16-W	3/17/13	nd	nd	-	nd
B17-W	3/17/13	-	nd	-	nd
Practical Quantitation Limit		5.0	10.0	5.0	3.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

SPECTRA Laboratories

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03/11/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project:	John Havens Estate
Sample Matrix:	Water
Date Sampled:	02/25/2013
Date Received:	02/27/2013
Spectra Project:	2013020577

Client ID	Spectra #	Analyte	Result	Units	Method
B15-W	1	Ethylene Glycol	<10	mg/L	GC-FID
B15-W	1	Propylene Glycol	<10	mg/L	GC-FID
B16-W	2	Ethylene Glycol	<10	mg/L	GC-FID
B16-W	2	Propylene Glycol	<10	mg/L	GC-FID
B17-W	3	Ethylene Glycol	<10	mg/L	GC-FID
B17-W	3	Propylene Glycol	<10	mg/L	GC-FID

Analyzed on 03/08/13 by JJB.

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a7/mlh

2013020577

Libby Environmental, Inc.

Chain of Custody Record

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Date: 2/26/13 Page: 1 of 1

Client: Libby Environmental INC

Project Manager: JAMIE DEYMAN

Address: SEE ABOVE

Project Name: John Havens Estate

City: State: Zip:

Location: City, State:

Phone: Fax:

Collector: Date of Collection: 2/25/13

Client Project #

Email:

	Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Glycols			Field Notes
1	B15-W			H2O	Amber												↓			
2	B16-W			↓	↓												↓			
3	B17-W			↓	↓												↓			
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	2/26/13 11:45	[signature]	2/27/13 @ 0950

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Record pH here:
5DAY
STD

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

SPECTRA Laboratories

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

03/07/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project: John Havens Estate
Sample Matrix: Water
Date Sampled: 02/25/2013
Date Received: 02/27/2013
Spectra Project: 2013020578

Client ID	Spectra #	Analyte	Result	Units	Method
B-15-W	1	Nickel	0.852	mg/L	SW846 6010B
B-16-W	2	Nickel	0.789	mg/L	SW846 6010B
B-17-W	3	Nickel	0.382	mg/L	SW846 6010B
MW-4-3	4	Total Nickel	20.8	mg/Kg	SW846 6010B
B15-3	5	Total Nickel	20.8	mg/Kg	SW846 6010B
B16-3	6	Total Nickel	22.4	mg/Kg	SW846 6010B
B17-3	7	Total Nickel	20	mg/Kg	SW846 6010B

Date Analyzed - 3-5-13 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a7/mlh

SPECTRA Laboratories

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

3/5/2013

Libby Environmental, Inc
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013020578
Applies to Spectra #'s	1 thru 3

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Water/Liquid

Method Blank

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	1.0	0.963	96.3

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013
Sample Spiked: 2013030044-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.047	1.0	0.956	90.9	0.949	90.2	0.8

Recovery Limits 75-125%
RPD Limit 20

Spectra Laboratories

Steven G. Hibbs
Laboratory Manager

SPECTRA Laboratories

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

3/5/2013

Libby Environmental
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013020578
Applies to Spectra #'s	4 thru 7

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Soil/Solid

Method Blank

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	2.098	104.9

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/5/2013 Date Analyzed: 3/5/2013

Sample Spiked: 2013030045-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.156	2.0	2.008	92.6	1.994	91.9	0.8

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

2013020578

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE Ph: 360-352-2110
Olympia, WA 98506 Fax: 360-352-4154
www.LibbyEnvironmental.com

Client: Libby Environmental INC		Date: 2/26/13	Page: 1 of 1
Address: SEE ABOVE		Project Manager: Jamie Deymam	
City:	State: Zip:	Project Name: John Havens Estate	
Phone:	Fax:	Location:	City, State:
Client Project #		Collector:	Date of Collection: 2/25/13
		Email:	

Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Nickle		Field Notes
1 B-15-W			H2O	poly											X			
2 B-16-W																		
3 B-17-W																		
4 MW-4-3			SOIL	4oz JAR														
5 B15-3																		
6 B16-3																		
7 B17-3																		
8																		
9																		
10																		

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	2/26/13 11:45	[signature]	2/27/13 0950
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:
Record pH here:
5DAY
STD

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

SPECTRA Laboratories

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03/21/2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Sherry Chilcutt

Project: John Havens Estate
Date Received: 03/15/2013
Spectra Project: 2013030335

Client ID	Spectra #	Analyte	Result	Units	Method	Matrix	Date Sampled
B15-W	1	Dissolved Nickel	< 0.015	mg/L	EPA 200.7	Water	02/25/2013
B16-W	2	Dissolved Nickel	< 0.015	mg/L	EPA 200.7	Water	02/25/2013
B17-W	3	Dissolved Nickel	< 0.015	mg/L	EPA 200.7	Water	02/25/2013
B17-9	4	Total Nickel	22.2	mg/Kg	SW846 6010B	Soil	02/25/2013

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a8/scj

SPECTRA Laboratories

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

March 21, 2013

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2013030335
Applies to Spectra #'s	1 thru 3

QUALITY CONTROL RESULTS

ICP Dissolved Metals - EPA Method 200.7 - Water

Dissolved Filter Blank

Date Digested: 3/21/2013 Date Analyzed: 3/21/2013

Element	Result
Nickel	< 0.015

Initial Calibration Verification (ICV)

Date Digested: 3/21/2013 Date Analyzed: 3/21/2013

Element	ICV Conc.	ICV Result	ICV %Rec
Nickel	1.0	1.025	102.5

ICV Recovery limits 95-105%

Spectra Laboratories

Steve Hibbs
Laboratory Manager

SPECTRA Laboratories

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

3/21/2013

Libby Environmental
4139 Libby Rd. NE
Olympia, WA 98506

Units: mg/L
Spectra Project: 2013030335
Applies to Spectra #'s 4

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Soil/Solid

Method Blank

Date Digested: 3/21/2013 Date Analyzed: 3/21/2013

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 3/21/2013 Date Analyzed: 3/21/2013

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	2.004	100.2

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 3/20/2013 Date Analyzed: 3/20/2013
Sample Spiked: 2013030386-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.462	2.0	2.206	87.2	2.185	86.2	1.2

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

2013030335

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Client: Libby Environmental, Inc.
Address: See above
City: State: Zip:
Phone: Fax:
Client Project #

Date: 3-14-13 Page: 1 of 1
Project Manager: Jamie Deyman
Project Name: John Havens Estate
Location: City, State: Olympia, WA
Collector: Date of Collection: 2-25-13
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Dissolved Ni	Total Ni		Field Notes
1	B15-W	—	1425	H2O	Poly												X			
2	B16-W	—	1545	H2O	Poly												X			
3	B17-W	—	1700	H2O	Poly												X			
4	B17-9	9	1645	soil	Jar													X		
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	3-14-13	[signature]	3/15/13 @0935
		[signature]	

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks: Standard TAT
EDD

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc. — Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Date: 2/25/13 Page: 1 of 2

Client: ROBINSON NOBLE
Address: 3011 S. HUSON SUITE A1
City: TACOMA State: WA Zip: 98469
Phone: Fax:
Client Project # 2491-001E

Project Manager: MAX WILLS
Project Name: John Havens Estate
Location: 411 93rd City, State: OLYMPIA WA
Collector: ACY Date of Collection: 2/25/13
Email: MWILLS@ROBINSON-NOBLE.COM

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	ZINC, COPPER, NICKEL	Glycols	see notes	Field Notes
1	~~B~~ B12-3	3	9:45	SOIL	4 oz/VOA			X		X										
2	B12-8	8	9:50	SOIL	4 oz/VOA			X		X										
3	B12-W	—	10:00	WTR	AMR/VOA			X		X										
4	B13-3	3	10:40	SOIL	4oz/VOA			X		X										
5	B13-8	8	10:50	SOIL	4oz/VOA			X		X										
6	B13-W	—	11:00	WTR	AMR			X		X										
7	B14-3	3	11:45	soil	4oz/VOA			X		X										
8	B14-8	8	1200	soil	4oz/VOA			X		X										
9	B14-W	—	1205	WTR	AMR			X		X										
10	MW-4-3	3	1255	SOIL	4oz					X						X	X			
11	MW-4-9	9	1305	SOIL	4oz					X						X	X			Hold metals
12	B15-3	3	1400	soil	3 4oz/VOA			X		X						X	X			
13	B15-10	10	1410	soil	3 4oz/VOA			X		X						X	X			Hold Metals
14	B15-W	—	1425	WTR	Poly/VOA/AMR			X		X						X	X	X	X	Pb, Cr, As, Cu, Ni - Dissolved
15	B16-3	3	1515	SOIL	3 4oz/VOA			X		X						X	X			
16	B16-10	10	1525	SOIL	3 4oz/VOA			X		X						X	X			Hold Metals
17	B16-W	—	15~~45~~	WTR	Poly/VOA/AMR			X		X						X	X	X	X	Pb, Cr, As, Ni - Dissolved

3-14-13 dissolved metals added per Max via email. STD

Relinquished by:	Date / Time	Received by:	Date / Time
		Paul Burg	2-25-13

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks: need EIM
-STD-
Turn around

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc. — Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 2/25/13 Page: 1 of 2

Client: Robinson Noble
Address: 3011 S. Huson Suite A
City: Tacoma State: WA Zip: 98409
Phone: Fax:
Client Project # 2491-001E

Project Manager: Max Wills
Project Name: John Havens Estate
Location: 411 93rd City, State: Olympia WA
Collector: ACT Date of Collection: 2/25/13
Email: mwills@robinson-noble.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Zinc, Copper, Nickel	Glycols	See Notes	Field Notes
1	B12-3	3	9:45	Soil	4oz/VOA			X		X										
2	B12-8	8	9:50	Soil	4oz/VOA			X		X										
3	B12-W	—	10:00	WTR	AMR/VOA			X		X										
4	B13-3	3	10:40	Soil	4oz/VOA			X		X										
5	B13-8	8	10:50	Soil	4oz/VOA			X		X										
6	B13-W	—	11:00	WTR	AMR			X		X										
7	B14-3	3	11:45	Soil	4oz/VOA			X		X										
8	B14-8	8	1200	Soil	4oz/VOA			X		X										
9	B14-W	—	1205	WTR	AMR			X		X										
10	MW-4-3	3	1255	Soil	4oz					X						X	X			
11	MW-4-9	9	1305	Soil	4oz					X						X	X			
12	B15-3	3	1406	Soil	4oz/VOA			X		X						X	X			
13	B15-10	10	1410	Soil	4oz/VOA			X		X						X	X			
14	B15-W	—	1425	WTR	VOA/AMR			X		X						X	X	X	X	Pb, Cr, As, Cu, Ni - Dissolved
15	B16-3	3	1515	Soil	3 4oz/VOA			X		X						X	X			
16	B16-10	10	1525	Soil	3 4oz/VOA			X		X						X	X			
17	B16-W	—	1545	WTR	AMR/VOA/AMR			X		X						X	X	X	X	Pb, Cr, As, Ni - Dissolved

3-14-13 dissolved metals added per Max via email, STD

Relinquished by:	Date / Time	Received by:	Date / Time
		Paul Burg	2-25-13
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks: -STD- Turnaround

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a cout of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506

Ph: 360-352-2110
Fax: 360-352-4154

Client: ROBINSON NOBLE
Address: 3011 S. HUSON SUITE A
City: TACOMA State: WA Zip: 98409
Phone: (253) 475-7711 Fax:
Client Project # 2491-001E

Date: 2/25/13 Page: 2 of 2
Project Manager: MAX WILLS
Project Name: JOHN HAVENS ESTATE
Location: 411 93rd City, State: OLYMPIA WA
Collector: ACY Date of Collection: 2/25/13
Email: MWILLS@ROBINSON-NOBLE.COM

3-14-13 dissolved metals added per Max via email. STD

See notes

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Zinc, Copper, Nickel	Glycols		Field Notes (3-14-13 run select metals per Max STD)
1	B17-3	3	1630	SOIL	3 4oz/VOA			X		X						X	X			
2	B17-9	9	1645	SOIL	3 4oz/VOA			X		X						X	X			~~Hold metals~~ Run metals
3	B17-W	–	1700	WTR	POLY/VOA/AMB			X		X						X	X	X	X	Cr, As, Ni - Dissolved
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
Aaron Young	2-25- 17:30	Paul Burk	2-25-13 17:30
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks: need EIM
- STD
Turnaround

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc. — Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 2/25/13 Page: 2 of 2

Client: Robinson Noble
Address: 3011 S. Huson Suite A
City: Tacoma State: WA Zip: 98409
Phone: (253) 475-7711 Fax:
Client Project # 2491-001E

Project Manager: Max Wills
Project Name: John Havens Estate
Location: 411 93rd City, State: Olympia WA
Collector: ACY Date of Collection: 2/25/13
Email: mwills@robinson-noble.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Zinc Copper Nickel	[illegible]	[illegible]	Field Notes
1	B17-3	3	1635	Soil	3 4oz/VOA			X		X						X	X			
2	B17-9	9	1645	Soil	3 4oz/VOA			X		X						X	X			[illegible]
3	B17-W	—	1700	WTR	Poly/VOA/Amb			X		X						X	X	X	X	Cr, As, Ni
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
Aaron Young	2-25 17:30	Paul Burke	2-25-13 17:30

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks: [illegible]

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

APPENDIX D

Max Wills

From: Radcliff, Eugene (ECY) [erad461@ECY.WA.GOV]
Sent: Wednesday, June 26, 2013 4:50 PM
To: Max Wills
Cc: Alan Wertjes; Callender, Alexander (ECY); Gerald Tousley; Rose, Scott (ECY)
Subject: John's Auto Wrecking - SW1127: Site Visit

Max:

Thank you for meeting with us (Eugene Radcliff - VCP and Alex Callender (WQ)) at the Havens Auto Wrecking facility (Site) in Tumwater yesterday. My general impression was that the Site's appearance had dramatically improved in some areas (northeast corner of the Site), while observing little progress in other areas (pond and upper building area). Based on my Site visit yesterday, Ecology has some recommendations for you to consider when conducting further evaluation of the Site:

- Evaluate sediments and surface water samples in pond southern pond along property line. Sediment COCs: TPH-HCID*, metals, PAHs, PCBs, VOCs, semi-VOCs.
- Remove tires, wheels, and all other debris from water bodies. Removal of material should by least invasive, least destructive methods (e.g. by hand)
- Evaluate the pond banks to ascertain whether tires have been buried into the bank along north shoreline of pond.
- Review the electric pole transformer history; sample soils beneath the transformer for PCBs as warranted.
- Remove large "creosote" timber near southern property line (and any other treated lumber found) and sample soil for PAHs, pentachlorophenol, and metals.
- Segregate/remove debris pile from the northern portion of the Site and transport to appropriate off-Site disposal facilities, do not store debris piles on Site for extended periods of time. Ecology views the debris piles as a potential pollutant source, it may necessitate additional sample analyses as well as added cleanup costs if these piles remain on-Site. Items identified in the debris pile included fluorescent light ballasts, insulation, treated wood, a portion of a chimney, galvanized metals, and oil storage containers.
- BMPs should be used when storing debris piles on the Site. The county has primacy on solid waste storage issues and there may be permitting requirements for this type of storage activity. Please contact the Thurston County Health Department for additional guidance on solid waste issues
- Further investigation, based on historic maps and aerial imagery plus the appearance of the area soils being reworked south of the Hopkins Ditch, may be warranted.
- Small collections of metal, tires, and other debris remain scattered throughout the Site and should be removed.
- A Terrestrial Ecological Evaluation (TEE) should be conducted for the Site.
- We discussed the value of having a wetland delineation completed for the Site, this could be useful to help you complete a TEE.

The County has zoned the Site, consisting of five parcels, with two zoning classifications:

Zoned LIGHT INDUSTRIAL DISTRICT (LI)* (northern three parcels)
Subject to the provisions of this title, the following uses are permitted in the light industrial district:

3.Processing and Storage.

g.Junk, rags, paper, or metal salvage, storage, recycling or processing;

Zoned RURAL—ONE DWELLING UNIT PER TEN ACRES (R 1/10) (southern two parcels)

Primary uses.

Subject to the provisions of this title, the following uses are permitted in this district:

1.Single-family dwellings (limited to one primary residential structure per lot);
2.Agriculture;
3.Forest practices and forest management activities; and
4.Outdoor recreation.

Any additional investigation/feasibility study should take these zoning criteria into consideration as potential future uses.

Per our discussion at the Site, Ecology would not be receptive to providing a No Further Action Opinion fort a Site where re-contamination was possible. That is why the removal of any potential Site contamination, and its sources, is essential to moving forward in any future cleanup activities.

Ecology's Southwest Regional Office Water Quality Section may have some additional comments for you at a later date. I will forward to you if I receive any comments.

I would be happy to meet with you and your client to discuss future remedial actions at the Site if you would like.

If you have any questions or comments, please contact me.

Sincerely,

Eugene

Eugene Radcliff, L.G.
Toxic Cleanup Program-Voluntary Cleanup Program
Washington Department of Ecology
(360) 407-7404
erad461@ecy.wa.gov

* TPH-HCID should be collected at selected locations, if the analysis indicated TPH-D or TPH-O then the samples should be NWTPH-Dx using without the silica gel/acid cleanup preparation.

ROBINSON NOBLE

October 16, 2013

Alan Wertjes
Attorney at Law
1800 Cooper Point Road, Building 3
Olympia, WA 98502

Subject: Draft work plan for supplemental remedial investigation and limited soil remediation, John's Auto Wrecking (Facility/Site No. 57665495; VCP Project No. SW1127) (Exhibit A)

Dear Alan,

Robinson Noble, Inc. is pleased to present this proposed (draft) work plan for a supplemental remedial investigation (RI) and limited soil remediation at the John's Auto Wrecking site (site), located at 411 93rd Avenue Southeast in Olympia, Washington. Complete details pertaining to site characterization and previous work are presented in our recent remedial investigation (*John's Auto Wrecking, 411 93rd Avenue Southeast, Olympia, Washington, Facility/Site No. 57665495; VCP Project No. SW1127, Remedial Investigation*) dated July 2013. This draft work plan is based directly on the findings and recommendations presented in the July 2013 remedial investigation report, as well as specific issues discussed in our recent meeting together (September 24) with Eugene Radcliff from the Washington State Department of Ecology (Ecology). For the purpose of organization, the draft work plan is divided into eight separate tasks, which include the following:

- Task 1: Completion of the final work plan following Ecology review
- Task 2: Final debris removal and associated soil sampling
- Task 3: Investigation of possible PCB-containing transformers
- Task 4: Investigation of possible imported fill
- Task 5: Quarterly groundwater sampling at MW-1
- Task 6: Wetland delineation and site-specific terrestrial ecologic evaluation (TEE)
- Task 7: EIM preparation and upload
- Task 8: Report preparation

The following sections provide a description of each of the tasks to be completed under the proposed work plan.

Task 1: Completion of the final work plan following Ecology review

As discussed in our September 24 meeting, this draft work plan is being concurrently submitted to Eugene Radcliff (the current Ecology site manager) for review and comment. Once we receive comments back from Ecology, we will incorporate any recommended changes into a final work plan. This final work plan will then be used as the guiding document for all subsequent work completed at the site.

Task 2: Final debris removal and associated soil sampling

The preponderance of the source material (i.e., auto-wrecking equipment, cars, various auto parts, etc.) has already been removed from the site. However, there are a number of specific areas where a significant amount of debris is still present, and generally there is still random debris strewn across the entire site. Under this task, all of this material will be removed from the site and disposed of in an appropriate manor. A contractor will be hired by the estate of John Havens (represented by Alan Wertjes) to complete the actual debris removal. Robinson Noble will act as a client representative and will oversee the debris-removal process. Debris removal should be completed during the winter months (January and February) when vegetation is sparse and debris is easier to locate. Much of the debris scattered about the site or in wetland areas will need to be removed by hand. As discussed in our meeting, the Ecology Conservation Corps, or an equivalent organization, could be utilized for this purpose.

Robinson Noble will conduct regular site visits during the debris-removal process to assist the contractor with identification of material to be removed. We will also advise the contractor and/or the client on issues pertaining to appropriate disposal of regulated waste. During the debris-removal process, Robinson Noble personnel will be on site to inspect underlying areas and collect soil samples as appropriate. We will also complete limited soil remediation as needed, followed by appropriate confirmation sampling. In addition to general site-wide debris removal, the following specific areas have been identified for debris removal followed by applicable sampling and/or soil remediation as needed:

- The numerous structures located on the northwest corner of the site. The interiors of these structures will need to be accessed to determine whether or not hazardous material is present inside and then removed if present. Sampling/remediation may be necessary depending on the specific conditions found within the buildings.
- The debris piles located to the south of the structures on the northwest corner of the site. This is a former structure that was demolished. Once all of the debris in this area has been removed, sampling and analyses will be conducted for petroleum hydrocarbons (gas- through oil-range), volatile organic compounds (VOC), metals (lead, cadmium, chromium, arsenic, mercury, copper, zinc, and nickel), polychlorinated biphenyls (PCB), and carcinogenic poly aromatic hydrocarbons (cPAHs).
- A possible berm of buried tires located to the north of the small pond at the south end of the site. Appropriate sampling and analyses will be determined in the field depending on the presence (if any) and type of source materials.
- The large creosote-treated timber located in the wetland at the south end of the site. Following removal, the underlying soils will be analyzed for metals, and semi-volatile organics including cPAHs and chlorinated phenols.
- Wheels, tires, and other debris present within Hopkins Ditch. Debris removal in this area will be accomplished almost exclusively by hand to minimize disturbance to the wetlands. Subsequent sampling to characterize this area will be accomplished during the completion of the TEE described below under Task 6.
- Debris located in the northeast corner of the site, just outside the gate. Once debris has been removed from this area, and any appropriate testing completed, Ecology blocks or other similar blockade devices should be utilized in this area to dissuade further illegal dumping.

Task 3: Investigation of possible PCB-containing transformers

Robinson Noble will conduct a review of power company records to try to determine if any of the pole-mounted transformers located on the site currently or previously used oil-containing PCBs. If power-company records show that non-PCB transformer oil has generally been utilized, no other action is required. However, if records cannot be found or show that transformer-oil containing PCBs was used, near-surface soil sampling will be completed in the area of each power pole to establish whether or not soils are impacted with PCBs.

Task 4: Investigation of possible imported fill

To investigate the possible use of imported fill material or significant reworking of site soils, Robinson Noble will review historical aerial photos, topographic maps, and other applicable geographic sources for signs of changes in topography and/or surface conditions. Robinson Noble will then direct the excavation of several test pits at key locations across the site to evaluate the possible presence of fill material. The test pits will be excavated primarily on the southern half of the site. A significant number of borings have already been completed across the northern half of the site and have not penetrated fill material. Therefore, only a few additional test pits will be excavated in select areas on the northern half of the site for this purpose unless review of historical data shows an area or areas that warrant additional investigation.

Task 5: Quarterly groundwater sampling at MW-1

During our previous investigation, laboratory analyses indicated a possible intermittent issue with low levels of arsenic in the groundwater in the area around monitoring well MW-1 (located in the southeast portion of the site). To resolve this issue, Robinson Noble will complete four consecutive quarters of groundwater sampling in this area utilizing MW-1. During each quarterly sampling event, we will use standard low-flow sampling techniques to obtain groundwater samples from this well and submit the samples to an accredited laboratory for analysis of total metals (lead, cadmium, chromium, arsenic, mercury, copper, zinc, and nickel). Analytical results will be compared to Model Toxic Control Act (MTCA) Method A cleanup levels, or other appropriate criteria, to evaluate compliance. If, after four quarters of sampling, levels of total metals are found to be out of compliance, additional sampling may be required. Options for additional monitoring and/or possible remediation will be evaluated at that time within the context of other findings for the area around Hopkins Ditch and the surrounding wetlands.

Task 6: Wetland delineation and site-specific terrestrial ecologic evaluation (TEE)

Robinson Noble will subcontract with Normandeau Associates, Inc. (Normandeau), who specializes in habitat evaluation and restoration, to complete formal wetland delineation at the site. This will specifically include the southern half of the site in the area around Hopkins Ditch but will also incorporate any other area of the site determined to be a wetland. Prior to conducting the wetland delineation, Robinson Noble will confirm property boundaries in the field, particularly at the southern end of the site, so that all appropriate areas are included in the delineation. This will be accomplished using either previously generated survey data (if available) or by having a new survey completed.

Following the completion of the wetland delineation (and after all debris has been removed from the site), Robinson Noble will work with Normandeau to complete a site-specific terrestrial ecological evaluation (TEE). The TEE will be used to evaluate potential pathways between any identified contamination and both human receptors and ecological receptors identified through the wetland delineation. Completion of the TEE will require the collection and analyses of additional samples in Hopkins Ditch and the surrounding wetland area. This will include surface water samples from Hopkins Ditch where it enters and exits the site, as well as various areas along its course, and surface water samples from the ponds located to the north and south of Hopkins Ditch. Additional, soil and sediment samples will also be collected throughout the wetland area in sufficient quantity to characterize potential contamination. Currently, we anticipate collecting up to 20 additional soil and sediment samples in the wetland area. These samples will be analyzed for petroleum hydrocarbons and metals (lead, cadmium, chromium, arsenic, mercury, copper, zinc, and nickel), and select samples will be analyzed for cPAHs.

Task 7: Input data into Ecology's EIM database

In order to qualify for final no-further-action (NFA) status under Ecology's Voluntary Cleanup Program (VCP), all analytical and appropriate geographical data collected during the course of investigating (and remediating if applicable) the site will need to be uploaded to Ecology's Environmental Information Management (EIM) database system. EIM data has been generated for all of the analytical data collected to date. For this task, we will continue to generate EIM data sets and upload the files to Ecology as they are compiled.

Task 8: Reporting

Upon completion of Tasks 1 through 6 described above, Robinson Noble will compile a final remedial investigation (RI) report summarizing our previous work and documenting the new work described in the final work plan. Ecology is currently conducting a formal review of our July 2013 RI, and our final RI will incorporate or address any issues raised by Ecology in that review. The final RI will also provide recommendations for additional investigative work or remediation as appropriate. If applicable, the final RI report will also provide a discussion of possible remediation options and a cost analysis for each recommended approach.

We will forward a cost estimate under separate cover. If you have questions or need additional information, please contact us at your convenience. It is our pleasure to provide continued service to you and the John Havens Estate on this project.

Respectfully submitted,
Robinson Noble, Inc.

Max T. Wills

Max Wills, LHG
Senior Hydrogeologist

cc Eugene Radcliff

APPENDIX C

Thurston County Assessor

Parcel Number: 12723210000 **Date: 4/3/2020**

Situs Address:	413 SE 93RD AVE	**Sect/Town/Range:**	23 17 2W
Owner:	HAVENS ESTATE INVESTMENTS LLC	**Size:**	5.18 Acres
Address:	5023 8TH AVE NE SEATTLE, WA 98105	**UseCode:**	91 Undeveloped Land
		TCA Number:	465
Taxpayer:	HAVENS ESTATE INVESTMENTS LLC	**Neighborhood:**	15K1
Address:	5023 8TH AVE NE SEATTLE, WA 98105	**Property Type:**	LND
		Taxable:	YES
		Active Exemptions:	None
Abbreviated Legal:	23-17-2W W2-NE-NW LYING E OF W 210F LESS N 405F ALSO S 150F	**Fire District:**	FIRE DISTRICT #06
		School District:	TUMWATER S.D. #33

Market Values

Tax Year **Assessment Year**	**2020** **2019**	**2019** **2018**	**2018** **2017**	**2017** **2016**	**2016** **2015**	**2015** **2014**	**2014** **2013**	**2013** **2012**	**2012** **2011**	**2011** **2010**
Market Value Land	$43,700	$35,300	$35,600	$32,550	$31,150	$37,550	$35,550	$30,450	$35,600	$106,850
Market Value Buildings										$8,400
Market Value Total	**$43,700**	**$35,300**	**$35,600**	**$32,550**	**$31,150**	**$37,550**	**$35,550**	**$30,450**	**$35,600**	**$115,250**

Land Characteristics

Land Flag	9150	**Land Influence(s)**	FR-FAIR NBHD APPEAL W2-20%-WETLAND CN-CONTAMINATION
Lot Square Footage	Not Listed		
Lot Acreage	5.18		
Effective Frontage	Not Listed		
Effective Depth	Not Listed		
Water Source	Not Listed		
Sewer Source	Not Listed		

Sales

Sale Date:	09/13/2017	09/13/2017	12/19/1988
Price:			
Excise:	534706	535760	535759
Sale Type:	QUIT CLAIM DEED	QUIT CLAIM DEED	QUIT CLAIM DEED
Recording Number:	4585799	4603413	4603412
Seller:	HAVENS SARAH		
Buyer:	HAVENS ESTATE INVESTMENTS LLC	HAVENS ESTATE INVESTMENTS LLC	HAVENS ESTATE INVESTMENTS LLC
Multiple Parcel Sale:	Y	Y	Y

The Assessor's Office maintains property records on approximately 112,000 parcels in Thurston County for tax purposes. Though records are updated regularly, the accuracy and timeliness of published data cannot be guaranteed. Any person or entity that relies on information obtained from this website does so at his or her own risk. Neither Thurston County nor the Assessor will be held liable for damage or losses caused by use of this information. ***All critical information should be independently verified.***

Office of the Assessor

Steven J. Drew, Assessor

2000 Lakeridge Drive SW - Olympia, WA 98502

Customer Service (360)867-2200 -- Fax (360)867-2201 -- TDD (360)754-2933

Thurston County Assessor

Parcel Number: 12723210100 **Date: 4/3/2020**

Situs Address:	411 SE 93RD AVE	**Sect/Town/Range:**	23 17 2W
Owner:	HAVENS ESTATE INVESTMENTS LLC	**Size:**	1.62 Acres
Address:	5023 8TH AVE NE SEATTLE, WA 98105	**UseCode:**	69 Warehouse
		TCA Number:	465
		Neighborhood:	6WKE
Taxpayer:	HAVENS ESTATE INVESTMENTS LLC	**Property Type:**	WHS
Address:	5023 8TH AVE NE SEATTLE, WA 98105	**Taxable:**	YES
		Active Exemptions:	None
		Fire District:	FIRE DISTRICT #06
Abbreviated Legal:	23-17-2W NE NW COM NW COR E 417.5 F S 208.5F N 208.5F	**School District:**	TUMWATER S.D. #33

Market Values

Tax Year	**2020**	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**
Assessment Year	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**
Market Value Land	$146,200	$117,600	$118,400	$103,750	$93,350	$93,350	$94,450	$87,900	$87,900	$258,200
Market Value Buildings	$10,500	$9,200	$9,400							$26,900
Market Value Total	**$156,700**	**$126,800**	**$127,800**	**$103,750**	**$93,350**	**$93,350**	**$94,450**	**$87,900**	**$87,900**	**$285,100**

Commercial Structures

Building	**Year Built**	**Floor**	**Square Feet**	**No. Floors**	**Total Sq. Ft.**	**Quality**	**Condition**
STORAGE-WHSE	1978	1	1800	1	1800	FAIR	POOR
					---------- 1800		

Detached Structures

Structure	**Year Built**	**Square Feet**	**Quality**	**Condition**
FENCE-CHLK-6	2014	480	AVERAGE	AVERAGE

Land Characteristics

Land Flag	8010	**Land Influence(s)**	NS-NO SITE IMPRV CT-CONTIGUOUS CN-CONTAMINATION MT-MOD-TRAFFIC
Lot Square Footage	70567		
Lot Acreage	1.62		
Effective Frontage	Not Listed		
Effective Depth	Not Listed		
Water Source	Not Listed		
Sewer Source	Not Listed		

Sales

Sale Date:	09/13/2017	09/13/2017	12/19/1988
Price:			
Excise:	534706	535760	535759
Sale Type:	QUIT CLAIM DEED	QUIT CLAIM DEED	QUIT CLAIM DEED
Recording Number:	4585799	4603413	4603412
Seller:	HAVENS SARAH		
Buyer:	HAVENS ESTATE INVESTMENTS LLC	HAVENS ESTATE INVESTMENTS LLC	HAVENS ESTATE INVESTMENTS LLC
Multiple Parcel Sale:	Y	Y	Y

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Steven J. Drew, Assessor
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Thurston County Assessor

Parcel Number: 12723210400 **Date: 4/3/2020**

Situs Address:	437 SE 93RD AVE	**Sect/Town/Range:**	23 17 2W
Owner:	HAVENS ESTATE INVESTMENTS LLC	**Size:**	2.09 Acres
Address:	5023 8TH AVE NE	**UseCode:**	91 Undeveloped Land
	SEATTLE, WA 98105	**TCA Number:**	465
		Neighborhood:	0LKE
Taxpayer:	HAVENS ESTATE INVESTMENTS LLC	**Property Type:**	LND
Address:	5023 8TH AVE NE	**Taxable:**	YES
	SEATTLE, WA 98105	**Active Exemptions:**	None
		Fire District:	FIRE DISTRICT #06
Abbreviated Legal:	23-17-2W W2 NE NW E242.5F OF N405F LESS RD	**School District:**	TUMWATER S.D. #33

Market Values

Tax Year **Assessment Year**	**2020** **2019**	**2019** **2018**	**2018** **2017**	**2017** **2016**	**2016** **2015**	**2015** **2014**	**2014** **2013**	**2013** **2012**	**2012** **2011**	**2011** **2010**
Market Value Land	$146,000	$160,800	$168,200	$147,400	$144,350	$135,650	$130,450	$121,750	$130,450	$253,100
Market Value Buildings										$14,700
Market Value Total	**$146,000**	**$160,800**	**$168,200**	**$147,400**	**$144,350**	**$135,650**	**$130,450**	**$121,750**	**$130,450**	**$267,800**

Detached Structures

Structure	Year Built	Square Feet	Quality	Condition
GEN-PUR-BLDG	1979	1584	LOW-COST	POOR

Land Characteristics

Land Flag	8010	**Land Influence(s)**	NS-NO SITE IMPRV CN-CONTAMINATION MT-MOD-TRAFFIC
Lot Square Footage	91040		
Lot Acreage	2.09		
Effective Frontage	Not Listed		
Effective Depth	Not Listed		
Water Source	Not Listed		
Sewer Source	Not Listed		

Sales

Sale Date:	09/13/2017	09/13/2017
Price:		
Excise:	534706	535760
Sale Type:	QUIT CLAIM DEED	QUIT CLAIM DEED
Recording Number:	4585799	4603413
Seller:	HAVENS SARAH	
Buyer:	HAVENS ESTATE INVESTMENTS LLC	HAVENS ESTATE INVESTMENTS LLC
Multiple Parcel Sale:	Y	Y

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Thurston County Assessor

Parcel Number: 12723210401 **Date: 4/3/2020**

Situs Address:		**Sect/Town/Range:**	23 17 2W
Owner:	HAVENS ESTATE INVESTMENTS LLC	**Size:**	1.95 Acres
Address:	5023 8TH AVE NE SEATTLE, WA 98105	**UseCode:**	91 Undeveloped Land
		TCA Number:	465
		Neighborhood:	0LKE
Taxpayer:	HAVENS ESTATE INVESTMENTS LLC	**Property Type:**	LND
Address:	5023 8TH AVE NE SEATTLE, WA 98105	**Taxable:**	YES
		Active Exemptions:	None
		Fire District:	FIRE DISTRICT #06
Abbreviated Legal:	23-17-2W W2 NE NW N405F EXC N208.5F OF W417.5F EXC E	**School District:**	TUMWATER S.D. #33

Market Values

Tax Year	**2020**	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**
Assessment Year	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**
Market Value Land	$54,800	$57,000	$50,700	$44,550	$37,900	$35,600	$34,250	$31,950	$34,250	$136,450
Market Value Buildings										$2,800
Market Value Total	**$54,800**	**$57,000**	**$50,700**	**$44,550**	**$37,900**	**$35,600**	**$34,250**	**$31,950**	**$34,250**	**$139,250**

Land Characteristics

Land Flag	8010	**Land Influence(s)**	NS-NO SITE IMPRV CT-CONTIGUOUS CN-CONTAMINATION LT-LIGHT TRAFFIC PE-PR EXPOSURE PA-POOR ACCESS
Lot Square Footage	84942		
Lot Acreage	1.95		
Effective Frontage	Not Listed		
Effective Depth	Not Listed		
Water Source	Not Listed		
Sewer Source	Not Listed		

Sales

Sale Date:	09/13/2017	09/13/2017	12/19/1988
Price:			
Excise:	534706	535760	535759
Sale Type:	QUIT CLAIM DEED	QUIT CLAIM DEED	QUIT CLAIM DEED
Recording Number:	4585799	4603413	4603412
Seller:	HAVENS SARAH		
Buyer:	HAVENS ESTATE INVESTMENTS LLC	HAVENS ESTATE INVESTMENTS LLC	HAVENS ESTATE INVESTMENTS LLC
Multiple Parcel Sale:	Y	Y	Y

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Thurston County Assessor

Parcel Number: 12723210700 **Date: 4/3/2020**

Situs Address:	443 SE 93RD AVE	**Sect/Town/Range:**	23 17 2W
Owner:	HAVENS ESTATE INVESTMENTS LLC	**Size:**	5.01 Acres
Address:	5023 8TH AVE NE SEATTLE, WA 98105	**UseCode:**	91 Undeveloped Land
		TCA Number:	465
		Neighborhood:	15K1
Taxpayer:	HAVENS ESTATE INVESTMENTS LLC	**Property Type:**	LND
Address:	5023 8TH AVE NE SEATTLE, WA 98105	**Taxable:**	YES
		Active Exemptions:	None
		Fire District:	FIRE DISTRICT #06
Abbreviated Legal:	23-17-2W W2 NE NW E238F LESS N405F	**School District:**	TUMWATER S.D. #33

Market Values

Tax Year **Assessment Year**	**2020** **2019**	**2019** **2018**	**2018** **2017**	**2017** **2016**	**2016** **2015**	**2015** **2014**	**2014** **2013**	**2013** **2012**	**2012** **2011**	**2011** **2010**
Market Value Land	$43,100	$34,800	$35,100	$32,100	$30,700	$37,000	$35,050	$30,200	$35,300	$150,000
Market Value Buildings										$6,300
Market Value Total	**$43,100**	**$34,800**	**$35,100**	**$32,100**	**$30,700**	**$37,000**	**$35,050**	**$30,200**	**$35,300**	**$156,300**

Land Characteristics

Land Flag	9150	**Land Influence(s)**	CN-CONTAMINATION FR-FAIR NBHD APPEAL W2-20%-WETLAND
Lot Square Footage	Not Listed		
Lot Acreage	5.01		
Effective Frontage	Not Listed		
Effective Depth	Not Listed		
Water Source	Not Listed		
Sewer Source	Not Listed		

Sales

Sale Date:	09/13/2017	09/13/2017
Price:		
Excise:	534706	535760
Sale Type:	QUIT CLAIM DEED	QUIT CLAIM DEED
Recording Number:	4585799	4603413
Seller:	HAVENS SARAH	
Buyer:	HAVENS ESTATE INVESTMENTS LLC	HAVENS ESTATE INVESTMENTS LLC
Multiple Parcel Sale:	Y	Y

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Thurston County Assessor

Parcel Number: 12723220200 **Date: 4/3/2020**

Situs Address:	429 SE 93RD AVE	**Sect/Town/Range:**	23 17 2W
Owner:	HAVENS ESTATE INVESTMENTS LLC	**Size:**	0.19 Acres
Address:	5023 8TH AVE NE	**UseCode:**	91 Undeveloped Land
	SEATTLE, WA 98105	**TCA Number:**	465
		Neighborhood:	0LKE
Taxpayer:	HAVENS ESTATE INVESTMENTS LLC	**Property Type:**	LND
Address:	5023 8TH AVE NE	**Taxable:**	YES
	SEATTLE, WA 98105	**Active Exemptions:**	None
		Fire District:	FIRE DISTRICT #06
Abbreviated Legal:	23-17-2W E 54.25F OF N 330F OF NW NW LESS N 200F	**School District:**	TUMWATER S.D. #33

Market Values

Tax Year	**2020**	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**
Assessment Year	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**
Market Value Land	$12,400	$14,200	$12,200	$10,800	$11,850	$11,100	$10,700	$10,000	$10,700	$7,250
Market Value Buildings										
Market Value Total	**$12,400**	**$14,200**	**$12,200**	**$10,800**	**$11,850**	**$11,100**	**$10,700**	**$10,000**	**$10,700**	**$7,250**

Land Characteristics

Land Flag	8010	**Land Influence(s)**	PE-PR EXPOSURE
Lot Square Footage	8276		FA-FAIR ACCESS
Lot Acreage	0.19		NS-NO SITE IMPRV
Effective Frontage	Not Listed		CT-CONTIGUOUS
Effective Depth	Not Listed		CN-CONTAMINATION
Water Source	Not Listed		LT-LIGHT TRAFFIC
Sewer Source	Not Listed		

Sales

Sale Date:	09/13/2017	09/13/2017	12/19/1988
Price:			
Excise:	534706	535760	535759
Sale Type:	QUIT CLAIM DEED	QUIT CLAIM DEED	QUIT CLAIM DEED
Recording Number:	4585799	4603413	4603412
Seller:	HAVENS SARAH		
Buyer:	HAVENS ESTATE INVESTMENTS LLC	HAVENS ESTATE INVESTMENTS LLC	HAVENS ESTATE INVESTMENTS LLC
Multiple Parcel Sale:	Y	Y	Y

The Assessor's Office maintains property records on approximately 112,000 parcels in Thurston County for tax purposes. Though records are updated regularly, the accuracy and timeliness of published data cannot be guaranteed. Any person or entity that relies on information obtained from this website does so at his or her own risk. Neither Thurston County nor the Assessor will be held liable for damage or losses caused by use of this information. ***All critical information should be independently verified.***

Office of the Assessor
Steven J. Drew, Assessor
2000 Lakeridge Drive SW - Olympia, WA 98502
Customer Service (360)867-2200 -- Fax (360)867-2201 -- TDD (360)754-2933

APPENDIX D

Libby Environmental, Inc.
4139 Libby Road NE • Olympia, WA 98506-2518

December 8, 2014

Max Wills
Robinson Noble
17625 130th Avenue NE, Suite 102
Woodinville, WA 98072

Dear Mr. Wills:

Please find enclosed the analytical data report for the Havens Estate Project located in Olympia, Washington. Soil samples were analyzed for Volatile Organic Compounds by EPA Method 8260C, Gasoline by NWTPH-Gx, Diesel & Oil by NWTPH-Dx/Dx Extended, Mineral Oil by NWTPH-Dx/Dx Extended, Metals Arsenic, Cadmium, Chromium, Copper, Lead, and Zinc by EPA Method 7010 Series, Mercury by EPA Method 7471, Total Nickel and TCLP Lead by EPA Method SW846 6010C, Hexavalent Chromium by EPA Method 7196A, Polyaromatic Hydrocarbons by EPA Method 8270 (SIM), and PCB (Polychlorinated Biphenyls) by EPA Method 8082.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. All soil samples are reported on a dry weight basis. An invoice for this analytical work is included and has been emailed to the Tacoma office.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Kurt Johnson
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com
www.LibbyEnvironmental.com

Libby Environmental, Inc.

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		Method Blank	TP12-1	TP12-3	TP13-1	TP13-3	TP14-1.5
Date Sampled	Reporting	N/A	11/5/14	11/5/14	11/5/14	11/5/14	11/5/14
Date Analyzed	Limits	11/6/14	11/6/14	11/6/14	11/6/14	11/6/14	11/6/14
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd	nd	nd	nd	nd
Chloromethane	0.06	nd	nd	nd	nd	nd	nd
Vinyl chloride	0.02	nd	nd	nd	nd	nd	nd
Bromomethane	0.09	nd	nd	nd	nd	nd	nd
Chloroethane	0.06	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd
Methylene chloride	0.02	nd	nd	nd	nd	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	0.05	nd	nd	nd	nd	nd	nd
trans -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	0.03	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
Chloroform	0.02	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	0.03	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Benzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.03	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.02	nd	nd	nd	nd	nd	nd
Dibromomethane	0.04	nd	nd	nd	nd	nd	nd
Bromodichloromethane	0.02	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Toluene	0.03	nd	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
Dibromochloromethane	0.03	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd	nd	nd	nd
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd	nd
Ethylbenzene	0.03	nd	nd	nd	nd	nd	nd
Total Xylenes	0.03	nd	nd	nd	nd	nd	nd
Styrene	0.02	nd	nd	nd	nd	nd	nd

Libby Environmental, Inc.

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		Method Blank	TP12-1	TP12-3	TP13-1	TP13-3	TP14-1.5
Date Sampled	Reporting	N/A	11/5/14	11/5/14	11/5/14	11/5/14	11/5/14
Date Analyzed	Limits	11/6/14	11/6/14	11/6/14	11/6/14	11/6/14	11/6/14
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.03	nd	nd	nd	nd	nd	nd
Isopropylbenzene	0.08	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.03	nd	nd	nd	nd	nd	nd
Bromobenzene	0.03	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd	nd
n-Propylbenzene	0.02	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd
Isopropyltoluene	0.02	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd
n-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.05	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd	nd	nd	nd	nd
Naphthalenes	0.05	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	0.1	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		108	114	110	114	109	94
1,2-Dichloroethane-d4		121	135	127	123	128	100
Toluene-d8		90	92	90	91	88	74
4-Bromofluorobenzene		97	94	95	96	90	94

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.
* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		TP14-1.5 Dup	TP14-3	TP16-1	TP16-3	TP15-1	TP15-3
Date Sampled	Reporting	11/5/14	11/5/14	11/5/14	11/5/14	11/5/14	11/5/14
Date Analyzed	Limits	11/6/14	11/6/14	11/6/14	11/6/14	11/6/14	11/6/14
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd	nd	nd	nd	nd
Chloromethane	0.06	nd	nd	nd	nd	nd	nd
Vinyl chloride	0.02	nd	nd	nd	nd	nd	nd
Bromomethane	0.09	nd	nd	nd	nd	nd	nd
Chloroethane	0.06	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd
Methylene chloride	0.02	nd	nd	nd	nd	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	0.05	nd	nd	nd	nd	nd	nd
trans -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	0.03	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
Chloroform	0.02	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	0.03	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Benzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.03	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.02	nd	nd	nd	nd	nd	nd
Dibromomethane	0.04	nd	nd	nd	nd	nd	nd
Bromodichloromethane	0.02	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Toluene	0.03	nd	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
Dibromochloromethane	0.03	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd	nd	nd	nd
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd	nd
Ethylbenzene	0.03	nd	nd	nd	nd	nd	nd
Total Xylenes	0.03	nd	nd	nd	nd	nd	nd
Styrene	0.02	nd	nd	nd	nd	nd	nd

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		TP14-1.5 Dup	TP14-3	TP16-1	TP16-3	TP15-1	TP15-3
Date Sampled	Reporting	11/5/14	11/5/14	11/5/14	11/5/14	11/5/14	11/5/14
Date Analyzed	Limits	11/6/14	11/6/14	11/6/14	11/6/14	11/6/14	11/6/14
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.03	nd	nd	nd	nd	nd	nd
Isopropylbenzene	0.08	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.03	nd	nd	nd	nd	nd	nd
Bromobenzene	0.03	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd	nd
n-Propylbenzene	0.02	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd
Isopropyltoluene	0.02	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd
n-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.05	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd	nd	nd	nd	nd
Naphthalenes	0.05	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	0.1	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		95	116	104	96	111	113
1,2-Dichloroethane-d4		88	131	132	120	126	129
Toluene-d8		80	89	77	75	90	80
4-Bromofluorobenzene		85	84	98	84	92	95

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.
* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		TP17-1	TP17-3	TP18-1	TP18-3	TP18-3 Dup
Date Sampled	Reporting	11/5/14	11/5/14	11/5/14	11/5/14	11/5/14
Date Analyzed	Limits	11/6/14	11/6/14	11/6/14	11/6/14	11/6/14
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd	nd	nd	nd
Chloromethane	0.06	nd	nd	nd	nd	nd
Vinyl chloride	0.02	nd	nd	nd	nd	nd
Bromomethane	0.09	nd	nd	nd	nd	nd
Chloroethane	0.06	nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd
Methylene chloride	0.02	nd	nd	nd	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	0.05	nd	nd	nd	nd	nd
trans -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd
1,1-Dichloroethane	0.03	nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd
Chloroform	0.02	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd	nd	nd	nd
Carbon tetrachloride	0.03	nd	nd	nd	nd	nd
1,1-Dichloropropene	0.02	nd	nd	nd	nd	nd
Benzene	0.02	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.03	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.02	nd	nd	nd	nd	nd
Dibromomethane	0.04	nd	nd	nd	nd	nd
Bromodichloromethane	0.02	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd	nd	nd	nd
Toluene	0.03	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd	nd	nd
Dibromochloromethane	0.03	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd	nd	nd
Chlorobenzene	0.02	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd
Ethylbenzene	0.03	nd	nd	nd	nd	nd
Total Xylenes	0.03	nd	nd	nd	nd	nd
Styrene	0.02	nd	nd	nd	nd	nd

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		TP17-1	TP17-3	TP18-1	TP18-3	TP18-3 Dup
Date Sampled	Reporting	11/5/14	11/5/14	11/5/14	11/5/14	11/5/14
Date Analyzed	Limits	11/6/14	11/6/14	11/6/14	11/6/14	11/6/14
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.03	nd	nd	nd	nd	nd
Isopropylbenzene	0.08	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.03	nd	nd	nd	nd	nd
Bromobenzene	0.03	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd
n-Propylbenzene	0.02	nd	nd	nd	nd	nd
2-Chlorotoluene	0.02	nd	nd	nd	nd	nd
4-Chlorotoluene	0.02	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd	nd	nd	nd
tert-Butylbenzene	0.02	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd	nd	nd	nd
sec-Butylbenzene	0.02	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.03	nd	nd	nd	nd	nd
Isopropyltoluene	0.02	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	0.03	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.03	nd	nd	nd	nd	nd
n-Butylbenzene	0.02	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.05	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd	nd	nd	nd
Naphthalenes	0.05	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	0.1	nd	nd	nd	nd	nd
Surrogate Recovery						
Dibromofluoromethane		110	113	107	91	116
1,2-Dichloroethane-d4		133	121	125	116	134
Toluene-d8		84	90	73	76	81
4-Bromofluorobenzene		96	96	89	100	96

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

QA/QC Data - EPA 8260C Analyses

Sample Identification: TP13-3							
	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 (%)	
1,1-Dichloroethene	0.50	0.47	94	0.50	0.46	92	2.2
Benzene	0.50	0.54	108	0.50	0.56	112	3.6
Toluene	0.50	0.52	104	0.50	0.49	98	5.9
Chlorobenzene	0.50	0.58	116	0.50	0.53	106	9.0
Trichloroethene (TCE)	0.50	0.56	112	0.50	0.60	120	6.9
Surrogate Recovery							
Dibromofluoromethane			93			121	
1,2-Dichloroethane-d4			105			130	
Toluene-d8			75			103	
4-Bromofluorobenzene			82			119	

Laboratory Control Sample			
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
1,1-Dichloroethene	0.50	0.43	86
Benzene	0.50	0.47	94
Toluene	0.50	0.44	88
Chlorobenzene	0.50	0.46	92
Trichloroethene (TCE)	0.50	0.46	92
Surrogate Recovery			
Dibromofluoromethane			112
1,2-Dichloroethane-d4			118
Toluene-d8			90
4-Bromofluorobenzene			94

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		Method Blank	TP21-1	TP21-3	TP22-1	TP22-3	TP23-1
Date Sampled	Reporting	N/A	11/6/14	11/6/14	11/6/14	11/6/14	11/6/14
Date Analyzed	Limits	11/7/14	11/6/14	11/7/14	11/7/14	11/7/14	11/7/14
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd	nd	nd	nd	nd
Chloromethane	0.06	nd	nd	nd	nd	nd	nd
Vinyl chloride	0.02	nd	nd	nd	nd	nd	nd
Bromomethane	0.09	nd	nd	nd	nd	nd	nd
Chloroethane	0.06	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd
Methylene chloride	0.02	nd	nd	nd	nd	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	0.05	nd	nd	nd	nd	nd	nd
trans -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	0.03	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd	nd
Chloroform	0.02	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	0.03	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Benzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.03	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.02	nd	nd	nd	nd	nd	nd
Dibromomethane	0.04	nd	nd	nd	nd	nd	nd
Bromodichloromethane	0.02	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd	nd	nd	nd	nd
Toluene	0.03	nd	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd	nd	nd	nd
Dibromochloromethane	0.03	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd	nd	nd	nd
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd	nd
Ethylbenzene	0.03	nd	nd	nd	nd	nd	nd
Total Xylenes	0.03	nd	nd	nd	nd	nd	nd
Styrene	0.02	nd	nd	nd	nd	nd	nd

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		Method Blank	TP21-1	TP21-3	TP22-1	TP22-3	TP23-1
Date Sampled	Reporting	N/A	11/6/14	11/6/14	11/6/14	11/6/14	11/6/14
Date Analyzed	Limits	11/7/14	11/6/14	11/7/14	11/7/14	11/7/14	11/7/14
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.03	nd	nd	nd	nd	nd	nd
Isopropylbenzene	0.08	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.03	nd	nd	nd	nd	nd	nd
Bromobenzene	0.03	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd	nd
n-Propylbenzene	0.02	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	0.02	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd
Isopropyltoluene	0.02	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd
n-Butylbenzene	0.02	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.05	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd	nd	nd	nd	nd
Naphthalenes	0.05	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	0.1	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		114	121	111	106	108	106
1,2-Dichloroethane-d4		125	123	133	122	133	135
Toluene-d8		89	83	80	75	82	89
4-Bromofluorobenzene		92	99	93	90	91	92

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

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HAVEN'S ESTATE PROJECT
Robinson Noble
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Libby Project # L141106-40
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		TP23-1 Dup	TP23-4
Date Sampled	Reporting	11/6/14	11/6/14
Date Analyzed	Limits	11/7/14	11/7/14
	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd
Chloromethane	0.06	nd	nd
Vinyl chloride	0.02	nd	nd
Bromomethane	0.09	nd	nd
Chloroethane	0.06	nd	nd
Trichlorofluoromethane	0.05	nd	nd
1,1-Dichloroethene	0.05	nd	nd
Methylene chloride	0.02	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	0.05	nd	nd
trans -1,2-Dichloroethene	0.02	nd	nd
1,1-Dichloroethane	0.03	nd	nd
2,2-Dichloropropane	0.05	nd	nd
cis -1,2-Dichloroethene	0.02	nd	nd
Chloroform	0.02	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd
Carbon tetrachloride	0.03	nd	nd
1,1-Dichloropropene	0.02	nd	nd
Benzene	0.02	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd
Trichloroethene (TCE)	0.03	nd	nd
1,2-Dichloropropane	0.02	nd	nd
Dibromomethane	0.04	nd	nd
Bromodichloromethane	0.02	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd
Toluene	0.03	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd
1,3-Dichloropropane	0.05	nd	nd
Dibromochloromethane	0.03	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd
Chlorobenzene	0.02	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd
Ethylbenzene	0.03	nd	nd
Total Xylenes	0.03	nd	nd
Styrene	0.02	nd	nd

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Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		TP23-1 Dup	TP23-4
Date Sampled	Reporting	11/6/14	11/6/14
Date Analyzed	Limits	11/7/14	11/7/14
	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.03	nd	nd
Isopropylbenzene	0.08	nd	nd
1,2,3-Trichloropropane	0.03	nd	nd
Bromobenzene	0.03	nd	nd
1,1,2,2-Tetrachloroethane	0.03	nd	nd
n-Propylbenzene	0.02	nd	nd
2-Chlorotoluene	0.02	nd	nd
4-Chlorotoluene	0.02	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd
tert-Butylbenzene	0.02	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd
sec-Butylbenzene	0.02	nd	nd
1,3-Dichlorobenzene	0.03	nd	nd
Isopropyltoluene	0.02	nd	nd
1,4-Dichlorobenzene	0.03	nd	nd
1,2-Dichlorobenzene	0.03	nd	nd
n-Butylbenzene	0.02	nd	nd
1,2-Dibromo-3-Chloropropane	0.05	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd
Naphthalenes	0.05	nd	nd
1,2,3-Trichlorobenzene	0.1	nd	nd
Surrogate Recovery			
Dibromofluoromethane		93	111
1,2-Dichloroethane-d4		104	132
Toluene-d8		79	89
4-Bromofluorobenzene		84	91

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

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QA/QC Data - EPA 8260C Analyses

Sample Identification: TP23-4	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 (%)	
1,1-Dichloroethene	0.50	0.42	84	0.50	0.44	88	4.7
Benzene	0.50	0.46	92	0.50	0.47	94	2.2
Toluene	0.50	0.44	88	0.50	0.45	90	2.2
Chlorobenzene	0.50	0.46	92	0.50	0.47	94	2.2
Trichloroethene (TCE)	0.50	0.48	96	0.50	0.49	98	2.1
Surrogate Recovery							
Dibromofluoromethane			102			112	
1,2-Dichloroethane-d4			111			132	
Toluene-d8			90			87	
4-Bromofluorobenzene			75			88	

Laboratory Control Sample	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
1,1-Dichloroethene	0.50	0.41	82
Benzene	0.50	0.47	94
Toluene	0.50	0.45	90
Chlorobenzene	0.50	0.46	92
Trichloroethene (TCE)	0.50	0.46	92
Surrogate Recovery			
Dibromofluoromethane			114
1,2-Dichloroethane-d4			128
Toluene-d8			91
4-Bromofluorobenzene			92

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

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HAVEN'S ESTATE PROJECT
Robinson Noble
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Analyses of Gasoline (NWTPH-Gx) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)
Method Blank	11/6/14	90	nd
TP12-1	11/6/14	92	nd
TP12-3	11/6/14	90	nd
TP13-1	11/6/14	91	nd
TP13-3	11/6/14	88	nd
TP14-1.5	11/6/14	74	nd
TP14-1.5 Dup	11/6/14	80	nd
TP14-3	11/6/14	89	nd
TP16-1	11/6/14	77	nd
TP16-3	11/6/14	75	nd
TP15-1	11/6/14	90	nd
TP15-3	11/6/14	80	nd
TP17-1	11/6/14	84	nd
TP17-3	11/6/14	90	nd
TP18-1	11/6/14	73	nd
TP18-3	11/6/14	76	nd
TP18-3 Dup	11/6/14	81	nd
Practical Quantitation Limit			10

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

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HAVEN'S ESTATE PROJECT
Robinson Noble
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Libby Project # L141106-40
Client Project # 2491-001F

Analyses of Gasoline (NWTPH-Gx) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)
Method Blank	11/7/14	89	nd
TP21-1	11/6/14	83	nd
TP21-3	11/6/14	80	nd
TP22-1	11/7/14	75	nd
TP22-3	11/7/14	82	nd
TP23-1	11/7/14	89	nd
TP23-1 Dup	11/7/14	79	nd
TP23-4	11/7/14	89	nd
Practical Quantitation Limit			10

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

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HAVEN'S ESTATE PROJECT
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Client Project # 2491-001F

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (mg/kg)	Oil (mg/kg)
Method Blank	11/6/14	105	nd	nd
TP12-1	11/6/14	96	nd	nd
TP12-3	11/6/14	119	nd	nd
TP13-1	11/6/14	104	nd	nd
TP13-3	11/6/14	115	nd	nd
TP14-1.5	11/6/14	106	nd	416
TP14-3	11/6/14	int	nd	nd
TP16-1	11/6/14	106	nd	nd
TP16-1 Dup	11/6/14	101	nd	nd
TP16-3	11/6/14	128	nd	nd
TP16-3 Dup	11/6/14	122	nd	nd
TP15-1	11/6/14	102	nd	nd
TP15-3	11/6/14	126	nd	nd
TP17-1	11/6/14	104	nd	nd
TP17-3	11/6/14	106	nd	nd
TP18-1	11/6/14	99	nd	nd
TP18-3	11/6/14	128	nd	nd
Practical Quantitation Limit			50	200

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

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HAVEN'S ESTATE PROJECT
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Client Project # 2491-001F

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (mg/kg)	Oil (mg/kg)
Method Blank	11/6/14	105	nd	nd
TP21-1	11/6/14	81	nd	nd
TP21-3	11/6/14	108	nd	nd
TP22-1	11/7/14	77	nd	nd
TP22-3	11/7/14	100	nd	nd
TP23-1	11/7/14	79	nd	nd
TP23-4	11/7/14	98	nd	nd
TP23-4 Dup	11/7/14	103	nd	nd
Practical Quantitation Limit			50	200

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

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HAVEN'S ESTATE PROJECT
Robinson Noble
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Libby Project # L141106-40
Client Project # 2491-001F

Analyses of Mineral Oil by (NWTPH-Dx/Dx Extended) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Min Oil (mg/kg)
Method Blank	11/6/14	105	nd
TP19-1	11/6/14	106	nd
TP19-3	11/6/14	122	nd
TP20-1	11/7/14	86	nd
TP20-3	11/7/14	119	nd
Practical Quantitation Limit			100

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

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HAVEN'S ESTATE PROJECT
Robinson Noble
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Client Project # 2491-001F

Analyses of Total Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)
Method Blank	11/9/14	nd	nd	nd	nd
TP12-1	11/9/14	13	nd	27	7.0
TP12-3	11/9/14	nd	nd	34	8.9
TP13-1	11/9/14	13	nd	7.6	6.5
TP13-3	11/9/14	6.9	nd	13	8.0
TP14-1.5	11/9/14	5552	nd	116	7.6
TP14-3	11/9/14	21	nd	23	7.0
TP16-1	11/9/14	17	nd	39	7.3
TP16-3	11/9/14	nd	nd	25	7.9
TP15-1	11/9/14	6.5	nd	9.4	7.1
TP15-3	11/9/14	nd	nd	46	8.9
TP17-1	11/9/14	nd	nd	85	7.7
TP17-3	11/9/14	nd	nd	15	7.0
TP18-1	11/9/14	nd	nd	57	6.9
TP18-3	11/12/14	nd	nd	11	7.0
Practical Quantitation Limit		5.0	1.0	5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

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HAVEN'S ESTATE PROJECT
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Client Project # 2491-001F

Analyses of Total Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)
Method Blank	11/9/14	nd	nd	nd	nd
TP21-1	11/9/14	nd	nd	56	8.3
TP21-3	11/9/14	nd	nd	72	7.9
TP22-1	11/9/14	5.4	nd	59	5.0
TP22-3	11/9/14	nd	nd	9.4	6.8
TP23-1	11/9/14	6.6	nd	34	5.2
TP23-4	11/9/14	nd	nd	37	6.7
TP23-4 Dup	11/9/14	nd	nd	39	7.1
Practical Quantitation Limit		5.0	1.0	5.0	5.0

"nd" Indicates not detected at the listed detection limits.

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HAVEN'S ESTATE PROJECT
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QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	11/9/14	99%	86%	87%	91%
TP23-4 MS	11/9/14	88%	87%	89%	92%
TP23-4 MSD	11/9/14	96%	88%	92%	99%
RPD	11/9/14	9%	1%	3%	7%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

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QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	11/12/14	108%	91%	106%	112%
L141111-2 MS	11/12/14	112%	82%	113%	118%
L141111-2 MSD	11/12/14	103%	85%	110%	112%
RPD	11/12/14	9%	4%	3%	5%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

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Analyses of Total Mercury in Soil by EPA Method 7471

Sample Number	Date Analyzed	Mercury (mg/kg)
Method Blank	11/13/14	nd
TP12-1	11/13/14	nd
TP12-3	11/13/14	nd
TP13-1	11/18/14	nd
TP13-3	11/13/14	nd
TP14-1.5	11/13/14	nd
TP14-3	11/13/14	nd
TP16-1	11/13/14	nd
TP16-3	11/13/14	nd
TP15-1	11/13/14	nd
TP15-3	11/13/14	nd
TP15-3 Dup	11/13/14	nd
TP17-1	11/13/14	nd
TP17-3	11/13/14	nd
TP18-1	11/18/14	nd
TP18-3	11/13/14	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

Analyses of Total Mercury in Soil by EPA Method 7471

Sample Number	Date Analyzed	Mercury (mg/kg)
Method Blank	11/13/14	nd
TP21-1	11/13/14	nd
TP21-3	11/13/14	nd
TP22-1	11/13/14	nd
TP22-3	11/13/14	nd
TP23-1	11/13/14	nd
TP23-4	11/13/14	nd
TP23-4 Dup	11/13/14	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	11/13/14	98%
TP23-4 MS	11/13/14	98%
TP23-4 MSD	11/13/14	98%
RPD	11/13/14	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
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Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	11/18/14	91%
L141118-1 MS	11/18/14	91%
L141118-1 MSD	11/18/14	91%
RPD	11/18/14	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
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Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

Analyses of Total Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (mg/kg)	Zinc (mg/kg)
Method Blank	11/9/14	nd	nd
TP12-1	11/9/14	15	nd
TP12-3	11/9/14	12	9.2
TP13-1	11/9/14	9.8	nd
TP13-3	11/9/14	13	7.1
TP14-1.5	11/9/14	3113	nd
TP14-3	11/9/14	15	nd
TP16-1	11/9/14	10	nd
TP16-3	11/9/14	12	nd
TP15-1	11/9/14	9.9	nd
TP15-3	11/9/14	12	nd
TP17-1	11/9/14	12	nd
TP17-3	11/9/14	10	nd
TP18-1	11/9/14	11	nd
TP18-3	11/12/14	20	5.7
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

Analyses of Total Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (mg/kg)	Zinc (mg/kg)
Method Blank	11/9/14	nd	nd
TP21-1	11/9/14	11	nd
TP21-3	11/9/14	12	nd
TP22-1	11/9/14	5.2	9.2
TP22-3	11/9/14	nd	nd
TP23-1	11/9/14	5.7	nd
TP23-4	11/9/14	6.2	7.4
TP23-4 Dup	11/9/14	5.8	7.6
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	11/9/14	100%	117%
TP23-4 MS	11/9/14	97%	92%
TP23-4 MSD	11/9/14	88%	84%
RPD	11/9/14	10%	9%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141106-40
Client Project # 2491-001F

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	11/12/14	106%	100%
L141111-2 MS	11/12/14	95%	89%
L141111-2 MSD	11/12/14	93%	86%
RPD	11/12/14	3%	4%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

SPECTRA Laboratories

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

11/26/2014

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Jamie Deyman

Project: Havens Estate
Sample Matrix: Soil
Date Sampled: 11/05/2014
Date Received: 11/11/2014
Spectra Project: 2014110260

Client ID	Spectra #	Analyte	Result	Units	Method
TP 12-1	1	Total Nickel	24.4	mg/Kg	SW846 6010C
TP 12-3	2	Total Nickel	23.4	mg/Kg	SW846 6010C
TP 12-3	2	Hexavalent Chromium	<1.0	mg/Kg	SW846 7196A
TP 13-1	3	Total Nickel	24.2	mg/Kg	SW846 6010C
TP 13-3	4	Total Nickel	23.0	mg/Kg	SW846 6010C
TP 14-1.5	5	TCLP Lead	3.42	mg/L	SW846 6010C
TP 14-1.5	5	Total Nickel	26.4	mg/Kg	SW846 6010C
TP 14-1.5	5	Hexavalent Chromium	<1.0	mg/Kg	SW846 7196A
TP 14-3	6	Total Nickel	22.8	mg/Kg	SW846 6010C
TP 16-1	7	Total Nickel	21.1	mg/Kg	SW846 6010C
TP 16-1	7	Hexavalent Chromium	<1.0	mg/Kg	SW846 7196A
TP 16-3	8	Total Nickel	22.7	mg/Kg	SW846 6010C
TP 15-1	9	Total Nickel	15.9	mg/Kg	SW846 6010C
TP 15-3	10	Total Nickel	19.8	mg/Kg	SW846 6010C
TP 15-3	10	Hexavalent Chromium	<1.0	mg/Kg	SW846 7196A
TP 17-1	11	Total Nickel	19.6	mg/Kg	SW846 6010C
TP 17-1	11	Hexavalent Chromium	<1.0	mg/Kg	SW846 7196A
TP 17-3	12	Total Nickel	19.4	mg/Kg	SW846 6010C
TP 18-1	13	Total Nickel	20.4	mg/Kg	SW846 6010C
TP 18-1	13	Hexavalent Chromium	<1.0	mg/Kg	SW846 7196A
TP 18-3	14	Total Nickel	21.1	mg/Kg	SW846 6010C
TP 21-1	19	Total Nickel	18.9	mg/Kg	SW846 6010C
TP 21-3	20	Total Nickel	22.6	mg/Kg	SW846 6010C

ICP analysis: 11-12-14 SCJ Additional TCLP analysis by ICP: 11-26-14 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a7/scj

SPECTRA Laboratories

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

11/26/2014

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Jamie Deyman

Project: Havens Estate
Sample Matrix: Soil
Date Sampled: 11/06/2014
Date Received: 11/11/2014
Spectra Project: 2014110260

Client ID	Spectra #	Analyte	Result	Units	Method
TP 21-3	20	Hexavalent Chromium	<1.0	mg/Kg	SW846 7196A
TP 22-1	21	Total Nickel	17.5	mg/Kg	SW846 6010C
TP 22-1	21	Hexavalent Chromium	<1.0	mg/Kg	SW846 7196A
TP 22-3	22	Total Nickel	20.2	mg/Kg	SW846 6010C
TP 23-1	23	Total Nickel	16.2	mg/Kg	SW846 6010C
TP 23-4	24	Total Nickel	18.2	mg/Kg	SW846 6010C
TP 23-4	24	Hexavalent Chromium	<0.5	mg/Kg	SW846 7196A

ICP analysis: 11-12-14 SCJ Additional TCLP analysis by ICP: 11-26-14 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a7/scj

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

11/26/2014

Libby Environmental, Inc
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2014110260
Applies to Spectra #'s	5

QUALITY CONTROL RESULTS
ICP Metals SW846 6010C - TCLP

Method Blank

Date Digested: 11/26/2014 Date Analyzed: 11/26/2014

Element	Result
Lead	< 0.04

Blank Spike (LCS)

Date Digested: 11/26/2014 Date Analyzed: 11/26/2014

Element	Spike Added	LCS Conc.	LCS %Rec
Lead	1.0	1.114	111.4

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 11/25/2014 Date Analyzed: 11/25/2014
Sample Spiked: 2014110542-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Lead	0.000	1.0	0.932	93.2	0.964	96.4	3.4

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

SPECTRA Laboratories

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

November 26, 2014

Libby Environmental
4139 Libby Rd NE
Olympia, WA 98506

Units:	mg/Kg
Spectra Project:	2014110460
Applies to Spectra #'s	1,5,7,10,11,13,20,21,24
Analyst:	BJN

QUALITY CONTROL RESULTS

Hexavalent Chromium in Soil/Solid - Method SM 3500 Cr-D/ SW846 7196A

Method Blank

Date Extracted: 11/26/2014 Date Analyzed: 11/26/2014

	Method Blank
Hexavalent Chromium	< 0.1

Blank Spike (LCS)

Date Extracted: 11/26/2014 Date Analyzed: 11/26/2014

	Spike Added	LCS Conc.	LCS %Rec
Hexavalent Chromium	0.1	0.090	90.0

LCS Recovery limits 75-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Extracted: 11/10/2014 Date Analyzed: 11/11/2014
Sample Spiked: 2014110179-1

	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Hexavalent Chromium	0.569	0.10	0.660	91.0	0.667	98.0	7.4

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

SPECTRA Laboratories

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11/12/2014

		Units:	mg/L
Libby Environmental		Spectra Project:	2014110260
4139 Libby Rd. NE		Applies to Spectra #'s	1-14 19,20
Olympia, WA 98506			

QUALITY CONTROL RESULTS

ICP Metals SW846 6010C - Soil/Solid

Method Blank

Date Digested: 11/12/2014 Date Analyzed: 11/12/2014

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 11/12/2014 Date Analyzed: 11/12/2014

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	2.067	103.4

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 11/12/2014 Date Analyzed: 11/12/2014

Sample Spiked: 2014110260-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.488	2.0	2.436	97.4	2.466	98.9	1.5

Recovery Limits 75-125%

RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs

Laboratory Manager

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

11/12/2014

Units:	mg/L
Spectra Project:	2014110260
Applies to Spectra #'s	21-24

Libby Environmental
4139 Libby Rd. NE
Olympia, WA 98506

QUALITY CONTROL RESULTS

ICP Metals SW846 6010C - Soil/Solid

Method Blank

Date Digested: 11/12/2014 Date Analyzed: 11/12/2014

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 11/12/2014 Date Analyzed: 11/12/2014

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	1.883	94.2

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 11/12/2014 Date Analyzed: 11/12/2014
Sample Spiked: 2014110260-21

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.350	2.0	2.205	92.8	2.205	92.8	0.0

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record 2014110260

Date: 11-7-14
Page: 1 of 2

Client: Libby Environmental, Inc

Address:

Phone:
Fax:

Client Project #

Project Manager: Jamie Deyman

Project Name: Havens Estate

Location:
City: Olympia, WA

Collector:
Date of Collection:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Total Nickel		Field Notes
1	TP 12-1	1'	1046	Soil	Jar												X		
2	TP 12-3	3'	1057														X		
3	TP 13-1	1'	1145														X		
4	TP 13-3	3'	1145														X		
5	TP 14-1.5	1.5	1330														X		
6	TP 14-3	3'	1335														X		
7	TP 16-1	1'	1235														X		
8	TP 16-3	3'	1237														X		
9	TP 15-1	1'	1215														X		
10	TP 15-3	3'	1210														X		
11	TP 17-1	1'	1425														X		
12	TP 17-3	3'	1420														X		
13	TP 18-1	1'	1437														X		
14	TP 18-3	3	1435														X		
15																			
16																			
17																			
18																			

Relinquished by:	Date / Time	Received by:	Date / Time
Em ZR	11/07/14	UPS	
UPS		Marie Kindler	11/11 11:00

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks: STD

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc. — **Chain of Custody Record** 20141102600

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: Libby Environmental, Inc.		Date:	Page: 2 of 2
Address:		Project Manager: Jamie Deyman	
Phone:	Fax:	Project Name: Havens Estate	
Client Project #		Location:	City: Olympia, WA
		Collector:	Date of Collection: 11-6-14

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Total Nickel			Field Notes
1	TP 19-1	1'	952	soil	Jar															HOLD
2	TP 19-3	3	958																	HOLD
3	TP20-1	1'	1004																	HOLD
4	TP20-3	3'	1006																	HOLD
5	TP21-1	1'	1059														X			
6	TP21-3	3'	1103														X			
7	TP 22-1	1'	1346														X			
8	TP 22-3	3'	1350														X			
9	TP 23-1	1'	1405														X			
10	TP 23-4	3'	1415														X			
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	11-7-14	UPS	
UPS		[signature]	11/11 10:00

Sample Receipt	
Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks: STD

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record 2014110260

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: Libby Environmental Inc.
Address:
Phone: Fax:
Client Project #

Date: 11-7-14 Page: 1 of 2
Project Manager: Jamie Dugan
Project Name: Havens Estate
Location: City: Olympia, WA
Collector: Date of Collection:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Hex Chrom	TCLP Pb	Field Notes
1	TP12-1	1'	1040	Soil	[illegible]											X			11-25-14 added
2	TP12-3	3'	1057													X	X		HexChrom, TCLP Pb
3	TP13-1	1'	1115													X			per Emily via email
4	TP13-3	3'	1145													X			Standard TAT
5	TP14-1.5	1.5'	1330													X	X	X	5 day
6	TP14-3	3'	1335													X			
7	TP16-1	1'	1255													X	X		
8	TP16-3	3'	1237													X			
9	TP15-1	1'	1215													X			
10	TP15-3	3'	1210													X	X		
11	TP17-1	1'	1425													X	X		
12	TP17-3	3'	1430													X			
13	TP18-1	1'	1437													X	X		
14	TP18-3	3'	1435													X			
15																			
16																			
17																			
18																			

Relinquished by:	Date / Time	Received by:	Date / Time
Em R	11/07/14	UPS	
UPS			

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks: STD

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506

Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

2014110260

Client: Libby Environmental Inc.
Address:
Phone:
Fax:
Client Project #

Date:
Page: 2 of 2
Project Manager: Dawne Dayman
Project Name: Havens Estate
Location:
City: Olympia, WA
Collector:
Date of Collection: 11-6-14

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Total Nickel	Hex Chrom	Field Notes
1	TP19-1	1'	952	Soil	Jar														HOLD
2	TP19-3	3'	958																HOLD
3	TP20-1	1'	1004																HOLD
4	TP20-3	3'	1006																HOLD
5	TP21-1	1'	1054													X			11-25-14 added
6	TP21-3	3'	1103													X	X		Hex Chrom per Emily
7	TP22-1	1'	1345													X	X		Via email.
8	TP22-3	3'	1350													X			Standard 5 day TAT
9	TP23-1	1'	1405													X			
10	TP23-4	3'	1415													X	X		
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			

Relinquished by:	Date / Time	Received by:	Date / Time
[illegible]	11-7-14	UPS	
UPS			

Sample Receipt

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks: STD

Distribution: White - Lab, Yellow - File, Pink - Originator

Fremont Analytical

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Jamie Deyman
4139 Libby Rd. NE
Olympia, WA 98506

RE: Havens Estate
Lab ID: 1411107

November 19, 2014

Attention Jamie Deyman:

Fremont Analytical, Inc. received 24 sample(s) on 11/11/2014 for the analyses presented in the following report.

> ***Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)***
> ***Sample Moisture (Percent Moisture)***

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Chelsea Ward
Project Manager

Fremont Analytical

Date: *11/19/2014*

CLIENT:	Libby Environmental		
Project:	Havens Estate		
Lab Order:	1411107		

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1411107-001	TP 12-1	11/05/2014 10:46 AM	11/11/2014 3:17 PM
1411107-002	TP 12-3	11/05/2014 10:57 AM	11/11/2014 3:17 PM
1411107-003	TP 13-1	11/05/2014 11:45 AM	11/11/2014 3:17 PM
1411107-004	TP 13-3	11/05/2014 11:45 AM	11/11/2014 3:17 PM
1411107-005	TP 14-1.5	11/05/2014 1:30 PM	11/11/2014 3:17 PM
1411107-006	TP 14-3	11/05/2014 1:35 PM	11/11/2014 3:17 PM
1411107-007	TP 16-1	11/05/2014 12:35 PM	11/11/2014 3:17 PM
1411107-008	TP 16-3	11/05/2014 12:37 PM	11/11/2014 3:17 PM
1411107-009	TP 15-1	11/05/2014 12:15 PM	11/11/2014 3:17 PM
1411107-010	TP 15-3	11/05/2014 12:10 PM	11/11/2014 3:17 PM
1411107-011	TP 17-1	11/05/2014 2:25 PM	11/11/2014 3:17 PM
1411107-012	TP 17-3	11/05/2014 2:20 PM	11/11/2014 3:17 PM
1411107-013	TP 18-1	11/05/2014 2:37 PM	11/11/2014 3:17 PM
1411107-014	TP 18-3	11/05/2014 2:35 PM	11/11/2014 3:17 PM
1411107-015	TP 19-1	11/06/2014 9:52 AM	11/11/2014 3:17 PM
1411107-016	TP 19-3	11/06/2014 9:58 AM	11/11/2014 3:17 PM
1411107-017	TP 20-1	11/06/2014 10:04 AM	11/11/2014 3:17 PM
1411107-018	TP 20-3	11/06/2014 10:06 AM	11/11/2014 3:17 PM
1411107-019	TP 21-1	11/06/2014 10:59 AM	11/11/2014 3:17 PM
1411107-020	TP 21-3	11/06/2014 11:03 AM	11/11/2014 3:17 PM
1411107-021	TP 22-1	11/06/2014 1:45 PM	11/11/2014 3:17 PM
1411107-022	TP 22-3	11/06/2014 1:50 PM	11/11/2014 3:17 PM
1411107-023	TP 23-1	11/06/2014 2:05 PM	11/11/2014 3:17 PM
1411107-024	TP 23-4	11/06/2014 2:15 PM	11/11/2014 3:17 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Fremont Analytical

Case Narrative

WO#: **1411107**
Date: **11/19/2014**

CLIENT: Libby Environmental
Project: Havens Estate

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Fremont Analytical

Analytical Report

WO#: **1411107**

Date Reported: **11/19/2014**

Client: Libby Environmental

Collection Date: 11/5/2014 1:30:00 PM

Project: Havens Estate

Lab ID: 1411107-005

Matrix: Soil

Client Sample ID: TP 14-1.5

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	53.9		µg/Kg-dry	1	11/17/2014 3:38:00 AM
Chrysene	ND	53.9		µg/Kg-dry	1	11/17/2014 3:38:00 AM
Benzo(b)fluoranthene	ND	53.9		µg/Kg-dry	1	11/17/2014 3:38:00 AM
Benzo(k)fluoranthene	ND	53.9		µg/Kg-dry	1	11/17/2014 3:38:00 AM
Benzo(a)pyrene	ND	53.9		µg/Kg-dry	1	11/17/2014 3:38:00 AM
Indeno(1,2,3-cd)pyrene	ND	53.9		µg/Kg-dry	1	11/17/2014 3:38:00 AM
Dibenz(a,h)anthracene	ND	53.9		µg/Kg-dry	1	11/17/2014 3:38:00 AM
Surr: 2-Fluorobiphenyl	109	42.7-132		%REC	1	11/17/2014 3:38:00 AM
Surr: Terphenyl-d14 (surr)	133	48.8-157		%REC	1	11/17/2014 3:38:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	11.3			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- RL Reporting Limit
- D Dilution was required
- H Holding times for preparation or analysis exceeded
- ND Not detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**
Date Reported: **11/19/2014**

Client: Libby Environmental
Project: Havens Estate
Lab ID: 1411107-006
Client Sample ID: TP 14-3

Collection Date: 11/5/2014 1:35:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	55.3		µg/Kg-dry	1	11/17/2014 4:01:00 AM
Chrysene	ND	55.3		µg/Kg-dry	1	11/17/2014 4:01:00 AM
Benzo(b)fluoranthene	ND	55.3		µg/Kg-dry	1	11/17/2014 4:01:00 AM
Benzo(k)fluoranthene	ND	55.3		µg/Kg-dry	1	11/17/2014 4:01:00 AM
Benzo(a)pyrene	ND	55.3		µg/Kg-dry	1	11/17/2014 4:01:00 AM
Indeno(1,2,3-cd)pyrene	ND	55.3		µg/Kg-dry	1	11/17/2014 4:01:00 AM
Dibenz(a,h)anthracene	ND	55.3		µg/Kg-dry	1	11/17/2014 4:01:00 AM
Surr: 2-Fluorobiphenyl	111	42.7-132		%REC	1	11/17/2014 4:01:00 AM
Surr: Terphenyl-d14 (surr)	122	48.8-157		%REC	1	11/17/2014 4:01:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	11.1			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**
Date Reported: **11/19/2014**

Client: Libby Environmental
Project: Havens Estate
Lab ID: 1411107-009
Client Sample ID: TP 15-1
Collection Date: 11/5/2014 12:15:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	55.9		µg/Kg-dry	1	11/17/2014 4:23:00 AM
Chrysene	ND	55.9		µg/Kg-dry	1	11/17/2014 4:23:00 AM
Benzo(b)fluoranthene	ND	55.9		µg/Kg-dry	1	11/17/2014 4:23:00 AM
Benzo(k)fluoranthene	ND	55.9		µg/Kg-dry	1	11/17/2014 4:23:00 AM
Benzo(a)pyrene	ND	55.9		µg/Kg-dry	1	11/17/2014 4:23:00 AM
Indeno(1,2,3-cd)pyrene	ND	55.9		µg/Kg-dry	1	11/17/2014 4:23:00 AM
Dibenz(a,h)anthracene	ND	55.9		µg/Kg-dry	1	11/17/2014 4:23:00 AM
Surr: 2-Fluorobiphenyl	111	42.7-132		%REC	1	11/17/2014 4:23:00 AM
Surr: Terphenyl-d14 (surr)	127	48.8-157		%REC	1	11/17/2014 4:23:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	14.6			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**

Date Reported: **11/19/2014**

Client: Libby Environmental

Collection Date: 11/5/2014 12:10:00 PM

Project: Havens Estate

Lab ID: 1411107-010

Matrix: Soil

Client Sample ID: TP 15-3

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	61.0		µg/Kg-dry	1	11/17/2014 4:46:00 AM
Chrysene	ND	61.0		µg/Kg-dry	1	11/17/2014 4:46:00 AM
Benzo(b)fluoranthene	ND	61.0		µg/Kg-dry	1	11/17/2014 4:46:00 AM
Benzo(k)fluoranthene	ND	61.0		µg/Kg-dry	1	11/17/2014 4:46:00 AM
Benzo(a)pyrene	ND	61.0		µg/Kg-dry	1	11/17/2014 4:46:00 AM
Indeno(1,2,3-cd)pyrene	ND	61.0		µg/Kg-dry	1	11/17/2014 4:46:00 AM
Dibenz(a,h)anthracene	ND	61.0		µg/Kg-dry	1	11/17/2014 4:46:00 AM
Surr: 2-Fluorobiphenyl	98.8	42.7-132		%REC	1	11/17/2014 4:46:00 AM
Surr: Terphenyl-d14 (surr)	108	48.8-157		%REC	1	11/17/2014 4:46:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	19.8			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**

Date Reported: **11/19/2014**

Client: Libby Environmental

Collection Date: 11/5/2014 2:25:00 PM

Project: Havens Estate

Lab ID: 1411107-011

Matrix: Soil

Client Sample ID: TP 17-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	64.0		µg/Kg-dry	1	11/17/2014 5:08:00 AM
Chrysene	ND	64.0		µg/Kg-dry	1	11/17/2014 5:08:00 AM
Benzo(b)fluoranthene	ND	64.0		µg/Kg-dry	1	11/17/2014 5:08:00 AM
Benzo(k)fluoranthene	ND	64.0		µg/Kg-dry	1	11/17/2014 5:08:00 AM
Benzo(a)pyrene	ND	64.0		µg/Kg-dry	1	11/17/2014 5:08:00 AM
Indeno(1,2,3-cd)pyrene	ND	64.0		µg/Kg-dry	1	11/17/2014 5:08:00 AM
Dibenz(a,h)anthracene	ND	64.0		µg/Kg-dry	1	11/17/2014 5:08:00 AM
Surr: 2-Fluorobiphenyl	97.1	42.7-132		%REC	1	11/17/2014 5:08:00 AM
Surr: Terphenyl-d14 (surr)	108	48.8-157		%REC	1	11/17/2014 5:08:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	21.9			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- RL Reporting Limit
- D Dilution was required
- H Holding times for preparation or analysis exceeded
- ND Not detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1411107**

Date Reported: **11/19/2014**

Client: Libby Environmental

Collection Date: 11/5/2014 2:20:00 PM

Project: Havens Estate

Lab ID: 1411107-012

Matrix: Soil

Client Sample ID: TP 17-3

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	61.3		µg/Kg-dry	1	11/17/2014 5:31:00 AM
Chrysene	ND	61.3		µg/Kg-dry	1	11/17/2014 5:31:00 AM
Benzo(b)fluoranthene	ND	61.3		µg/Kg-dry	1	11/17/2014 5:31:00 AM
Benzo(k)fluoranthene	ND	61.3		µg/Kg-dry	1	11/17/2014 5:31:00 AM
Benzo(a)pyrene	ND	61.3		µg/Kg-dry	1	11/17/2014 5:31:00 AM
Indeno(1,2,3-cd)pyrene	ND	61.3		µg/Kg-dry	1	11/17/2014 5:31:00 AM
Dibenz(a,h)anthracene	ND	61.3		µg/Kg-dry	1	11/17/2014 5:31:00 AM
Surr: 2-Fluorobiphenyl	105	42.7-132		%REC	1	11/17/2014 5:31:00 AM
Surr: Terphenyl-d14 (surr)	118	48.8-157		%REC	1	11/17/2014 5:31:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	19.9			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	D	Dilution was required
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Analytical Report

Fremont Analytical

WO#: **1411107**
Date Reported: **11/19/2014**

Client: Libby Environmental
Project: Havens Estate
Lab ID: 1411107-013
Client Sample ID: TP 18-1

Collection Date: 11/5/2014 2:37:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	59.2		µg/Kg-dry	1	11/17/2014 5:53:00 AM
Chrysene	ND	59.2		µg/Kg-dry	1	11/17/2014 5:53:00 AM
Benzo(b)fluoranthene	ND	59.2		µg/Kg-dry	1	11/17/2014 5:53:00 AM
Benzo(k)fluoranthene	ND	59.2		µg/Kg-dry	1	11/17/2014 5:53:00 AM
Benzo(a)pyrene	ND	59.2		µg/Kg-dry	1	11/17/2014 5:53:00 AM
Indeno(1,2,3-cd)pyrene	ND	59.2		µg/Kg-dry	1	11/17/2014 5:53:00 AM
Dibenz(a,h)anthracene	ND	59.2		µg/Kg-dry	1	11/17/2014 5:53:00 AM
Surr: 2-Fluorobiphenyl	103	42.7-132		%REC	1	11/17/2014 5:53:00 AM
Surr: Terphenyl-d14 (surr)	116	48.8-157		%REC	1	11/17/2014 5:53:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	18.7			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**

Date Reported: **11/19/2014**

Client: Libby Environmental

Project: Havens Estate

Lab ID: 1411107-014

Client Sample ID: TP 18-3

Collection Date: 11/5/2014 2:35:00 PM

Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	60.8		µg/Kg-dry	1	11/17/2014 6:16:00 AM
Chrysene	ND	60.8		µg/Kg-dry	1	11/17/2014 6:16:00 AM
Benzo(b)fluoranthene	ND	60.8		µg/Kg-dry	1	11/17/2014 6:16:00 AM
Benzo(k)fluoranthene	ND	60.8		µg/Kg-dry	1	11/17/2014 6:16:00 AM
Benzo(a)pyrene	ND	60.8		µg/Kg-dry	1	11/17/2014 6:16:00 AM
Indeno(1,2,3-cd)pyrene	ND	60.8		µg/Kg-dry	1	11/17/2014 6:16:00 AM
Dibenz(a,h)anthracene	ND	60.8		µg/Kg-dry	1	11/17/2014 6:16:00 AM
Surr: 2-Fluorobiphenyl	88.1	42.7-132		%REC	1	11/17/2014 6:16:00 AM
Surr: Terphenyl-d14 (surr)	101	48.8-157		%REC	1	11/17/2014 6:16:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	19.5			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**

Date Reported: **11/19/2014**

Client: Libby Environmental

Collection Date: 11/6/2014 9:52:00 AM

Project: Havens Estate

Lab ID: 1411107-015

Matrix: Soil

Client Sample ID: TP 19-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	61.1		µg/Kg-dry	1	11/17/2014 6:39:00 AM
Chrysene	ND	61.1		µg/Kg-dry	1	11/17/2014 6:39:00 AM
Benzo(b)fluoranthene	ND	61.1		µg/Kg-dry	1	11/17/2014 6:39:00 AM
Benzo(k)fluoranthene	ND	61.1		µg/Kg-dry	1	11/17/2014 6:39:00 AM
Benzo(a)pyrene	ND	61.1		µg/Kg-dry	1	11/17/2014 6:39:00 AM
Indeno(1,2,3-cd)pyrene	ND	61.1		µg/Kg-dry	1	11/17/2014 6:39:00 AM
Dibenz(a,h)anthracene	ND	61.1		µg/Kg-dry	1	11/17/2014 6:39:00 AM
Surr: 2-Fluorobiphenyl	88.4	42.7-132		%REC	1	11/17/2014 6:39:00 AM
Surr: Terphenyl-d14 (surr)	104	48.8-157		%REC	1	11/17/2014 6:39:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	18.1			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**
Date Reported: **11/19/2014**

Client: Libby Environmental
Collection Date: 11/6/2014 9:58:00 AM
Project: Havens Estate
Lab ID: 1411107-016
Matrix: Soil
Client Sample ID: TP 19-3

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	60.6		µg/Kg-dry	1	11/17/2014 7:01:00 AM
Chrysene	ND	60.6		µg/Kg-dry	1	11/17/2014 7:01:00 AM
Benzo(b)fluoranthene	ND	60.6		µg/Kg-dry	1	11/17/2014 7:01:00 AM
Benzo(k)fluoranthene	ND	60.6		µg/Kg-dry	1	11/17/2014 7:01:00 AM
Benzo(a)pyrene	ND	60.6		µg/Kg-dry	1	11/17/2014 7:01:00 AM
Indeno(1,2,3-cd)pyrene	ND	60.6		µg/Kg-dry	1	11/17/2014 7:01:00 AM
Dibenz(a,h)anthracene	ND	60.6		µg/Kg-dry	1	11/17/2014 7:01:00 AM
Surr: 2-Fluorobiphenyl	89.8	42.7-132		%REC	1	11/17/2014 7:01:00 AM
Surr: Terphenyl-d14 (surr)	107	48.8-157		%REC	1	11/17/2014 7:01:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	18.5			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**

Date Reported: **11/19/2014**

Client: Libby Environmental
Project: Havens Estate
Lab ID: 1411107-017
Client Sample ID: TP 20-1

Collection Date: 11/6/2014 10:04:00 AM

Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	62.9		µg/Kg-dry	1	11/17/2014 7:23:00 AM
Chrysene	ND	62.9		µg/Kg-dry	1	11/17/2014 7:23:00 AM
Benzo(b)fluoranthene	ND	62.9		µg/Kg-dry	1	11/17/2014 7:23:00 AM
Benzo(k)fluoranthene	ND	62.9		µg/Kg-dry	1	11/17/2014 7:23:00 AM
Benzo(a)pyrene	ND	62.9		µg/Kg-dry	1	11/17/2014 7:23:00 AM
Indeno(1,2,3-cd)pyrene	ND	62.9		µg/Kg-dry	1	11/17/2014 7:23:00 AM
Dibenz(a,h)anthracene	ND	62.9		µg/Kg-dry	1	11/17/2014 7:23:00 AM
Surr: 2-Fluorobiphenyl	110	42.7-132		%REC	1	11/17/2014 7:23:00 AM
Surr: Terphenyl-d14 (surr)	112	48.8-157		%REC	1	11/17/2014 7:23:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	17.5			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- RL Reporting Limit
- D Dilution was required
- H Holding times for preparation or analysis exceeded
- ND Not detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**

Date Reported: **11/19/2014**

Client: Libby Environmental

Collection Date: 11/6/2014 10:06:00 AM

Project: Havens Estate

Lab ID: 1411107-018

Matrix: Soil

Client Sample ID: TP 20-3

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	64.1		µg/Kg-dry	1	11/17/2014 7:45:00 AM
Chrysene	ND	64.1		µg/Kg-dry	1	11/17/2014 7:45:00 AM
Benzo(b)fluoranthene	ND	64.1		µg/Kg-dry	1	11/17/2014 7:45:00 AM
Benzo(k)fluoranthene	ND	64.1		µg/Kg-dry	1	11/17/2014 7:45:00 AM
Benzo(a)pyrene	ND	64.1		µg/Kg-dry	1	11/17/2014 7:45:00 AM
Indeno(1,2,3-cd)pyrene	ND	64.1		µg/Kg-dry	1	11/17/2014 7:45:00 AM
Dibenz(a,h)anthracene	ND	64.1		µg/Kg-dry	1	11/17/2014 7:45:00 AM
Surr: 2-Fluorobiphenyl	96.2	42.7-132		%REC	1	11/17/2014 7:45:00 AM
Surr: Terphenyl-d14 (surr)	104	48.8-157		%REC	1	11/17/2014 7:45:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	18.3			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**

Date Reported: **11/19/2014**

Client: Libby Environmental | **Collection Date:** 11/6/2014 10:59:00 AM

Project: Havens Estate

Lab ID: 1411107-019 | **Matrix:** Soil

Client Sample ID: TP 21-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9285		Analyst: NG
Benz(a)anthracene	ND	60.8		µg/Kg-dry	1	11/17/2014 8:08:00 AM
Chrysene	ND	60.8		µg/Kg-dry	1	11/17/2014 8:08:00 AM
Benzo(b)fluoranthene	ND	60.8		µg/Kg-dry	1	11/17/2014 8:08:00 AM
Benzo(k)fluoranthene	ND	60.8		µg/Kg-dry	1	11/17/2014 8:08:00 AM
Benzo(a)pyrene	ND	60.8		µg/Kg-dry	1	11/17/2014 8:08:00 AM
Indeno(1,2,3-cd)pyrene	ND	60.8		µg/Kg-dry	1	11/17/2014 8:08:00 AM
Dibenz(a,h)anthracene	ND	60.8		µg/Kg-dry	1	11/17/2014 8:08:00 AM
Surr: 2-Fluorobiphenyl	112	42.7-132		%REC	1	11/17/2014 8:08:00 AM
Surr: Terphenyl-d14 (surr)	121	48.8-157		%REC	1	11/17/2014 8:08:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	16.0			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**

Date Reported: **11/19/2014**

Client: Libby Environmental

Project: Havens Estate

Lab ID: 1411107-020

Client Sample ID: TP 21-3

Collection Date: 11/6/2014 11:03:00 AM

Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9286		Analyst: MD
Benz(a)anthracene	ND	61.8		µg/Kg-dry	1	11/17/2014 9:15:00 AM
Chrysene	ND	61.8		µg/Kg-dry	1	11/17/2014 9:15:00 AM
Benzo(b)fluoranthene	ND	61.8		µg/Kg-dry	1	11/17/2014 9:15:00 AM
Benzo(k)fluoranthene	ND	61.8		µg/Kg-dry	1	11/17/2014 9:15:00 AM
Benzo(a)pyrene	ND	61.8		µg/Kg-dry	1	11/17/2014 9:15:00 AM
Indeno(1,2,3-cd)pyrene	ND	61.8		µg/Kg-dry	1	11/17/2014 9:15:00 AM
Dibenz(a,h)anthracene	ND	61.8		µg/Kg-dry	1	11/17/2014 9:15:00 AM
Surr: 2-Fluorobiphenyl	84.5	42.7-132		%REC	1	11/17/2014 9:15:00 AM
Surr: Terphenyl-d14 (surr)	85.8	48.8-157		%REC	1	11/17/2014 9:15:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	19.0			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**

Date Reported: **11/19/2014**

Client: Libby Environmental

Collection Date: 11/6/2014 1:45:00 PM

Project: Havens Estate

Lab ID: 1411107-021

Matrix: Soil

Client Sample ID: TP 22-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9286		Analyst: MD
Benz(a)anthracene	ND	59.8		µg/Kg-dry	1	11/17/2014 10:00:00 AM
Chrysene	ND	59.8		µg/Kg-dry	1	11/17/2014 10:00:00 AM
Benzo(b)fluoranthene	ND	59.8		µg/Kg-dry	1	11/17/2014 10:00:00 AM
Benzo(k)fluoranthene	ND	59.8		µg/Kg-dry	1	11/17/2014 10:00:00 AM
Benzo(a)pyrene	ND	59.8		µg/Kg-dry	1	11/17/2014 10:00:00 AM
Indeno(1,2,3-cd)pyrene	ND	59.8		µg/Kg-dry	1	11/17/2014 10:00:00 AM
Dibenz(a,h)anthracene	ND	59.8		µg/Kg-dry	1	11/17/2014 10:00:00 AM
Surr: 2-Fluorobiphenyl	99.0	42.7-132		%REC	1	11/17/2014 10:00:00 AM
Surr: Terphenyl-d14 (surr)	99.9	48.8-157		%REC	1	11/17/2014 10:00:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	16.4			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**
Date Reported: **11/19/2014**

Client: Libby Environmental
Project: Havens Estate
Lab ID: 1411107-023
Client Sample ID: TP 23-1

Collection Date: 11/6/2014 2:05:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9286		Analyst: MD
Benz(a)anthracene	ND	66.7		µg/Kg-dry	1	11/17/2014 11:29:00 AM
Chrysene	ND	66.7		µg/Kg-dry	1	11/17/2014 11:29:00 AM
Benzo(b)fluoranthene	ND	66.7		µg/Kg-dry	1	11/17/2014 11:29:00 AM
Benzo(k)fluoranthene	ND	66.7		µg/Kg-dry	1	11/17/2014 11:29:00 AM
Benzo(a)pyrene	ND	66.7		µg/Kg-dry	1	11/17/2014 11:29:00 AM
Indeno(1,2,3-cd)pyrene	ND	66.7		µg/Kg-dry	1	11/17/2014 11:29:00 AM
Dibenz(a,h)anthracene	ND	66.7		µg/Kg-dry	1	11/17/2014 11:29:00 AM
Surr: 2-Fluorobiphenyl	94.2	42.7-132		%REC	1	11/17/2014 11:29:00 AM
Surr: Terphenyl-d14 (surr)	92.0	48.8-157		%REC	1	11/17/2014 11:29:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	25.0			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- RL Reporting Limit
- D Dilution was required
- H Holding times for preparation or analysis exceeded
- ND Not detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411107**
Date Reported: **11/19/2014**

Client: Libby Environmental
Project: Havens Estate
Lab ID: 1411107-024
Client Sample ID: TP 23-4
Collection Date: 11/6/2014 2:15:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9286		Analyst: MD
Benz(a)anthracene	ND	61.8		µg/Kg-dry	1	11/17/2014 11:52:00 AM
Chrysene	ND	61.8		µg/Kg-dry	1	11/17/2014 11:52:00 AM
Benzo(b)fluoranthene	ND	61.8		µg/Kg-dry	1	11/17/2014 11:52:00 AM
Benzo(k)fluoranthene	ND	61.8		µg/Kg-dry	1	11/17/2014 11:52:00 AM
Benzo(a)pyrene	ND	61.8		µg/Kg-dry	1	11/17/2014 11:52:00 AM
Indeno(1,2,3-cd)pyrene	ND	61.8		µg/Kg-dry	1	11/17/2014 11:52:00 AM
Dibenz(a,h)anthracene	ND	61.8		µg/Kg-dry	1	11/17/2014 11:52:00 AM
Surr: 2-Fluorobiphenyl	98.7	42.7-132		%REC	1	11/17/2014 11:52:00 AM
Surr: Terphenyl-d14 (surr)	97.2	48.8-157		%REC	1	11/17/2014 11:52:00 AM
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	19.1			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:
B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
RL Reporting Limit
D Dilution was required
H Holding times for preparation or analysis exceeded
ND Not detected at the Reporting Limit
S Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411107
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **MB-9285** SampType: **MBLK** Units: **µg/Kg** Prep Date: **11/13/2014** RunNo: **18076**
Client ID: **MBLKS** Batch ID: **9285** Analysis Date: **11/16/2014** SeqNo: **360374**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	ND	50.0									
Chrysene	ND	50.0									
Benzo(b)fluoranthene	ND	50.0									
Benzo(k)fluoranthene	ND	50.0									
Benzo(a)pyrene	ND	50.0									
Indeno(1,2,3-cd)pyrene	ND	50.0									
Dibenz(a,h)anthracene	ND	50.0									
Surr: 2-Fluorobiphenyl	522		500.0		104	42.7	132				
Surr: Terphenyl-d14 (surr)	465		500.0		93.0	48.8	157				

Sample ID: **LCS-9285** SampType: **LCS** Units: **µg/Kg** Prep Date: **11/13/2014** RunNo: **18076**
Client ID: **LCSS** Batch ID: **9285** Analysis Date: **11/16/2014** SeqNo: **360375**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	1,110	50.0	1,000	0	111	41.9	136				
Chrysene	1,210	50.0	1,000	0	121	51.4	135				
Benzo(b)fluoranthene	787	50.0	1,000	0	78.7	39.7	137				
Benzo(k)fluoranthene	1,020	50.0	1,000	0	102	45.7	138				
Benzo(a)pyrene	1,400	50.0	1,000	0	140	40.9	141				
Indeno(1,2,3-cd)pyrene	889	50.0	1,000	0	88.9	45.4	137				
Dibenz(a,h)anthracene	879	50.0	1,000	0	87.9	37.6	140				
Surr: 2-Fluorobiphenyl	574		500.0		115	42.7	132				
Surr: Terphenyl-d14 (surr)	518		500.0		104	48.8	157				

Qualifiers:

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
R RPD outside accepted recovery limits
D Dilution was required
J Analyte detected below quantitation limits
RL Reporting Limit
E Value above quantitation range
ND Not detected at the Reporting Limit
S Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411107
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **1411100-002ADUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **11/13/2014** RunNo: **18076**
Client ID: **BATCH** Batch ID: **9285** Analysis Date: **11/16/2014** SeqNo: **360377**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	ND	55.9						0		30	
Chrysene	158	55.9						119.8	27.4	30	
Benzo(b)fluoranthene	ND	55.9						0		30	
Benzo(k)fluoranthene	ND	55.9						0		30	
Benzo(a)pyrene	ND	55.9						0		30	
Indeno(1,2,3-cd)pyrene	ND	55.9						0		30	
Dibenz(a,h)anthracene	ND	55.9						0		30	
Surr: 2-Fluorobiphenyl	451		558.7		80.7	42.7	132		0		
Surr: Terphenyl-d14 (surr)	737		558.7		132	48.8	157		0		

Sample ID: **1411100-004AMS** SampType: **MS** Units: **µg/Kg-dry** Prep Date: **11/13/2014** RunNo: **18076**
Client ID: **BATCH** Batch ID: **9285** Analysis Date: **11/16/2014** SeqNo: **360379**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	1,550	61.9	1,238	0	125	57.5	169				
Chrysene	1,310	61.9	1,238	0	106	45.2	146				
Benzo(b)fluoranthene	1,820	61.9	1,238	0	147	42.2	168				
Benzo(k)fluoranthene	977	61.9	1,238	0	78.9	48	161				
Benzo(a)pyrene	1,860	61.9	1,238	59.94	145	34.4	179				
Indeno(1,2,3-cd)pyrene	1,600	61.9	1,238	0	130	41.1	165				
Dibenz(a,h)anthracene	1,640	61.9	1,238	0	133	38.1	166				
Surr: 2-Fluorobiphenyl	680		618.9		110	42.7	132				
Surr: Terphenyl-d14 (surr)	691		618.9		112	48.8	157				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: *11/19/2014*

Work Order: 1411107
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **MB-9286** SampType: **MBLK** Units: **µg/Kg** Prep Date: **11/13/2014** RunNo: **18124**
Client ID: **MBLKS** Batch ID: **9286** Analysis Date: **11/17/2014** SeqNo: **361419**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	ND	50.0									
Chrysene	ND	50.0									
Benzo(b)fluoranthene	ND	50.0									
Benzo(k)fluoranthene	ND	50.0									
Benzo(a)pyrene	ND	50.0									
Indeno(1,2,3-cd)pyrene	ND	50.0									
Dibenz(a,h)anthracene	ND	50.0									
Surr: 2-Fluorobiphenyl	594		500.0		119	42.7	132				
Surr: Terphenyl-d14 (surr)	563		500.0		113	48.8	157				

Sample ID: **1411107-020ADUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **11/13/2014** RunNo: **18124**
Client ID: **TP 21-3** Batch ID: **9286** Analysis Date: **11/17/2014** SeqNo: **361422**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	ND	61.8						0		30	
Chrysene	ND	61.8						0		30	
Benzo(b)fluoranthene	ND	61.8						0		30	
Benzo(k)fluoranthene	ND	61.8						0		30	
Benzo(a)pyrene	ND	61.8						0		30	
Indeno(1,2,3-cd)pyrene	ND	61.8						0		30	
Dibenz(a,h)anthracene	ND	61.8						0		30	
Surr: 2-Fluorobiphenyl	627		617.6		101	42.7	132		0		
Surr: Terphenyl-d14 (surr)	623		617.6		101	48.8	157		0		

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411107
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **1411107-021AMS** SampType: **MS** Units: **µg/Kg-dry** Prep Date: **11/13/2014** RunNo: **18124**
Client ID: **TP 22-1** Batch ID: **9286** Analysis Date: **11/17/2014** SeqNo: **361426**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	1,360	59.8	1,197	0	114	57.5	169				
Chrysene	1,200	59.8	1,197	0	100	45.2	146				
Benzo(b)fluoranthene	1,330	59.8	1,197	0	111	42.2	168				
Benzo(k)fluoranthene	1,090	59.8	1,197	0	90.8	48	161				
Benzo(a)pyrene	1,230	59.8	1,197	0	103	34.4	179				
Indeno(1,2,3-cd)pyrene	1,320	59.8	1,197	0	110	41.1	165				
Dibenz(a,h)anthracene	1,340	59.8	1,197	0	112	38.1	166				
Surr: 2-Fluorobiphenyl	585		598.4		97.7	42.7	132				
Surr: Terphenyl-d14 (surr)	591		598.4		98.8	48.8	157				

Sample ID: **LCS-9286** SampType: **LCS** Units: **µg/Kg** Prep Date: **11/13/2014** RunNo: **18124**
Client ID: **LCSS** Batch ID: **9286** Analysis Date: **11/17/2014** SeqNo: **361549**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	1,410	50.0	1,000	0	141	41.9	136				S
Chrysene	1,230	50.0	1,000	0	123	51.4	135				
Benzo(b)fluoranthene	1,100	50.0	1,000	0	110	39.7	137				
Benzo(k)fluoranthene	1,320	50.0	1,000	0	132	45.7	138				
Benzo(a)pyrene	1,260	50.0	1,000	0	126	40.9	141				
Indeno(1,2,3-cd)pyrene	1,450	50.0	1,000	0	145	45.4	137				S
Dibenz(a,h)anthracene	1,430	50.0	1,000	0	143	37.6	140				S
Surr: 2-Fluorobiphenyl	503		500.0		101	42.7	132				
Surr: Terphenyl-d14 (surr)	473		500.0		94.5	48.8	157				

NOTES:
S - Outlying spike recovery(ies) observed - High Bias. There were no detections in the samples. No further action is required.

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Sample Log-In Check List

Client Name:	LIBBY	Work Order Number:	1411107
Logged by:	Erica Silva	Date Received:	11/11/2014 3:17:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? UPS

Log In

3. Coolers are present? Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☑ No ☐
5. Custody seals intact on shipping container/cooler? Yes ☐ No ☐ Not Required ☑
6. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
7. Were all coolers received at a temperature of >0°C to 10.0°C Yes ☐ No ☑ NA ☐
   Please refer to item information
8. Sample(s) in proper container(s)? Yes ☑ No ☐
9. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
10. Are samples properly preserved? Yes ☑ No ☐
11. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
12. Is the headspace in the VOA vials? Yes ☐ No ☐ NA ☑
13. Did all samples containers arrive in good condition(unbroken)? Yes ☑ No ☐
14. Does paperwork match bottle labels? Yes ☑ No ☐
15. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
16. Is it clear what analyses were requested? Yes ☑ No ☐
17. Were all holding times able to be met? Yes ☑ No ☐

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified:		Date:	
By Whom:		Via:	☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:			
Client Instructions:			

19. Additional remarks:

Item Information

Item #	Temp °C	Condition
Cooler	12.1	
Sample	11.5	

Libby Environmental, Inc.

4139 Libby Road NE Ph 360-352-2110
Olympia WA 98506 Fax 360-352-4154

Chain of Custody Record

1411107

Client: Libby Environmental, Inc.	Date: 11-7-14 Page 1 of 2
Address:	Project Manager: Jamie Deyman
Phone: Fax:	Project Name: Havens Estate
	Location: City: Olympia, WA
Client Project #	Collector: Date of Collection: 11-5-14

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext	~~PAH~~ 8270 CPAH	PCB's 8082	MTCA 5 Metals				Field Notes
1	TP 12-1	1'	1046	Soil	Jar															HOLD
2	TP 12-3	3'	1057																	HOLD
3	TP 13-1	1'	1145																	HOLD
4	TP 13-3	3'	1145																	HOLD
5	TP 14-1.5	1.5'	1330											X						
6	TP 14-3	3'	1335											X						
7	TP 16-1	1'	1235																	HOLD
8	TP 16-3	3'	1237																	HOLD
9	TP 15-1	1'	1215											X						
10	TP 15-3	3'	1210											X						
11	TP 17-1	1'	1425											X						
12	TP 17-3	3'	1420											X						
13	TP 18-1	1'	1437											X						
14	TP 18-3	3'	1435											X						
15																				
16																				
17																				
18																				

Relinquished by	Date / Time	Received by	Date / Time	Sample Receipt		Remarks:
[signature]	11-7-14	UPS				STD
Relinquished by: UPS	Date / Time	Received by: [signature]	Date / Time: 11/11/14 15:17	Good Condition?		
				Cold?		
Relinquished by	Date / Time	Received by	Date / Time	Seals Intact?		
				Total Number of Containers		

Libby Environmental, Inc.

4139 Libby Road NE
Olympia WA 98506
Ph 360-352-2110
Fax 360-352-4154

Chain of Custody Record

1411107

Client: Libby Environmental, Inc.
Address:
Phone: Fax:
Client Project #

Date: 11-7-14 Page: 2 of 2
Project Manager: Jamie Deyman
Project Name: Havens Estate
Location: City: Olympia, WA
Collector: Date of Collection: ~~10~~ 11-6-14

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext	~~PAH~~ 8270 cPAH	PCB's 8082	MTCA 5 Metals			Field Notes
1	TP19-1	1'	952	Soil	Jar									X					
2	TP19-3	3'	958											X					
3	TP 20-1	1'	1004											X					
4	TP 20-3	3'	1006											X					
5	TP 21-1	1'	1059											X					
6	TP 21-3	3'	1103											X					
7	TP22-1	1'	1345											X					
8	TP22-3	3'	1350																HOLD
9	TP 23-1	1'	1405											X					
10	TP 23-4	3'	1415											X					
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			

Relinquished by	Date / Time	Received by	Date / Time
[illegible signature]	11-7-14	UPS	
UPS		Kevin [illegible signature]	11/11/14 15:17

Sample Receipt
Good Condition?
Cold?
Seals intact?
Total Number of Containers

Remarks: STD

DRAGON ANALYTICAL LABORATORY

530 A1 Ronlee Ln, Olympia, WA 98502
(360) 866-0543

Hazardous Waste, Microbiology, NPDES, Potable and Non-potable Water
Mobile Environmental Laboratory

Libby Environmental, Inc.
4139 Libby Road NE
Olympia, WA 98506

Sampled By: Unknown

DAL Project No.: 141120-05

Project Name: Havens Estate
Project No.: L141106-40
P.O. No.: n/a
Date Collected: 11/5/2014; 10:46 to 11/6/2014; 14:15
Date Received: 11/20/2014; 12:17
Temperature Received (°C): n/a
Report Date: 11/25/2014

Preparation Method: US EPA 3550C
Analytical Method: US EPA 8082A
Date Prepared: 11/20/2014
Date Analyzed: 11/20/2014
Analyst: TM
Data Reviewed By:

Units: mg/kg
Matrix: Soil
Reporting Limits: Standard
Injection Volume: 2 uL
Instrument ID: Agilent 9074
Lab Data File: 14112001

PCB's
ANALYTICAL RESULTS

Sample Identification	CAS No.	MRL	Method Blank	TP 12-1	TP 13-1	TP 13-3	TP 14-1.5	TP 14-1.5 Dup.	TP 14 -3	TP 16-1	TP 15-1	TP 15-3	TP 17-1	TP 17-3
PCB Aroclor 1016	12674-11-2	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB Aroclor 1221	1104-28-2	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB Aroclor 1232	11141-16-5	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB Aroclor 1242	53469-21-9	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB Aroclor 1248	12672-29-6	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB Aroclor 1254	11097-69-1	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB Aroclor 1260	11096-82-5	0.50	nd	nd	nd	nd	**0.46 J**	**0.50**	nd	nd	nd	nd	nd	nd
Percent Solids (%)				84.7	87.2	87.5	95.3	95.3	89.2	83.6	83.1	79.1	77.0	78.6
Dilution Factor				10	10	10	43	43	10	10	10	10	10	10
Data Flags														

Comments and Explanations: A "J" flag indicates an estimated value that is greater than the MDL but less than the MRL.

DRAGON ANALYTICAL LABORATORY

530 A1 Ronlee Ln, Olympia, WA 98502
(360) 866-0543

Hazardous Waste, Microbiology, NPDES, Potable and Non-potable Water
Mobile Environmental Laboratory

Libby Environmental, Inc.
4139 Libby Road NE
Olympia, WA 98506

Sampled By: Unknown

DAL Project No.: 141120-05

Project Name: Havens Estate
Project No.: L141106-40
P.O. No.: n/a
Date Collected: 11/5/2014; 10:46 to 11/6/2014; 14:15
Date Received: 11/20/2014; 12:17
Temperature Received (°C): n/a
Report Date: 11/25/2014

Preparation Method: US EPA 3550C
Analytical Method: US EPA 8082A
Date Prepared: 11/20/2014
Date Analyzed: 11/20/2014
Analyst: TM
Data Reviewed By:

Units: mg/kg
Matrix: Soil
Reporting Limits: Standard
Injection Volume: 2 uL
Instrument ID: Agilent 9074
Lab Data File: 14112001

PCB's
ANALYTICAL RESULTS

Sample Identification	CAS No.	MRL	TP 18-1	TP 18-3	TP 19-1	TP 19-3	TP 20-1	TP 20-3	TP 21-1	TP 21-3	TP 22-1	TP 23-1	TP 23-4	TP 23-4 Dup.
PCB Aroclor 1016	12674-11-2	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB Aroclor 1221	1104-28-2	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB Aroclor 1232	11141-16-5	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB Aroclor 1242	53469-21-9	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB Aroclor 1248	12672-29-6	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB Aroclor 1254	11097-69-1	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB Aroclor 1260	11096-82-5	0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Percent Solids (%)			80.1	79.3	80.9	79.9	80.4	80.9	83.2	84.4	80.2	77.4	80.3	80.3
Dilution Factor			10	10	10	10	10	10	30	10	10	10	10	10
Data Flags														

DRAGON ANALYTICAL LABORATORY

530 A1 Ronlee Ln, Olympia, WA 98502
(360) 866-0543

Hazardous Waste, Microbiology, NPDES, Potable and Non-potable Water
Mobile Environmental Laboratory

Libby Environmental, Inc.
DAL Project No.: 141120-05

Project Name: Havens Estate
Project No.: L141106-40

PCB's
QUALITY CONTROL RESULTS

SURROGATE RECOVERY

Surrogate	Limits (%)	Method Blank	TP 12-1	TP 13-1	TP 13-3	TP 14-1.5	TP 14-1.5 Dup.	TP 14 -3	TP 16-1	TP 15-1	TP 15-3	TP 17-1	TP 17-3
TCMX	30-150	97.8	97.3	96.9	97.3	108	97.7	98.8	93.7	97.4	103	98.2	101
DCBP	30-150	102	101	99.1	98.7	101	98.2	99.9	96.3	101	104	100	104

Surrogate	Limits (%)	TP 18-1	TP 18-3	TP 19-1	TP 19-3	TP 20-1	TP 20-3	TP 21-1	TP 21-3	TP 22-1	TP 23-1	TP 23-4	TP 23-4 Dup.
TCMX	30-150	97.1	98.4	99.8	99.4	102	106	100	101	101	115	114	99.3
DCBP	30-150	99.9	101	102	103	105	108	104	105	104	95.8	106	103

LABORATORY CONTROL SAMPLE AND MATRIX SPIKE

QC Batch ID: 141120-PCB

MS/MSD Sample ID: 141120-PCB MS/MSD

LCS Sample ID: 141120-PCB LCS

Analyte	MS/MSD Limits (%)	MS/MSD/ LCS Level (mg/kg)	Sample Conc. (mg/kg)	MS Recovery (mg/kg)	MS Percent Recovery	MSD Recovery (mg/kg)	MSD Percent Recovery	MS/MSD RPD Limits	RPD	LCS Limits (%)	LCS Recovery (mg/kg)	LCS Percent Recovery	LCSD Recovery (mg/kg)	LCSD Percent Recovery
Arochlor 1016	29-135	400	nd	406	101%	389	97.3%	≤ 22%	2.0	50-120	418	105%	393	98.3%
Arochlor 1260	29-135	400	nd	363	90.8%	351	87.8%	≤ 15%	1.7	50-120	423	106%	362	90.4%

WA-DOE-Laboratory Certification No.: C890
"nd" indicates the analyte was not detected at or above the listed Method Reporting Limit.
"n/a" indicates not applicable
Sample results based on dry weight.

Comments and Explanations: None.

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 11/6/14 Page: 1 of 2

Client: Robinson Noble

Project Manager: Max Wills

Address: 3011 S. Huson St Ste A

Project Name: Havens Estate

City: Tacoma State: WA Zip: 98

Location: 411 93rd Ave East City, State: Olympia, WA

Phone: 253-475-7711 Fax: 253-472-5846

Collector: Kari Thomas Date of Collection: 11/5/14

Client Project # 2491-001F

Email: kthomas@robinson-noble.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	~~PCBs 8082~~ TCLP Pb	MTCA 5 Metals	PCBs	cPAHs	Hex Chrom	Field Notes
1	TP12-1	1'	10:46	Soil				X			X		X			X	X	X		HOLD cPAHs
2	TP12-3'	3'	10:57					X			X		X			X	X	X	X	HOLD PCBs & cPAHs
3	TP13-1	1'	11:45					X			X		X			X	X	X		HOLD cPAHs
MS 4	TP13-3	3	11:45					X			X		X			X	X	X		HOLD cPAHs
5	TP14-1.5	1.5	13:30					X			X		X		X	X	X	X	X	
6	TP14-3	3	13:25					X			X		X			X	X	X		
7	TP16-1	1	12:35					X			X		X			X	X	X	X	HOLD cPAHs
8	TP16-3	3	12:37					X			X		X			X	X	X		HOLD PCBs & cPAHs
9	TP15-1	1	12:15					X			X		X			X	X	X		11-25-14 added
10	TP15-3	3	12:10					X			X		X			X	X	X	X	HexChrom TCLP Pb
11	TP17-1	1	14:25					X			X		X			X	X	X	X	per Max via email
12	TP17-3	3	14:20					X			X		X			X	X	X		STD
13	TP18-1	1	14:37					X			X		X			X	X	X	X	
14	TP18-3	3	14:35					X			X		X			X	X	X		
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	11/6/14 10:18	[signature]	11/6/14 1530
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks: EIM ML & STANDARD TURN

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.
4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

www.LibbyEnvironmental.com

Client: Robinson-Noble
Address: 2105 S Hosmer St Ste A
City: Tacoma State: WA Zip: 98409
Phone: 253-475-7711 Fax: 253-472-5846
Client Project # 2491-001F

Date: 11/6/14 Page: 2 of 2
Project Manager: Max Wills
Project Name: Harris Estate
Location: 411 93rd Ave East City, State: Olympia WA
Collector: Kris Thomas Date of Collection: 11/6/14
Email: kthomas@robinson-noble.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext. ~~Mineral oil~~	~~PAH 8270~~ Hex Chrom	PCB's 8082	MTCA 5 Metals	~~[illegible]~~	cPAHs	Mineral Oil only	Field Notes
1	TP19-1	1'	9:52	Soil	Jar								~~X~~		X		X		X	11-25-14 added
2	TP19-3	2'	9:58	Soil	Jar								~~X~~		X		X		X	Hex Chrom per Max
3	TP20-1	1'	10:04	Soil	Jar								~~X~~		X		X		X	via email STD
4	TP20-3	3'	10:06	Soil	Jar								~~X~~		X		X		X	
5	TP21-1	1'	10:59	Soil	Jar			X			X		X		X	X		X		Full Dx Dx
6	TP21-3	3	11:03	Soil	Jar			X			X		X	X	X	X		X		Full Dx Dx
7	TP22-1	1	13:45	Soil	Jars			X			X		X	X	X	X		X		Full Dx Dx
8	TP22-3	3	13:50	Soil	Jars			X			X		X		X	X		X		HOLD PCB HOLD cPAHs
9	TP23-1	1	14:05	Soil	Jars			X			X		X		X	X		X		Full Dx Dx
10	TP23-4	3	14:15	Soil	Jars			X			X		X	X	X	X		X		Full Dx Dx
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	11/6/14 1530	[signature]	11/6/14 1530

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks: EIM STANDARD TURN ML +

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Libby Environmental, Inc.
4139 Libby Road NE • Olympia, WA 98506-2518

December 11, 2014

Max Wills
Robinson Noble
17625 130th Avenue NE, Suite 102
Woodinville, WA 98072

Dear Mr. Wills:

Please find enclosed the analytical data report for the Havens Estate Project located in Olympia, Washington. Soil samples were analyzed for Volatile Organic Compounds by EPA Method 8260C, Gasoline by NWTPH-Gx, Diesel & Oil by NWTPH-Dx/Dx Extended, Metals Arsenic, Cadmium, Chromium, Copper, Lead, and Zinc by EPA Method 7010 Series, Mercury by EPA Method 7471, Total Nickel by EPA Method SW846 6010C, Hexavalent Chromium by EPA Method 7196A, Polyaromatic Hydrocarbons by EPA Method 8270 (SIM), Semi-Volatile Organic Compounds by EPA Method 8270, and PCB (Polychlorinated Biphenyls) by EPA Method 8082.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. All soil samples are reported on a dry weight basis. An invoice for this analytical work is included and has been emailed to the Tacoma office.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Kurt Johnson
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com
www.LibbyEnvironmental.com

Libby Environmental, Inc.

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Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141107-40
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		Method Blank	TP24-1	TP24-3	TP25-1	TP25-3
Date Sampled Date Analyzed	Reporting Limits (mg/kg)	N/A 11/7/14 (mg/kg)	11/7/14 11/7/14 (mg/kg)	11/7/14 11/7/14 (mg/kg)	11/7/14 11/7/14 (mg/kg)	11/7/14 11/7/14 (mg/kg)
Dichlorodifluoromethane	0.06	nd	nd	nd	nd	nd
Chloromethane	0.06	nd	nd	nd	nd	nd
Vinyl chloride	0.02	nd	nd	nd	nd	nd
Bromomethane	0.09	nd	nd	nd	nd	nd
Chloroethane	0.06	nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd
Methylene chloride	0.02	nd	nd	nd	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	0.05	nd	nd	nd	nd	nd
trans -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd
1,1-Dichloroethane	0.03	nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd
Chloroform	0.02	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd	nd	nd	nd
Carbon tetrachloride	0.03	nd	nd	nd	nd	nd
1,1-Dichloropropene	0.02	nd	nd	nd	nd	nd
Benzene	0.02	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.03	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.02	nd	nd	nd	nd	nd
Dibromomethane	0.04	nd	nd	nd	nd	nd
Bromodichloromethane	0.02	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd	nd	nd	nd
Toluene	0.03	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd	nd	nd
Dibromochloromethane	0.03	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd	nd	nd
Chlorobenzene	0.02	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd
Ethylbenzene	0.03	nd	nd	nd	nd	nd
Total Xylenes	0.03	nd	nd	nd	nd	nd
Styrene	0.02	nd	nd	nd	nd	nd

Libby Environmental, Inc.

4139 Libby Road NE
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Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141107-40
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		Method Blank	TP24-1	TP24-3	TP25-1	TP25-3
Date Sampled	Reporting	N/A	11/7/14	11/7/14	11/7/14	11/7/14
Date Analyzed	Limits	11/7/14	11/7/14	11/7/14	11/7/14	11/7/14
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.03	nd	nd	nd	nd	nd
Isopropylbenzene	0.08	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.03	nd	nd	nd	nd	nd
Bromobenzene	0.03	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd
n-Propylbenzene	0.02	nd	nd	nd	nd	nd
2-Chlorotoluene	0.02	nd	nd	nd	nd	nd
4-Chlorotoluene	0.02	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd	nd	nd	nd
tert-Butylbenzene	0.02	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd	nd	nd	nd
sec-Butylbenzene	0.02	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.03	nd	nd	nd	nd	nd
Isopropyltoluene	0.02	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	0.03	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.03	nd	nd	nd	nd	nd
n-Butylbenzene	0.02	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.05	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd	nd	nd	nd
Naphthalenes	0.05	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	0.1	nd	nd	nd	nd	nd
Surrogate Recovery						
Dibromofluoromethane		114	111	115	108	111
1,2-Dichloroethane-d4		125	132	125	123	125
Toluene-d8		89	89	89	75	90
4-Bromofluorobenzene		92	89	88	91	96

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141107-40
Client Project # 2491-001F

QA/QC Data - EPA 8260C Analyses

Sample Identification: L141107-40	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 (%)	
1,1-Dichloroethene	0.50	0.42	84	0.50	0.44	88	4.7
Benzene	0.50	0.46	92	0.50	0.47	94	2.2
Toluene	0.50	0.44	88	0.50	0.45	90	2.2
Chlorobenzene	0.50	0.46	92	0.50	0.47	94	2.2
Trichloroethene (TCE)	0.50	0.48	96	0.50	0.49	98	2.1
Surrogate Recovery							
Dibromofluoromethane			102			112	
1,2-Dichloroethane-d4			111			132	
Toluene-d8			90			87	
4-Bromofluorobenzene			75			88	

	Laboratory Control Sample		
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
1,1-Dichloroethene	0.50	0.41	82
Benzene	0.50	0.47	94
Toluene	0.50	0.45	90
Chlorobenzene	0.50	0.46	92
Trichloroethene (TCE)	0.50	0.46	92
Surrogate Recovery			
Dibromofluoromethane			114
1,2-Dichloroethane-d4			128
Toluene-d8			91
4-Bromofluorobenzene			92

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141107-40
Client Project # 2491-001F

Analyses of Gasoline (NWTPH-Gx) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)
Method Blank	11/7/14	89	nd
TP24-1	11/7/14	89	nd
TP24-3	11/7/14	89	nd
TP25-1	11/7/14	75	nd
TP25-3	11/7/14	90	nd
Practical Quantitation Limit			10

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141107-40
Client Project # 2491-001F

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (mg/kg)	Oil (mg/kg)
Method Blank	11/7/14	95	nd	nd
TP24-1	11/7/14	87	nd	nd
TP24-3	11/7/14	85	nd	nd
TP25-1	11/7/14	100	nd	nd
TP25-3	11/7/14	81	nd	nd
TP25-3 Dup	11/7/14	97	nd	nd
Practical Quantitation Limit			50	200

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141107-40
Client Project # 2491-001F

Analyses of Total Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)
Method Blank	11/9/14	nd	nd	nd	nd
TP24-1	11/9/14	nd	nd	53	5.4
TP24-3	11/9/14	nd	nd	23	nd
TP25-1	11/9/14	16	nd	19	6.6
TP25-3	11/9/14	nd	nd	83	6.7
TP26-2	11/9/14	7.7	nd	8.3	nd
TP26-2 Dup	11/9/14	7.5	nd	10	nd
Practical Quantitation Limit		5.0	1.0	5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

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Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141107-40
Client Project # 2491-001F

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	11/9/14	99%	86%	87%	91%
TP26-2 MS	11/9/14	106%	90%	95%	112%
TP26-2 MSD	11/9/14	117%	88%	92%	118%
RPD	11/9/14	9%	2%	4%	5%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141107-40
Client Project # 2491-001F

Analyses of Total Mercury in Soil by EPA Method 7471

Sample Number	Date Analyzed	Mercury (mg/kg)
Method Blank	11/13/14	nd
TP24-1	11/13/14	nd
TP24-3	11/13/14	nd
TP25-1	11/13/14	nd
TP25-3	11/13/14	nd
TP26-2	11/13/14	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

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Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141107-40
Client Project # 2491-001F

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	11/13/14	98%
L141111-2 MS	11/13/14	98%
L141111-2 MSD	11/13/14	98%
RPD	11/13/14	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

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Olympia, WA 98506
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Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141107-40
Client Project # 2491-001F

Analyses of Total Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (mg/kg)	Zinc (mg/kg)
Method Blank	11/9/14	nd	nd
TP24-1	11/9/14	6.6	nd
TP24-3	11/9/14	7.5	nd
TP25-1	11/9/14	13	nd
TP25-3	11/9/14	7.1	nd
TP26-2	11/9/14	nd	nd
TP26-2 Dup	11/9/14	nd	nd
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

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Olympia, WA 98506
Phone: (360) 352-2110
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Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141107-40
Client Project # 2491-001F

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	11/9/14	100%	117%
TP26-2 MS	11/9/14	110%	92%
TP26-2 MSD	11/9/14	103%	92%
RPD	11/9/14	6%	1%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

SPECTRA Laboratories

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

11/26/2014

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Jamie Deyman

Project:	Havens Estate
Sample Matrix:	Soil
Date Sampled:	11/07/2014
Date Received:	11/11/2014
Spectra Project:	2014110261

Client ID	Spectra #	Analyte	Result	Units	Method
TP 24-1	1	Total Nickel	16.2	mg/Kg	SW846 6010C
TP 24-1	1	Hexavalent Chromium	<1.0	mg/Kg	SW846 7196A
TP 24-3	2	Total Nickel	22.4	mg/Kg	SW846 6010C
TP 25-1	3	Total Nickel	24.4	mg/Kg	SW846 6010C
TP 25-3	4	Total Nickel	25.6	mg/Kg	SW846 6010C
TP 25-3	4	Hexavalent Chromium	<0.5	mg/Kg	SW846 7196A
TP 26-2	6	Total Nickel	3.9	mg/Kg	SW846 6010C

ICP analysis: 11-12-14 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a7/bjn

SPECTRA Laboratories

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

11/12/2014

Libby Environmental
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2014110261
Applies to Spectra #'s	1-4 6

QUALITY CONTROL RESULTS

ICP Metals SW846 6010C - Soil/Solid

Method Blank

Date Digested: 11/12/2014 Date Analyzed: 11/12/2014

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 11/12/2014 Date Analyzed: 11/12/2014

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	1.883	94.2

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 11/12/2014 Date Analyzed: 11/12/2014
Sample Spiked: 2014110260-21

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.350	2.0	2.205	92.8	2.205	92.8	0.0

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

SPECTRA Laboratories

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November 26, 2014

Libby Environmental
4139 Libby Rd NE
Olympia, WA 98506

Units:	mg/Kg
Spectra Project:	2014110461
Applies to Spectra #'s :	1, 4
Analyst:	BJN

QUALITY CONTROL RESULTS

Hexavalent Chromium in Soil/Solid - Method SM 3500 Cr-D/ SW846 7196A

Method Blank

Date Extracted: 11/26/2014 Date Analyzed: 11/26/2014

	Method Blank
Hexavalent Chromium	< 0.1

Blank Spike (LCS)

Date Extracted: 11/26/2014 Date Analyzed: 11/26/2014

	Spike Added	LCS Conc.	LCS %Rec
Hexavalent Chromium	0.1	0.090	90.0

LCS Recovery limits 75-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Extracted: 11/10/2014 Date Analyzed: 11/11/2014
Sample Spiked: 2014110179-1

	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Hexavalent Chromium	0.569	0.10	0.660	91.0	0.667	98.0	7.4

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Chain of Custody Record 2014110201

Client: Libby Environmental, Inc.
Address: (see above)
City: State: Zip:
Phone: Fax:
Client Project #

Date: 11/10/14
Page: 1 of 1
Project Manager: Jamie Deyman
Project Name: Havens Estate
Location:
City, State: Olympia, WA
Collector:
Date of Collection: 11/7/14
Email: libbyenv@aol.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	[illegible]	Total Nickel	Field Notes
1	TP 24-1	1	1405	soil	Jar												X		
2	TP 24-3	3	1415	↓	↓												X		
3	TP 25-1	1	1425														X		
4	TP 25-3	3	1430														X		
5	TP 26-1	1	1441																
6	TP 26-2	2	1445																HOLD
7																	X		
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	11/10/14	UPS	—
UPS	—	[signature]	11/11 10:55

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks: Standard TAT

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc. — Chain of Custody Record 2014110261

www.LibbyEnvironmental.com

4139 Libby Road NE Ph: 360-352-2110
Olympia, WA 98506 Fax: 360-352-4154

Client: Libby Environmental, Inc.		Date: 11/10/14	Page: 1 of 1
Address: (see above)		Project Manager: Jamie Deyman	
City:	State: Zip:	Project Name: Havens Estate	
Phone:	Fax:	Location:	City, State: Olympia, WA
Client Project #		Collector:	Date of Collection: 11/7/14
		Email: libbyenv@aol.com	

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	[illegible]	Total Nickel	Hex Chrom	Field Notes
1	TP24-1	1	1405	soil	Jar													X	X	11-25-14 added
2	TP24-3	3	1415															X		Hex Chrom per
3	TP25-1	1	1425															X		Emily via email
4	TP25-3	3	1432															X	X	Standard
5	TP26-1	1	1441															HOLD		5-day
6	TP26-2	2	1446															X		
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	11/10/14	UPS	
UPS			

Sample Receipt:	
Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks: Standard TAT

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Jamie Deyman
4139 Libby Rd. NE
Olympia, WA 98506

RE: Havens Estate
Lab ID: 1411104

November 19, 2014

Attention Jamie Deyman:

Fremont Analytical, Inc. received 6 sample(s) on 11/11/2014 for the analyses presented in the following report.

> ***Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)***
> ***Sample Moisture (Percent Moisture)***
> ***Semi-Volatile Organic Compounds by EPA Method 8270***

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Chelsea Ward
Project Manager

Fremont Analytical

Date: 11/19/2014

CLIENT: Libby Environmental
Project: Havens Estate
Lab Order: 1411104

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1411104-001	TP 24-1	11/07/2014 2:05 PM	11/11/2014 11:05 AM
1411104-002	TP 24-3	11/07/2014 2:15 PM	11/11/2014 11:05 AM
1411104-003	TP 25-1	11/07/2014 2:25 PM	11/11/2014 11:05 AM
1411104-004	TP 25-3	11/07/2014 2:30 PM	11/11/2014 11:05 AM
1411104-005	TP 26-1	11/07/2014 2:41 PM	11/11/2014 11:05 AM
1411104-006	TP 26-2	11/07/2014 2:45 PM	11/11/2014 11:05 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Fremont Analytical

Case Narrative

WO#: **1411104**

Date: **11/19/2014**

CLIENT: Libby Environmental
Project: Havens Estate

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Fremont Analytical

Analytical Report

WO#: **1411104**

Date Reported: **11/19/2014**

Client: Libby Environmental

Collection Date: 11/7/2014 2:05:00 PM

Project: Havens Estate

Lab ID: 1411104-001

Matrix: Soil

Client Sample ID: TP 24-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9286		Analyst: MD
Benz(a)anthracene	ND	61.6		µg/Kg-dry	1	11/17/2014 12:14:00 PM
Chrysene	ND	61.6		µg/Kg-dry	1	11/17/2014 12:14:00 PM
Benzo(b)fluoranthene	ND	61.6		µg/Kg-dry	1	11/17/2014 12:14:00 PM
Benzo(k)fluoranthene	ND	61.6		µg/Kg-dry	1	11/17/2014 12:14:00 PM
Benzo(a)pyrene	ND	61.6		µg/Kg-dry	1	11/17/2014 12:14:00 PM
Indeno(1,2,3-cd)pyrene	ND	61.6		µg/Kg-dry	1	11/17/2014 12:14:00 PM
Dibenz(a,h)anthracene	ND	61.6		µg/Kg-dry	1	11/17/2014 12:14:00 PM
Surr: 2-Fluorobiphenyl	103	42.7-132		%REC	1	11/17/2014 12:14:00 PM
Surr: Terphenyl-d14 (surr)	104	48.8-157		%REC	1	11/17/2014 12:14:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R17989		Analyst: SL
Percent Moisture	18.8			wt%	1	11/12/2014 2:19:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411104**

Date Reported: **11/19/2014**

Client: Libby Environmental

Project: Havens Estate

Lab ID: 1411104-003

Client Sample ID: **TP 25-1**

Collection Date: 11/7/2014 2:25:00 PM

Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9286		Analyst: MD
Benz(a)anthracene	ND	56.8		µg/Kg-dry	1	11/17/2014 12:37:00 PM
Chrysene	ND	56.8		µg/Kg-dry	1	11/17/2014 12:37:00 PM
Benzo(b)fluoranthene	ND	56.8		µg/Kg-dry	1	11/17/2014 12:37:00 PM
Benzo(k)fluoranthene	ND	56.8		µg/Kg-dry	1	11/17/2014 12:37:00 PM
Benzo(a)pyrene	ND	56.8		µg/Kg-dry	1	11/17/2014 12:37:00 PM
Indeno(1,2,3-cd)pyrene	ND	56.8		µg/Kg-dry	1	11/17/2014 12:37:00 PM
Dibenz(a,h)anthracene	ND	56.8		µg/Kg-dry	1	11/17/2014 12:37:00 PM
Surr: 2-Fluorobiphenyl	111	42.7-132		%REC	1	11/17/2014 12:37:00 PM
Surr: Terphenyl-d14 (surr)	117	48.8-157		%REC	1	11/17/2014 12:37:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R17989		Analyst: SL
Percent Moisture	12.0			wt%	1	11/12/2014 2:19:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411104**

Date Reported: **11/19/2014**

Client: Libby Environmental

Collection Date: 11/7/2014 2:30:00 PM

Project: Havens Estate

Lab ID: 1411104-004

Matrix: Soil

Client Sample ID: TP 25-3

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9286		Analyst: MD
Benz(a)anthracene	ND	61.5		µg/Kg-dry	1	11/17/2014 12:59:00 PM
Chrysene	ND	61.5		µg/Kg-dry	1	11/17/2014 12:59:00 PM
Benzo(b)fluoranthene	ND	61.5		µg/Kg-dry	1	11/17/2014 12:59:00 PM
Benzo(k)fluoranthene	ND	61.5		µg/Kg-dry	1	11/17/2014 12:59:00 PM
Benzo(a)pyrene	ND	61.5		µg/Kg-dry	1	11/17/2014 12:59:00 PM
Indeno(1,2,3-cd)pyrene	ND	61.5		µg/Kg-dry	1	11/17/2014 12:59:00 PM
Dibenz(a,h)anthracene	ND	61.5		µg/Kg-dry	1	11/17/2014 12:59:00 PM
Surr: 2-Fluorobiphenyl	104	42.7-132		%REC	1	11/17/2014 12:59:00 PM
Surr: Terphenyl-d14 (surr)	104	48.8-157		%REC	1	11/17/2014 12:59:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R17989		Analyst: SL
Percent Moisture	18.8			wt%	1	11/12/2014 2:19:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411104**

Date Reported: **11/19/2014**

Client: Libby Environmental

Collection Date: 11/7/2014 2:45:00 PM

Project: Havens Estate

Lab ID: 1411104-006

Matrix: Soil

Client Sample ID: TP 26-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Semi-Volatile Organic Compounds by EPA Method 8270				Batch ID: 9285		Analyst: NG
Phenol	ND	360		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Bis(2-chloroethyl) ether	ND	360		µg/Kg-dry	1	11/18/2014 10:40:00 AM
2-Chlorophenol	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
1,3-Dichlorobenzene	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
1,4-Dichlorobenzene	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
1,2-Dichlorobenzene	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Benzyl alcohol	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
2-Methylphenol (o-cresol)	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Hexachloroethane	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
N-Nitrosodi-n-propylamine	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Nitrobenzene	ND	360		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Isophorone	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
4-Methylphenol (p-cresol)	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
2-Nitrophenol	ND	360		µg/Kg-dry	1	11/18/2014 10:40:00 AM
2,4-Dimethylphenol	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Bis(2-chloroethoxy)methane	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
2,4-Dichlorophenol	ND	360		µg/Kg-dry	1	11/18/2014 10:40:00 AM
1,2,4-Trichlorobenzene	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Naphthalene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
4-Chloroaniline	ND	900		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Hexachlorobutadiene	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
4-Chloro-3-methylphenol	ND	900		µg/Kg-dry	1	11/18/2014 10:40:00 AM
2-Methylnaphthalene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
1-Methylnaphthalene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Hexachlorocyclopentadiene	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
2,4,6-Trichlorophenol	ND	360		µg/Kg-dry	1	11/18/2014 10:40:00 AM
2,4,5-Trichlorophenol	ND	360		µg/Kg-dry	1	11/18/2014 10:40:00 AM
2-Chloronaphthalene	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
2-Nitroaniline	ND	900		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Acenaphthene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Dimethylphthalate	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
2,6-Dinitrotoluene	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Acenaphthylene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
2,4-Dinitrophenol	ND	360		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Dibenzofuran	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411104**

Date Reported: **11/19/2014**

Client: Libby Environmental

Collection Date: 11/7/2014 2:45:00 PM

Project: Havens Estate

Lab ID: 1411104-006

Matrix: Soil

Client Sample ID: TP 26-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Semi-Volatile Organic Compounds by EPA Method 8270				Batch ID: 9285		Analyst: NG
2,4-Dinitrotoluene	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
4-Nitrophenol	ND	900		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Fluorene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
4-Chlorophenyl phenyl ether	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Diethylphthalate	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
4,6-Dinitro-2-methylphenol	ND	360		µg/Kg-dry	1	11/18/2014 10:40:00 AM
4-Bromophenyl phenyl ether	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Hexachlorobenzene	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Pentachlorophenol	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Phenanthrene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Anthracene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Carbazole	ND	900		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Di-n-butylphthalate	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Fluoranthene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Pyrene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Butyl Benzylphthalate	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
bis(2-Ethylhexyl)adipate	253	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Benz (a) anthracene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Chrysene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
bis (2-Ethylhexyl) phthalate	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Di-n-octyl phthalate	ND	180		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Benzo (b) fluoranthene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Benzo (k) fluoranthene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Benzo (a) pyrene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Indeno (1,2,3-cd) pyrene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Dibenz (a,h) anthracene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Benzo (g,h,I) perylene	ND	144		µg/Kg-dry	1	11/18/2014 10:40:00 AM
Surr: 2,4,6-Tribromophenol	139	14-136	S	%REC	1	11/18/2014 10:40:00 AM
Surr: 2-Fluorobiphenyl	88.0	27.3-158		%REC	1	11/18/2014 10:40:00 AM
Surr: Nitrobenzene-d5	93.4	21.9-141		%REC	1	11/18/2014 10:40:00 AM
Surr: Phenol-d6	128	18.4-144		%REC	1	11/18/2014 10:40:00 AM
Surr: p-Terphenyl	137	33.3-149		%REC	1	11/18/2014 10:40:00 AM

NOTES:

S - Outlying surrogate recovery observed. The LCS was within range.

Qualifiers:				
	B	Analyte detected in the associated Method Blank	D	Dilution was required
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411104**

Date Reported: **11/19/2014**

Client: Libby Environmental

Collection Date: 11/7/2014 2:45:00 PM

Project: Havens Estate

Lab ID: 1411104-006

Matrix: Soil

Client Sample ID: TP 26-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R18008		Analyst: KZ
Percent Moisture	46.3			wt%	1	11/13/2014 2:15:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **MB-9286** | SampType: **MBLK** | Units: **µg/Kg** | Prep Date: **11/13/2014** | RunNo: **18124**
Client ID: **MBLKS** | Batch ID: **9286** | Analysis Date: **11/17/2014** | SeqNo: **361419**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	ND	50.0									
Chrysene	ND	50.0									
Benzo(b)fluoranthene	ND	50.0									
Benzo(k)fluoranthene	ND	50.0									
Benzo(a)pyrene	ND	50.0									
Indeno(1,2,3-cd)pyrene	ND	50.0									
Dibenz(a,h)anthracene	ND	50.0									
Surr: 2-Fluorobiphenyl	594		500.0		119	42.7	132				
Surr: Terphenyl-d14 (surr)	563		500.0		113	48.8	157				

Sample ID: **1411107-020ADUP** | SampType: **DUP** | Units: **µg/Kg-dry** | Prep Date: **11/13/2014** | RunNo: **18124**
Client ID: **BATCH** | Batch ID: **9286** | Analysis Date: **11/17/2014** | SeqNo: **361422**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	ND	61.8						0		30	
Chrysene	ND	61.8						0		30	
Benzo(b)fluoranthene	ND	61.8						0		30	
Benzo(k)fluoranthene	ND	61.8						0		30	
Benzo(a)pyrene	ND	61.8						0		30	
Indeno(1,2,3-cd)pyrene	ND	61.8						0		30	
Dibenz(a,h)anthracene	ND	61.8						0		30	
Surr: 2-Fluorobiphenyl	627		617.6		101	42.7	132		0		
Surr: Terphenyl-d14 (surr)	623		617.6		101	48.8	157		0		

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **1411107-021AMS** | SampType: **MS** | Units: **µg/Kg-dry** | Prep Date: **11/13/2014** | RunNo: **18124**
Client ID: **BATCH** | Batch ID: **9286** | Analysis Date: **11/17/2014** | SeqNo: **361426**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	1,360	59.8	1,197	0	114	57.5	169				
Chrysene	1,200	59.8	1,197	0	100	45.2	146				
Benzo(b)fluoranthene	1,330	59.8	1,197	0	111	42.2	168				
Benzo(k)fluoranthene	1,090	59.8	1,197	0	90.8	48	161				
Benzo(a)pyrene	1,230	59.8	1,197	0	103	34.4	179				
Indeno(1,2,3-cd)pyrene	1,320	59.8	1,197	0	110	41.1	165				
Dibenz(a,h)anthracene	1,340	59.8	1,197	0	112	38.1	166				
Surr: 2-Fluorobiphenyl	585		598.4		97.7	42.7	132				
Surr: Terphenyl-d14 (surr)	591		598.4		98.8	48.8	157				

Sample ID: **LCS-9286** | SampType: **LCS** | Units: **µg/Kg** | Prep Date: **11/13/2014** | RunNo: **18124**
Client ID: **LCSS** | Batch ID: **9286** | Analysis Date: **11/17/2014** | SeqNo: **361549**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	1,410	50.0	1,000	0	141	41.9	136				S
Chrysene	1,230	50.0	1,000	0	123	51.4	135				
Benzo(b)fluoranthene	1,100	50.0	1,000	0	110	39.7	137				
Benzo(k)fluoranthene	1,320	50.0	1,000	0	132	45.7	138				
Benzo(a)pyrene	1,260	50.0	1,000	0	126	40.9	141				
Indeno(1,2,3-cd)pyrene	1,450	50.0	1,000	0	145	45.4	137				S
Dibenz(a,h)anthracene	1,430	50.0	1,000	0	143	37.6	140				S
Surr: 2-Fluorobiphenyl	503		500.0		101	42.7	132				
Surr: Terphenyl-d14 (surr)	473		500.0		94.5	48.8	157				

NOTES:
S - Outlying spike recovery(ies) observed - High Bias. There were no detections in the samples. No further action is required.

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **MB-9385** SampType: **MBLK** Units: **µg/Kg** Prep Date: **11/19/2014** RunNo: **18144**
Client ID: **MBLKS** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **361951**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phenol	ND	200									
Bis(2-chloroethyl) ether	ND	200									
2-Chlorophenol	ND	100									
1,3-Dichlorobenzene	ND	100									
1,4-Dichlorobenzene	ND	100									
1,2-Dichlorobenzene	ND	100									
Benzyl alcohol	ND	100									
2-Methylphenol (o-cresol)	ND	100									
Hexachloroethane	ND	100									
N-Nitrosodi-n-propylamine	ND	100									
Nitrobenzene	ND	200									
Isophorone	ND	100									
4-Methylphenol (p-cresol)	ND	100									
2-Nitrophenol	ND	200									
2,4-Dimethylphenol	ND	100									
Bis(2-chloroethoxy)methane	ND	100									
2,4-Dichlorophenol	ND	200									
1,2,4-Trichlorobenzene	ND	100									
Naphthalene	ND	80.0									
4-Chloroaniline	ND	500									
Hexachlorobutadiene	ND	100									
4-Chloro-3-methylphenol	ND	500									
2-Methylnaphthalene	ND	80.0									
1-Methylnaphthalene	ND	80.0									
Hexachlorocyclopentadiene	ND	100									
2,4,6-Trichlorophenol	ND	200									
2,4,5-Trichlorophenol	ND	200									
2-Chloronaphthalene	ND	100									
2-Nitroaniline	ND	500									

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **MB-9385** SampType: **MBLK** Units: **µg/Kg** Prep Date: **11/19/2014** RunNo: **18144**

Client ID: **MBLKS** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **361951**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	ND	80.0									
Dimethylphthalate	ND	100									
2,6-Dinitrotoluene	ND	100									
Acenaphthylene	ND	80.0									
2,4-Dinitrophenol	ND	200									
Dibenzofuran	ND	100									
2,4-Dinitrotoluene	ND	100									
4-Nitrophenol	ND	500									
Fluorene	ND	80.0									
4-Chlorophenyl phenyl ether	ND	100									
Diethylphthalate	ND	100									
4,6-Dinitro-2-methylphenol	ND	200									
4-Bromophenyl phenyl ether	ND	100									
Hexachlorobenzene	ND	100									
Pentachlorophenol	ND	100									
Phenanthrene	ND	80.0									
Anthracene	ND	80.0									
Carbazole	ND	500									
Di-n-butylphthalate	ND	100									
Fluoranthene	ND	80.0									
Pyrene	ND	80.0									
Butyl Benzylphthalate	ND	100									
bis(2-Ethylhexyl)adipate	ND	100									
Benz (a) anthracene	ND	80.0									
Chrysene	ND	80.0									
bis (2-Ethylhexyl) phthalate	ND	100									
Di-n-octyl phthalate	ND	100									
Benzo (b) fluoranthene	ND	80.0									
Benzo (k) fluoranthene	ND	80.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT
Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **MB-9385** | SampType: **MBLK** | Units: **µg/Kg** | Prep Date: **11/19/2014** | RunNo: **18144**
Client ID: **MBLKS** | Batch ID: **9285** | Analysis Date: **11/19/2014** | SeqNo: **361951**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo (a) pyrene	ND	80.0									
Indeno (1,2,3-cd) pyrene	ND	80.0									
Dibenz (a,h) anthracene	ND	80.0									
Benzo (g,h,i) perylene	ND	80.0									
Surr: 2,4,6-Tribromophenol	415		1,000		41.5	14	136				
Surr: 2-Fluorobiphenyl	397		500.0		79.4	27.3	158				
Surr: Nitrobenzene-d5	440		500.0		88.0	21.9	141				
Surr: Phenol-d6	1,200		1,000		120	18.4	144				
Surr: p-Terphenyl	445		500.0		89.0	33.3	149				

Sample ID: **LCS-9385** | SampType: **LCS** | Units: **µg/Kg** | Prep Date: **11/19/2014** | RunNo: **18144**
Client ID: **LCSS** | Batch ID: **9285** | Analysis Date: **11/19/2014** | SeqNo: **361952**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phenol	1,150	200	1,000	0	115	41.8	138				
Bis(2-chloroethyl) ether	1,070	200	1,000	0	107	65	116				
2-Chlorophenol	1,120	100	1,000	0	112	49.3	132				
1,3-Dichlorobenzene	996	100	1,000	0	99.6	69.8	116				
1,4-Dichlorobenzene	978	100	1,000	0	97.9	51.3	133				
1,2-Dichlorobenzene	1,090	100	1,000	0	109	54.2	129				
Benzyl alcohol	1,190	100	1,000	0	119	42.4	131				
2-Methylphenol (o-cresol)	1,190	100	1,000	0	119	68	128				
Hexachloroethane	1,150	100	1,000	0	115	48.9	133				
N-Nitrosodi-n-propylamine	1,150	100	1,000	0	115	39.8	135				
Nitrobenzene	1,190	200	1,000	0	119	62.3	126				
Isophorone	1,200	100	1,000	0	120	62.7	131				
4-Methylphenol (p-cresol)	1,160	100	1,000	0	116	66.1	126				
2-Nitrophenol	1,080	200	1,000	0	108	46.1	117				

Qualifiers:
B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
R RPD outside accepted recovery limits
D Dilution was required
J Analyte detected below quantitation limits
RL Reporting Limit
E Value above quantitation range
ND Not detected at the Reporting Limit
S Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411104

CLIENT: Libby Environmental

Project: Havens Estate

QC SUMMARY REPORT

Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **LCS-9385** SampType: **LCS** Units: **µg/Kg** Prep Date: **11/19/2014** RunNo: **18144**

Client ID: **LCSS** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **361952**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2,4-Dimethylphenol	1,030	100	1,000	0	103	57.8	121				
Bis(2-chloroethoxy)methane	1,070	100	1,000	0	107	67.5	124				
2,4-Dichlorophenol	1,170	200	1,000	0	117	57.1	128				
1,2,4-Trichlorobenzene	1,020	100	1,000	0	102	36.2	140				
Naphthalene	993	80.0	1,000	0	99.3	56.8	130				
4-Chloroaniline	1,120	500	1,000	0	112	56.1	128				
Hexachlorobutadiene	1,020	100	1,000	0	102	55.9	131				
4-Chloro-3-methylphenol	1,120	500	1,000	0	112	49.4	138				
2-Methylnaphthalene	1,070	80.0	1,000	0	107	68.3	121				
1-Methylnaphthalene	1,060	80.0	1,000	0	106	73	120				
Hexachlorocyclopentadiene	1,060	100	1,000	0	106	36.7	128				
2,4,6-Trichlorophenol	1,040	200	1,000	0	104	63.2	121				
2,4,5-Trichlorophenol	1,050	200	1,000	0	105	52.3	128				
2-Chloronaphthalene	1,060	100	1,000	0	106	67.1	123				
2-Nitroaniline	1,150	500	1,000	0	115	43.9	135				
Acenaphthene	1,090	80.0	1,000	0	109	49.2	127				
Dimethylphthalate	1,110	100	1,000	0	111	62.4	130				
2,6-Dinitrotoluene	1,100	100	1,000	0	110	54.6	127				
Acenaphthylene	1,130	80.0	1,000	0	113	64.8	127				
2,4-Dinitrophenol	676	200	1,000	0	67.6	7.9	119				
Dibenzofuran	1,010	100	1,000	0	101	67.5	123				
2,4-Dinitrotoluene	1,100	100	1,000	0	110	21.9	136				
4-Nitrophenol	998	500	1,000	0	99.8	31.1	131				
Fluorene	1,170	80.0	1,000	0	117	64.8	126				
4-Chlorophenyl phenyl ether	1,030	100	1,000	0	103	66.6	124				
Diethylphthalate	1,330	100	1,000	0	133	42.9	132				S
4,6-Dinitro-2-methylphenol	942	200	1,000	0	94.2	12.9	110				
4-Bromophenyl phenyl ether	1,110	100	1,000	0	111	61.8	128				
Hexachlorobenzene	983	100	1,000	0	98.3	66.8	124				

Qualifiers:
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- R RPD outside accepted recovery limits
- D Dilution was required
- J Analyte detected below quantitation limits
- RL Reporting Limit
- E Value above quantitation range
- ND Not detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **LCS-9385** SampType: **LCS** Units: **µg/Kg** Prep Date: **11/19/2014** RunNo: **18144**
Client ID: **LCSS** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **361952**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	499	100	1,000	0	49.9	21.4	135				
Phenanthrene	946	80.0	1,000	0	94.6	72.2	118				
Anthracene	1,120	80.0	1,000	0	112	68.9	122				
Carbazole	844	500	1,000	0	84.4	64.5	135				
Di-n-butylphthalate	1,100	100	1,000	0	110	50.6	130				
Fluoranthene	1,130	80.0	1,000	0	113	66	129				
Pyrene	1,110	80.0	1,000	0	111	45.4	140				
Butyl Benzylphthalate	1,370	100	1,000	0	137	30.4	138				
bis(2-Ethylhexyl)adipate	1,030	100	1,000	0	103	34.9	141				
Benz (a) anthracene	1,060	80.0	1,000	0	106	44	150				
Chrysene	983	80.0	1,000	0	98.3	65.8	128				
bis (2-Ethylhexyl) phthalate	1,030	100	1,000	0	103	40.1	127				
Di-n-octyl phthalate	971	100	1,000	0	97.1	37.2	135				
Benzo (b) fluoranthene	914	80.0	1,000	0	91.4	45.6	146				
Benzo (k) fluoranthene	952	80.0	1,000	0	95.2	65.2	134				
Benzo (a) pyrene	1,100	80.0	1,000	0	110	49.2	137				
Indeno (1,2,3-cd) pyrene	852	80.0	1,000	0	85.2	44.2	146				
Dibenz (a,h) anthracene	909	80.0	1,000	0	90.9	37.5	152				
Benzo (g,h,l) perylene	964	80.0	1,000	0	96.4	24.1	156				
Surr: 2,4,6-Tribromophenol	1,110		1,000		111	14	136				
Surr: 2-Fluorobiphenyl	449		500.0		89.7	27.3	158				
Surr: Nitrobenzene-d5	521		500.0		104	21.9	141				
Surr: Phenol-d6	1,180		1,000		118	18.4	144				
Surr: p-Terphenyl	481		500.0		96.2	33.3	149				

NOTES:
S - Outlying spike recovery observed for Diethyl phthalate (Biased High). There were no detections in the samples. No further action is required.

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **1411100-004AMS** SampType: **MS** Units: **µg/Kg-dry** Prep Date: **11/13/2014** RunNo: **18144**
Client ID: **BATCH** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **361954**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phenol	1,080	248	1,238	0	87.5	29.2	146				
Bis(2-chloroethyl) ether	1,060	248	1,238	0	86.0	65.4	115				
2-Chlorophenol	1,280	124	1,238	0	103	44	134				
1,3-Dichlorobenzene	913	124	1,238	0	73.8	69.1	117				
1,4-Dichlorobenzene	944	124	1,238	0	76.3	44.5	134				
1,2-Dichlorobenzene	984	124	1,238	0	79.5	35	131				
Benzyl alcohol	1,470	124	1,238	0	119	30.8	159				
2-Methylphenol (o-cresol)	1,390	124	1,238	0	112	57.7	125				
Hexachloroethane	983	124	1,238	0	79.4	67.1	118				
N-Nitrosodi-n-propylamine	1,350	124	1,238	0	109	26.4	151				
Nitrobenzene	1,300	248	1,238	0	105	61.4	130				
Isophorone	1,430	124	1,238	0	116	61.8	132				
4-Methylphenol (p-cresol)	1,390	124	1,238	0	113	65.5	127				
2-Nitrophenol	1,450	248	1,238	81.16	111	46.3	118				
2,4-Dimethylphenol	1,420	124	1,238	0	114	46	158				
Bis(2-chloroethoxy)methane	1,220	124	1,238	0	98.8	66.8	124				
2,4-Dichlorophenol	1,480	248	1,238	0	120	56.2	128				
1,2,4-Trichlorobenzene	1,090	124	1,238	0	87.8	29.2	140				
Naphthalene	1,120	99.0	1,238	0	90.9	44.4	136				
4-Chloroaniline	1,450	619	1,238	0	117	27	126				
Hexachlorobutadiene	1,030	124	1,238	0	83.2	38.2	138				
4-Chloro-3-methylphenol	1,500	619	1,238	0	121	36.8	159				
2-Methylnaphthalene	1,260	99.0	1,238	0	102	51.7	138				
1-Methylnaphthalene	1,270	99.0	1,238	0	102	70.4	124				
Hexachlorocyclopentadiene	733	124	1,238	0	59.2	37.5	129				
2,4,6-Trichlorophenol	1,440	248	1,238	0	116	62.7	122				
2,4,5-Trichlorophenol	1,460	248	1,238	0	118	54.7	127				
2-Chloronaphthalene	1,280	124	1,238	0	103	69.8	126				
2-Nitroaniline	1,520	619	1,238	0	123	39.3	145				

Qualifiers:

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
R RPD outside accepted recovery limits
D Dilution was required
J Analyte detected below quantitation limits
RL Reporting Limit
E Value above quantitation range
ND Not detected at the Reporting Limit
S Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **1411100-004AMS** SampType: **MS** Units: **µg/Kg-dry** Prep Date: **11/13/2014** RunNo: **18144**

Client ID: **BATCH** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **361954**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	1,270	99.0	1,238	0	103	49.6	129				
Dimethylphthalate	1,410	124	1,238	0	114	61.5	131				
2,6-Dinitrotoluene	1,410	124	1,238	0	114	56.8	137				
Acenaphthylene	1,410	99.0	1,238	0	114	64	128				
2,4-Dinitrophenol	1,480	248	1,238	0	120	35.3	144				
Dibenzofuran	1,180	124	1,238	0	95.5	64.7	131				
2,4-Dinitrotoluene	1,350	124	1,238	0	109	30.9	139				
4-Nitrophenol	1,620	619	1,238	0	131	48.6	137				
Fluorene	1,430	99.0	1,238	0	115	64.2	127				
4-Chlorophenyl phenyl ether	1,220	124	1,238	0	98.7	70.9	128				
Diethylphthalate	1,560	124	1,238	0	126	61.7	129				
4,6-Dinitro-2-methylphenol	559	248	1,238	0	45.2	21.9	143				
4-Bromophenyl phenyl ether	1,310	124	1,238	0	106	69.6	136				
Hexachlorobenzene	1,140	124	1,238	0	92.1	66.5	123				
Pentachlorophenol	856	124	1,238	0	69.1	28.2	156				
Phenanthrene	1,100	99.0	1,238	0	89.1	57	134				
Anthracene	1,370	99.0	1,238	0	110	68.2	123				
Carbazole	1,310	619	1,238	0	106	64.1	152				
Di-n-butylphthalate	1,660	124	1,238	54.10	129	52.4	130				
Fluoranthene	1,540	99.0	1,238	0	124	46.5	165				
Pyrene	1,520	99.0	1,238	0	122	31.4	151				
Butyl Benzylphthalate	4,520	124	1,238	0	365	30.4	138				S
bis(2-Ethylhexyl)adipate	2,640	124	1,238	192.2	198	32	136				S
Benz (a) anthracene	1,880	99.0	1,238	0	152	43.9	151				S
Chrysene	1,050	99.0	1,238	0	84.9	71.1	126				
bis (2-Ethylhexyl) phthalate	2,370	124	1,238	101.9	184	40.8	170				S
Di-n-octyl phthalate	5,120	124	1,238	38.28	411	34.6	142				S
Benzo (b) fluoranthene	2,260	99.0	1,238	0	182	52.1	136				S
Benzo (k) fluoranthene	1,300	99.0	1,238	0	105	64.5	135				

Qualifiers:

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
R RPD outside accepted recovery limits
D Dilution was required
J Analyte detected below quantitation limits
RL Reporting Limit
E Value above quantitation range
ND Not detected at the Reporting Limit
S Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT
Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **1411100-004AMS** SampType: **MS** Units: **µg/Kg-dry** Prep Date: **11/13/2014** RunNo: **18144**
Client ID: **BATCH** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **361954**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo (a) pyrene	2,130	99.0	1,238	0	172	50.5	137				S
Indeno (1,2,3-cd) pyrene	1,520	99.0	1,238	0	123	49.7	143				
Dibenz (a,h) anthracene	1,910	99.0	1,238	0	155	40.7	152				S
Benzo (g,h,I) perylene	1,300	99.0	1,238	0	105	34	157				
Surr: 2,4,6-Tribromophenol	1,580		1,238		128	14	136				
Surr: 2-Fluorobiphenyl	542		618.9		87.6	27.3	158				
Surr: Nitrobenzene-d5	565		618.9		91.3	21.9	141				
Surr: Phenol-d6	1,590		1,238		129	18.4	144				
Surr: p-Terphenyl	703		618.9		114	33.3	149				

NOTES:
S - Spike recovery indicates a possible matrix effect. The method is in control as indicated by the Laboratory Control Sample (LCS).

Sample ID: **CCV-9385** SampType: **ICV** Units: **µg/L** Prep Date: **11/19/2014** RunNo: **18144**
Client ID: **ICV** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **361955**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phenol	1,170	200	1,000	0	117	70	130				
Bis(2-chloroethyl) ether	1,060	200	1,000	0	106	70	130				
2-Chlorophenol	1,090	100	1,000	0	109	70	130				
1,3-Dichlorobenzene	1,020	100	1,000	0	102	70	130				
1,4-Dichlorobenzene	1,030	100	1,000	0	103	70	130				
1,2-Dichlorobenzene	1,120	100	1,000	0	112	70	130				
Benzyl alcohol	1,160	100	1,000	0	116	70	130				
2-Methylphenol (o-cresol)	1,120	100	1,000	0	112	70	130				
Hexachloroethane	1,210	100	1,000	0	121	70	130				
N-Nitrosodi-n-propylamine	1,130	100	1,000	0	113	70	130				
Nitrobenzene	1,190	200	1,000	0	119	70	130				
Isophorone	1,190	100	1,000	0	119	70	130				
4-Methylphenol (p-cresol)	1,120	100	1,000	0	112	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **CCV-9385** SampType: **ICV** Units: **µg/L** Prep Date: **11/19/2014** RunNo: **18144**
Client ID: **ICV** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **361955**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Nitrophenol	1,080	200	1,000	0	108	70	130				
2,4-Dimethylphenol	1,120	100	1,000	0	112	70	130				
Bis(2-chloroethoxy)methane	1,070	100	1,000	0	107	70	130				
2,4-Dichlorophenol	1,120	200	1,000	0	112	70	130				
1,2,4-Trichlorobenzene	1,040	100	1,000	0	104	70	130				
Naphthalene	1,010	80.0	1,000	0	101	70	130				
4-Chloroaniline	1,130	500	1,000	0	113	70	130				
Hexachlorobutadiene	1,020	100	1,000	0	102	70	130				
4-Chloro-3-methylphenol	1,070	500	1,000	0	107	70	130				
2-Methylnaphthalene	1,070	80.0	1,000	0	107	70	130				
1-Methylnaphthalene	1,060	80.0	1,000	0	106	70	130				
Hexachlorocyclopentadiene	1,090	100	1,000	0	109	70	130				
2,4,6-Trichlorophenol	1,010	200	1,000	0	101	70	130				
2,4,5-Trichlorophenol	1,020	200	1,000	0	102	70	130				
2-Chloronaphthalene	1,070	100	1,000	0	107	70	130				
2-Nitroaniline	1,100	500	1,000	0	110	70	130				
Acenaphthene	1,070	80.0	1,000	0	107	70	130				
Dimethylphthalate	1,080	100	1,000	0	108	70	130				
2,6-Dinitrotoluene	1,100	100	1,000	0	110	70	130				
Acenaphthylene	1,140	80.0	1,000	0	114	70	130				
2,4-Dinitrophenol	1,120	200	1,000	0	112	70	130				
Dibenzofuran	1,010	100	1,000	0	101	70	130				
2,4-Dinitrotoluene	1,080	100	1,000	0	108	70	130				
4-Nitrophenol	1,080	500	1,000	0	108	70	130				
Fluorene	1,160	80.0	1,000	0	116	70	130				
4-Chlorophenyl phenyl ether	1,070	100	1,000	0	107	70	130				
Diethylphthalate	1,960	100	1,000	0	196	70	130				S
4,6-Dinitro-2-methylphenol	1,120	200	1,000	0	112	70	130				
4-Bromophenyl phenyl ether	1,070	100	1,000	0	107	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **CCV-9385** SampType: **ICV** Units: **µg/L** Prep Date: **11/19/2014** RunNo: **18144**
Client ID: **ICV** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **361955**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Hexachlorobenzene	995	100	1,000	0	99.5	70	130				
Pentachlorophenol	1,020	100	1,000	0	102	70	130				
Phenanthrene	1,020	80.0	1,000	0	102	70	130				
Anthracene	1,180	80.0	1,000	0	118	70	130				
Carbazole	1,100	500	1,000	0	110	70	130				
Di-n-butylphthalate	1,040	100	1,000	0	104	70	130				
Fluoranthene	1,150	80.0	1,000	0	115	70	130				
Pyrene	1,180	80.0	1,000	0	118	70	130				
Butyl Benzylphthalate	1,250	100	1,000	0	125	70	130				
bis(2-Ethylhexyl)adipate	1,040	100	1,000	0	104	70	130				
Benz (a) anthracene	1,050	80.0	1,000	0	105	70	130				
Chrysene	1,080	80.0	1,000	0	108	70	130				
bis (2-Ethylhexyl) phthalate	994	100	1,000	0	99.4	70	130				
Di-n-octyl phthalate	1,030	100	1,000	0	103	70	130				
Benzo (b) fluoranthene	961	80.0	1,000	0	96.1	70	130				
Benzo (k) fluoranthene	971	80.0	1,000	0	97.1	70	130				
Benzo (a) pyrene	1,060	80.0	1,000	0	106	70	130				
Indeno (1,2,3-cd) pyrene	1,020	80.0	1,000	0	102	70	130				
Dibenz (a,h) anthracene	1,230	80.0	1,000	0	123	70	130				
Benzo (g,h,i) perylene	993	80.0	1,000	0	99.3	70	130				
Surr: 2,4,6-Tribromophenol	1,150		1,000		115	14	136				
Surr: 2-Fluorobiphenyl	590		500.0		118	42.6	139				
Surr: Nitrobenzene-d5	661		500.0		132	45.1	149				
Surr: Phenol-d6	1,380		1,000		138	48.2	143				
Surr: p-Terphenyl	670		500.0		134	33.3	149				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT
Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **1411100-002ADUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **11/13/2014** RunNo: **18144**
Client ID: **BATCH** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **362348**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phenol	ND	223						0		50	
Bis(2-chloroethyl) ether	ND	223						0		50	
2-Chlorophenol	ND	112						0		50	
1,3-Dichlorobenzene	ND	112						0		50	
1,4-Dichlorobenzene	ND	112						0		50	
1,2-Dichlorobenzene	ND	112						0		50	
Benzyl alcohol	ND	112						0		50	
2-Methylphenol (o-cresol)	ND	112						0		50	
Hexachloroethane	ND	112						0		50	
N-Nitrosodi-n-propylamine	2,590	112						1,999	25.6	50	
Nitrobenzene	ND	223						0		50	
Isophorone	7,370	112						5,197	34.5	50	
4-Methylphenol (p-cresol)	ND	112						0		50	
2-Nitrophenol	ND	223						0		50	
2,4-Dimethylphenol	2,500	112						1,610	43.2	50	
Bis(2-chloroethoxy)methane	ND	112						0		50	
2,4-Dichlorophenol	ND	223						0		50	
1,2,4-Trichlorobenzene	ND	112						0		50	
Naphthalene	ND	89.4						0		50	
4-Chloroaniline	ND	559						0		50	
Hexachlorobutadiene	ND	112						0		50	
4-Chloro-3-methylphenol	ND	559						0		50	
2-Methylnaphthalene	26,900	89.4						18,750	35.8	50	E
1-Methylnaphthalene	26,700	89.4						18,270	37.7	50	E
Hexachlorocyclopentadiene	ND	112						0		50	
2,4,6-Trichlorophenol	ND	223						0		50	
2,4,5-Trichlorophenol	ND	223						0		50	
2-Chloronaphthalene	ND	112						0		50	
2-Nitroaniline	ND	559						0		50	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **1411100-002ADUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **11/13/2014** RunNo: **18144**
Client ID: **BATCH** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **362348**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	ND	89.4						0		50	
Dimethylphthalate	ND	112						0		50	
2,6-Dinitrotoluene	ND	112						0		50	
Acenaphthylene	ND	89.4						0		50	
2,4-Dinitrophenol	ND	223						0		50	
Dibenzofuran	517	112						0	200	50	
2,4-Dinitrotoluene	ND	112						0		50	
4-Nitrophenol	ND	559						0		50	
Fluorene	5,860	89.4						5,189	12.1	50	
4-Chlorophenyl phenyl ether	ND	112						0		50	
Diethylphthalate	ND	112						0		50	
4,6-Dinitro-2-methylphenol	ND	223						0		50	
4-Bromophenyl phenyl ether	ND	112						0		50	
Hexachlorobenzene	ND	112						0		50	
Pentachlorophenol	ND	112						0		50	
Phenanthrene	3,750	89.4						2,807	28.8	50	
Anthracene	ND	89.4						0		50	
Carbazole	ND	559						0		50	
Di-n-butylphthalate	ND	112						0		50	
Fluoranthene	678	89.4						494.9	31.2	50	
Pyrene	754	89.4						559.3	29.7	50	
Butyl Benzylphthalate	888	112						1,246	33.5	50	
bis(2-Ethylhexyl)adipate	878	112						674.0	26.2	50	
Benz (a) anthracene	ND	89.4						0		50	
Chrysene	ND	89.4						205.9	200	50	R
bis (2-Ethylhexyl) phthalate	1,280	112						1,096	15.6	50	
Di-n-octyl phthalate	ND	112						0		50	
Benzo (b) fluoranthene	ND	89.4						210.8	200	50	R
Benzo (k) fluoranthene	ND	89.4						0		50	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/19/2014

Work Order: 1411104
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Semi-Volatile Organic Compounds by EPA Method 8270

Sample ID: **1411100-002ADUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **11/13/2014** RunNo: **18144**
Client ID: **BATCH** Batch ID: **9285** Analysis Date: **11/19/2014** SeqNo: **362348**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo (a) pyrene	ND	89.4						0		50	
Indeno (1,2,3-cd) pyrene	ND	89.4						0		50	
Dibenz (a,h) anthracene	ND	89.4						0		50	
Benzo (g,h,I) perylene	ND	89.4						0		50	
Surr: 2,4,6-Tribromophenol	1,730		1,117		155	14	136		0		S
Surr: 2-Fluorobiphenyl	670		558.7		120	27.3	158		0		
Surr: Nitrobenzene-d5	2,210		558.7		396	21.9	141		0		S
Surr: Phenol-d6	1,950		1,117		174	18.4	144		0		S
Surr: p-Terphenyl	819		558.7		147	33.3	149		0		

NOTES:

R - High RPD indicates possible matrix interference. The method is in control as indicated by the laboratory control sample (LCS).

Qualifiers:

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- R RPD outside accepted recovery limits
- D Dilution was required
- J Analyte detected below quantitation limits
- RL Reporting Limit
- E Value above quantitation range
- ND Not detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

Fremont Analytical

Sample Log-In Check List

Client Name:	LIBBY	Work Order Number:	1411104
Logged by:	Erica Silva	Date Received:	11/11/2014 11:05:00 AM

Chain of Custody

1. Is Chain of Custody complete? — Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? — UPS

Log In

3. Coolers are present? — Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? — Yes ☑ No ☐
5. Custody seals intact on shipping container/cooler? — Yes ☐ No ☑ Not Required ☐
6. Was an attempt made to cool the samples? — Yes ☑ No ☐ NA ☐
7. Were all coolers received at a temperature of >0°C to 10.0°C — Yes ☑ No ☐ NA ☐
8. Sample(s) in proper container(s)? — Yes ☑ No ☐
9. Sufficient sample volume for indicated test(s)? — Yes ☑ No ☐
10. Are samples properly preserved? — Yes ☑ No ☐
11. Was preservative added to bottles? — Yes ☐ No ☑ NA ☐
12. Is the headspace in the VOA vials? — Yes ☐ No ☐ NA ☑
13. Did all samples containers arrive in good condition(unbroken)? — Yes ☑ No ☐
14. Does paperwork match bottle labels? — Yes ☑ No ☐
15. Are matrices correctly identified on Chain of Custody? — Yes ☑ No ☐
16. Is it clear what analyses were requested? — Yes ☑ No ☐
17. Were all holding times able to be met? — Yes ☑ No ☐

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? — Yes ☑ No ☐ NA ☐

Person Notified:	Jamie Deyman	Date:	11/11/2014
By Whom:	Erica Silva	Via:	☑ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:	SVOCs, cPAHs, and Chlorinated Phenols request		
Client Instructions:	See comments		

19. Additional remarks:

Communication with client coordinated with Hilary Lewis (Libby) and Michael Ridgeway (FAI) - instructions to test sample "TP 26-2" for full SVOC list only.

Item Information

Item #	Temp °C	Condition
Cooler	6.0	Good
Sample	4.9	Good

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506

Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

1411104

www.LibbyEnvironmental.com

Client: Libby Environmental, Inc.
Address: (See above)
City: State: Zip:
Phone: Fax:
Client Project #

Date: 11/10/14   Page: 1 of 1
Project Manager: Jamie Deyman
Project Name: Havens Estate
Location: City, State: Olympia, WA
Collector: Date of Collection: 11-7-14
Email: libbyenv@aol.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext	~~PAH~~ 8270 cPAH	PCB's 8082	MTCA 5 Metals	Chlorinated Phenols			Field Notes
1	TP 24-1	1	1405	Soil	Jar									X						
2	TP 24-3	3	1415																	HOLD
3	TP 25-1	1	1425											X						
4	TP 25-3	3	1430											X						
5	TP 26-1	1	1441																	HOLD All
6	TP 26-2	2	1445						X					X			X			per H. Lewis 11/12/14
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by: [signature]   Date / Time: 11/10/14   Received by: UPS   Date / Time:
Relinquished by: UPS   Date / Time: Received by: [signature]   Date / Time: 11/11/14 1105
Relinquished by: Date / Time: Received by: Date / Time:

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks: Standard TAT

TAT: 24HR 48HR 5-DAY

DRAGON ANALYTICAL LABORATORY

530 A1 Ronlee Ln, Olympia, WA 98502
(360) 866-0543

Hazardous Waste, Microbiology, NPDES, Potable and Non-potable Water
Mobile Environmental Laboratory

Libby Environmental, Inc.
4139 Libby Road NE
Olympia, WA 98506

Sampled By: Unknown

DAL Project No.: 141120-05

Project Name: Havens Estate
Project No.: L141107-40
P.O. No.: n/a
Date Collected: 11/7/2014; 14:05 to 14:30
Date Received: 11/20/2014; 12:17
Temperature Received (°C): n/a
Report Date: 11/25/2014

Preparation Method: US EPA 3550C
Analytical Method: US EPA 8082A
Date Prepared: 11/20/2014
Date Analyzed: 11/20/2014
Analyst: TM
Data Reviewed By:

Units: mg/kg
Matrix: Soil
Reporting Limits: Standard
Injection Volume: 2 uL
Instrument ID: Agilent 9074
Lab Data File: 14112001

PCB's
ANALYTICAL RESULTS

Sample Identification	CAS No.	MRL	Method Blank	TP 24-1	TP 25-1	TP 25-3	TP 25-3 Dup.
PCB Aroclor 1016	12674-11-2	0.50	nd	nd	nd	nd	nd
PCB Aroclor 1221	1104-28-2	0.50	nd	nd	nd	nd	nd
PCB Aroclor 1232	11141-16-5	0.50	nd	nd	nd	nd	nd
PCB Aroclor 1242	53469-21-9	0.50	nd	nd	nd	nd	nd
PCB Aroclor 1248	12672-29-6	0.50	nd	nd	nd	nd	nd
PCB Aroclor 1254	11097-69-1	0.50	nd	nd	nd	nd	nd
PCB Aroclor 1260	11096-82-5	0.50	nd	nd	nd	nd	nd
Percent Solids (%)				81.0	89.5	51.2	63.2
Dilution Factor				10	10	10	10
Data Flags							

DRAGON ANALYTICAL LABORATORY

530 A1 Ronlee Ln, Olympia, WA 98502
(360) 866-0543

Hazardous Waste, Microbiology, NPDES, Potable and Non-potable Water
Mobile Environmental Laboratory

Libby Environmental, Inc.
DAL Project No.: 141120-05

Project Name: Havens Estate
Project No.: L141107-40

PCB's
QUALITY CONTROL RESULTS

SURROGATE RECOVERY

Surrogate	Limits (%)	Method Blank	TP 24-1	TP 25-1	TP 25-3	TP 25-3 Dup.
TCMX	30-150	97.8	101	99.1	108	97.4
DCBP	30-150	102	106	100	106	99.1

LABORATORY CONTROL SAMPLE AND MATRIX SPIKE

QC Batch ID: 141120-PCB — MS/MSD Sample ID: 141120-PCB MS/MSD — LCS Sample ID: 141120-PCB LCS

Analyte	MS/MSD Limits (%)	MS/MSD/ LCS Level (mg/kg)	Sample Conc. (mg/kg)	MS Recovery (mg/kg)	MS Percent Recovery	MSD Recovery (mg/kg)	MSD Percent Recovery	MS/MSD RPD Limits	RPD	LCS Limits (%)	LCS Recovery (mg/kg)	LCS Percent Recovery	LCSD Recovery (mg/kg)	LCSD Percent Recovery
Arochlor 1016	29-135	400	nd	406	101%	389	97.3%	≤ 22%	2.0	50-120	418	105%	393	98.3%
Arochlor 1260	29-135	400	nd	363	90.8%	351	87.8%	≤ 15%	1.7	50-120	423	106%	362	90.4%

WA-DOE-Laboratory Certification No.: C890
"nd" indicates the analyte was not detected at or above the listed Method Reporting Limit.
"n/a" indicates not applicable
Sample results based on dry weight.

Comments and Explanations: None.

Libby Environmental, Inc. — Chain of Custody Record

www.LibbyEnvironmental.com

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Ph: 360-352-2110
Fax: 360-352-4154

Client: Robinson Noble
Address: 3011 S Huson St Ste A
City: Tacoma State: WA Zip: 98409
Phone: 253-475-7711 Fax: 253-472-5840
Client Project # 2491-001F

Date: 11/7/14 Page: 1 of 1
Project Manager: Max Wills
Project Name: Havens Estate
Location: City, State: Olympia
Collector: Date of Collection: 11-7-14
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	cPAHs	Chlorinated [illegible]	Hex Chrom	Field Notes
1	TP24-1	1	1405	Soil	Jar			X			X		X		X	X	X		X	11-25-14 added
2	TP24-3	3	1415	Soil	Jar			X			X		X			X				Hex Chrom per
3	TP25-1	1	1425	Soil	Jars			X			X		X		X	X	X			Max via email STD
4	TP25-3	3	1430	Soil	Jars			X			X		X		X	X	X		X	
5	TP26-1	1	1441	Soil	Jars				X							X	X	X		HOLD ALL
6	TP26-2	3	1445	Soil	Jars				X							X	X	X		
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
		[signature]	11/7/14 1607

Sample Receipt:
Good Condition?
Cold?
Seals Intact?
Total Number of Containers

Remarks:
ML

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.
4139 Libby Road NE • Olympia, WA 98506-2518

December 11, 2014

Max Wills
Robinson Noble
17625 130th Avenue NE, Suite 102
Woodinville, WA 98072

Dear Mr. Wills:

Please find enclosed the analytical data report for the Havens Estate Project located in Olympia, Washington. Soil samples were analyzed for Volatile Organic Compounds by EPA Method 8260C, Gasoline by NWTPH-Gx, Diesel & Oil by NWTPH-Dx/Dx Extended, Metals Arsenic, Cadmium, Chromium, Copper, Lead, and Zinc by EPA Method 7010 Series, Mercury by EPA Method 7471, Total Nickel by EPA Method SW846 6010C, Polyaromatic Hydrocarbons by EPA Method 8270 (SIM), and PCB (Polychlorinated Biphenyls) by EPA Method 8082.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. All soil samples are reported on a dry weight basis. An invoice for this analytical work is included and has been emailed to the Tacoma office.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Kurt Johnson
Senior Chemist
Libby Environmental, Inc.

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Libby Environmental, Inc.

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141111-2
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		Method Blank	TP27-2	TP28-2	TP29-2	TP30-2
Date Sampled	Reporting	N/A	11/11/14	11/11/14	11/11/14	11/11/14
Date Analyzed	Limits	11/12/14	11/12/14	11/12/14	11/12/14	11/12/14
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Dichlorodifluoromethane	0.06	nd	nd	nd	nd	nd
Chloromethane	0.06	nd	nd	nd	nd	nd
Vinyl chloride	0.02	nd	nd	nd	nd	nd
Bromomethane	0.09	nd	nd	nd	nd	nd
Chloroethane	0.06	nd	nd	nd	nd	nd
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd
Methylene chloride	0.02	nd	nd	nd	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	0.05	nd	nd	nd	nd	nd
trans -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd
1,1-Dichloroethane	0.03	nd	nd	nd	nd	nd
2,2-Dichloropropane	0.05	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	0.02	nd	nd	nd	nd	nd
Chloroform	0.02	nd	nd	nd	nd	nd
1,1,1-Trichloroethane (TCA)	0.02	nd	nd	nd	nd	nd
Carbon tetrachloride	0.03	nd	nd	nd	nd	nd
1,1-Dichloropropene	0.02	nd	nd	nd	nd	nd
Benzene	0.02	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	0.03	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.03	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.02	nd	nd	nd	nd	nd
Dibromomethane	0.04	nd	nd	nd	nd	nd
Bromodichloromethane	0.02	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.02	nd	nd	nd	nd	nd
Toluene	0.03	nd	nd	nd	nd	nd
Trans-1,3-Dichloropropene	0.03	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.02	nd	nd	nd	nd	nd
1,3-Dichloropropane	0.05	nd	nd	nd	nd	nd
Dibromochloromethane	0.03	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.005	nd	nd	nd	nd	nd
Chlorobenzene	0.02	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd
Ethylbenzene	0.03	nd	nd	nd	nd	nd
Total Xylenes	0.03	nd	nd	nd	nd	nd
Styrene	0.02	nd	nd	nd	nd	nd

Libby Environmental, Inc.

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141111-2
Client Project # 2491-001F

Volatile Organic Compounds by EPA Method 8260C in Soil

Sample Description		Method Blank	TP27-2	TP28-2	TP29-2	TP30-2
Date Sampled	Reporting	N/A	11/11/14	11/11/14	11/11/14	11/11/14
Date Analyzed	Limits	11/12/14	11/12/14	11/12/14	11/12/14	11/12/14
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Bromoform	0.03	nd	nd	nd	nd	nd
Isopropylbenzene	0.08	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	0.03	nd	nd	nd	nd	nd
Bromobenzene	0.03	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.03	nd	nd	nd	nd	nd
n-Propylbenzene	0.02	nd	nd	nd	nd	nd
2-Chlorotoluene	0.02	nd	nd	nd	nd	nd
4-Chlorotoluene	0.02	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	0.02	nd	nd	nd	nd	nd
tert-Butylbenzene	0.02	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	0.02	nd	nd	nd	nd	nd
sec-Butylbenzene	0.02	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.03	nd	nd	nd	nd	nd
Isopropyltoluene	0.02	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	0.03	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.03	nd	nd	nd	nd	nd
n-Butylbenzene	0.02	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	0.05	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	0.05	nd	nd	nd	nd	nd
Hexachloro-1,3-butadiene	0.10	nd	nd	nd	nd	nd
Naphthalenes	0.05	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	0.1	nd	nd	nd	nd	nd
Surrogate Recovery						
Dibromofluoromethane		118	102	100	98	98
1,2-Dichloroethane-d4		115	111	106	106	103
Toluene-d8		91	93	85	85	84
4-Bromofluorobenzene		96	92	92	90	0.89

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

* INSTRUMENT DETECTION LIMIT
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141111-2
Client Project # 2491-001F

QA/QC Data - EPA 8260C Analyses

	Sample Identification:			L141110-30			
	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 (%)	
1,1-Dichloroethene	0.50	0.35	70	0.50	0.38	76	8.2
Benzene	0.50	0.42	84	0.50	0.45	90	6.9
Toluene	0.50	0.38	76	0.50	0.42	84	10.0
Chlorobenzene	0.50	0.42	84	0.50	0.44	88	4.7
Trichloroethene (TCE)	0.50	0.41	82	0.50	0.43	86	4.8
Surrogate Recovery							
Dibromofluoromethane			105			101	
1,2-Dichloroethane-d4			116			108	
Toluene-d8			87			92	
4-Bromofluorobenzene			97			99	

	Laboratory Control Sample		
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
1,1-Dichloroethene	0.50	0.37	74
Benzene	0.50	0.41	82
Toluene	0.50	0.39	78
Chlorobenzene	0.50	0.42	84
Trichloroethene (TCE)	0.50	0.41	82
Surrogate Recovery			
Dibromofluoromethane			115
1,2-Dichloroethane-d4			130
Toluene-d8			77
4-Bromofluorobenzene			98

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141111-2
Client Project # 2491-001F

Analyses of Gasoline (NWTPH-Gx) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (mg/kg)
Method Blank	11/12/14	91	nd
TP27-2	11/12/14	83	nd
TP28-2	11/12/14	95	nd
TP29-2	11/12/14	85	nd
TP30-2	11/12/14	84	nd
Practical Quantitation Limit			10

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

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Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141111-2
Client Project # 2491-001F

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (mg/kg)	Oil (mg/kg)
Method Blank	11/12/14	103	nd	nd
TP27-2	11/12/14	117	nd	nd
TP28-2	11/12/14	115	nd	nd
TP29-2	11/12/14	119	nd	nd
TP30-2	11/12/14	116	nd	nd
Practical Quantitation Limit			50	250

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

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Olympia, WA 98506
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Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141111-2
Client Project # 2491-001F

Analyses of Total Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Arsenic (mg/kg)
Method Blank	11/12/14	nd	nd	nd	nd
TP27-2	11/12/14	nd	nd	11	nd
TP28-2	11/12/14	nd	nd	10	nd
TP29-2	11/12/14	13	nd	11	nd
TP30-2	11/12/14	nd	nd	11	nd
TP30-2 Dup	11/12/14	nd	nd	10	nd
Practical Quantitation Limit		5.0	1.0	5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141111-2
Client Project # 2491-001F

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	11/12/14	108%	91%	106%	112%
TP30-2 MS	11/12/14	112%	82%	113%	118%
TP30-2 MSD	11/12/14	103%	85%	110%	112%
RPD	11/12/14	9%	4%	3%	5%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141111-2
Client Project # 2491-001F

Analyses of Total Mercury in Soil by EPA Method 7471

Sample Number	Date Analyzed	Mercury (mg/kg)
Method Blank	11/13/14	nd
TP27-2	11/13/14	nd
TP28-2	11/13/14	nd
TP29-2	11/13/14	nd
TP30-2	11/13/14	nd
TP30-2 Dup	11/13/14	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
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FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141111-2
Client Project # 2491-001F

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	11/13/14	98%
TP30-2 MS	11/13/14	98%
TP30-2 MSD	11/13/14	98%
RPD	11/13/14	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
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HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141111-2
Client Project # 2491-001F

Analyses of Total Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (mg/kg)	Zinc (mg/kg)
Method Blank	11/12/14	nd	nd
TP27-2	11/12/14	nd	nd
TP28-2	11/12/14	nd	nd
TP29-2	11/12/14	nd	nd
TP30-2	11/12/14	nd	nd
TP30-2 Dup	11/12/14	nd	nd
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVEN'S ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141111-2
Client Project # 2491-001F

QA/QC for Metals in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	11/12/14	106%	100%
TP30-2 MS	11/12/14	95%	89%
TP30-2 MSD	11/12/14	93%	86%
RPD	11/12/14	3%	4%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

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

11/14/2014

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Jamie Deyman

Sample Matrix: Soil
Date Sampled: 11/11/2014
Date Received: 11/12/2014
Spectra Project: 2014110305

Client ID	Spectra #	Analyte	Result	Units	Method
TP27-2	1	Total Nickel	8.7	mg/Kg	SW846 6010C
TP28-2	2	Total Nickel	14.8	mg/Kg	SW846 6010C
TP29-2	3	Total Nickel	8.0	mg/Kg	SW846 6010C
TP30-2	4	Total Nickel	15.2	mg/Kg	SW846 6010C

ICP analysis: 11-14-14 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a7/scj

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

11/14/2014

		Units:	mg/L
Libby Environmental		Spectra Project:	2014110305
4139 Libby Rd. NE		Applies to Spectra #'s	1-4
Olympia, WA 98506			

QUALITY CONTROL RESULTS
ICP Metals SW846 6010C - Soil/Solid

Method Blank

Date Digested: 11/14/2014 Date Analyzed: 11/14/2014

Element	Blank Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 11/14/2014 Date Analyzed: 11/14/2014

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	2.0	1.874	93.7

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 11/12/2014 Date Analyzed: 11/12/2014
Sample Spiked: 2014110260-21

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.350	2.0	2.205	92.8	2.205	92.8	0.0

Recovery Limits 75-125%
RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs
Laboratory Manager

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record 2014110305

www.LibbyEnvironmental.com

Client: Libby Environmental
Address: SEE ABOVE
City: State: Zip:
Phone: Fax:
Client Project #

Date: 11/12/14

Project Manager: Jamie Deyman
Project Name:
Location: City, State:
Collector: Date of Collection: 11/11/14
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Ni			Field Notes
1	TP27-2		10:54	SOIL	4oz JAR												X			
2	TP28-2		11:00																	
3	TP29-2		11:10																	
4	TP30-2		11:15																	
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	11-12-14 3:30 pm	[signature]	11/12 3:30
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Jamie Deyman
4139 Libby Rd. NE
Olympia, WA 98506

RE: Havens Estate
Lab ID: 1411166

November 24, 2014

Attention Jamie Deyman:

Fremont Analytical, Inc. received 4 sample(s) on 11/17/2014 for the analyses presented in the following report.

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)
Sample Moisture (Percent Moisture)

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Chelsea Ward
Project Manager

Fremont Analytical

Date: 11/24/2014

CLIENT:	Libby Environmental
Project:	Havens Estate
Lab Order:	1411166

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1411166-001	TP27-2	11/11/2014 10:54 AM	11/17/2014 3:15 PM
1411166-002	TP28-2	11/11/2014 11:00 AM	11/17/2014 3:15 PM
1411166-003	TP29-2	11/11/2014 11:10 AM	11/17/2014 3:15 PM
1411166-004	TP30-2	11/11/2014 11:15 AM	11/17/2014 3:15 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1411166**

Date: **11/24/2014**

CLIENT: Libby Environmental
Project: Havens Estate

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Fremont Analytical

Analytical Report

WO#: **1411166**

Date Reported: **11/24/2014**

Client: Libby Environmental

Collection Date: 11/11/2014 10:54:00 AM

Project: Havens Estate

Lab ID: 1411166-001

Matrix: Soil

Client Sample ID: TP27-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9402		Analyst: NG
Naphthalene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
2-Methylnaphthalene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
1-Methylnaphthalene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Acenaphthylene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Acenaphthene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Fluorene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Phenanthrene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Anthracene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Fluoranthene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Pyrene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Benz(a)anthracene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Chrysene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Benzo(b)fluoranthene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Benzo(k)fluoranthene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Benzo(a)pyrene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Indeno(1,2,3-cd)pyrene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Dibenz(a,h)anthracene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Benzo(g,h,i)perylene	ND	82.4		µg/Kg-dry	1	11/24/2014 1:27:00 PM
Surr: 2-Fluorobiphenyl	75.1	42.7-132		%REC	1	11/24/2014 1:27:00 PM
Surr: Terphenyl-d14 (surr)	104	48.8-157		%REC	1	11/24/2014 1:27:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R18097		Analyst: SB
Percent Moisture	39.6			wt%	1	11/18/2014 12:23:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411166**

Date Reported: **11/24/2014**

Client: Libby Environmental

Collection Date: 11/11/2014 11:00:00 AM

Project: Havens Estate

Lab ID: 1411166-002

Matrix: Soil

Client Sample ID: TP28-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9402		Analyst: NG
Naphthalene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
2-Methylnaphthalene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
1-Methylnaphthalene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Acenaphthylene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Acenaphthene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Fluorene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Phenanthrene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Anthracene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Fluoranthene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Pyrene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Benz(a)anthracene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Chrysene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Benzo(b)fluoranthene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Benzo(k)fluoranthene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Benzo(a)pyrene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Indeno(1,2,3-cd)pyrene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Dibenz(a,h)anthracene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Benzo(g,h,i)perylene	ND	64.6		µg/Kg-dry	1	11/24/2014 1:51:00 PM
Surr: 2-Fluorobiphenyl	67.7	42.7-132		%REC	1	11/24/2014 1:51:00 PM
Surr: Terphenyl-d14 (surr)	98.2	48.8-157		%REC	1	11/24/2014 1:51:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R18097		Analyst: SB
Percent Moisture	25.3			wt%	1	11/18/2014 12:23:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Analytical Report

WO#: **1411166**

Date Reported: **11/24/2014**

Client: Libby Environmental

Collection Date: 11/11/2014 11:10:00 AM

Project: Havens Estate

Lab ID: 1411166-003

Matrix: Soil

Client Sample ID: TP29-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9402		Analyst: NG
Naphthalene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
2-Methylnaphthalene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
1-Methylnaphthalene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Acenaphthylene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Acenaphthene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Fluorene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Phenanthrene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Anthracene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Fluoranthene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Pyrene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Benz(a)anthracene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Chrysene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Benzo(b)fluoranthene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Benzo(k)fluoranthene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Benzo(a)pyrene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Indeno(1,2,3-cd)pyrene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Dibenz(a,h)anthracene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Benzo(g,h,i)perylene	ND	75.3		µg/Kg-dry	1	11/24/2014 2:15:00 PM
Surr: 2-Fluorobiphenyl	56.4	42.7-132		%REC	1	11/24/2014 2:15:00 PM
Surr: Terphenyl-d14 (surr)	80.9	48.8-157		%REC	1	11/24/2014 2:15:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R18097		Analyst: SB
Percent Moisture	34.7			wt%	1	11/18/2014 12:23:24 PM

Qualifiers:				
B	Analyte detected in the associated Method Blank		D	Dilution was required
E	Value above quantitation range		H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits		ND	Not detected at the Reporting Limit
RL	Reporting Limit		S	Spike recovery outside accepted recovery limits

Analytical Report

WO#: **1411166**

Date Reported: **11/24/2014**

Client: Libby Environmental

Collection Date: 11/11/2014 11:15:00 AM

Project: Havens Estate

Lab ID: 1411166-004

Matrix: Soil

Client Sample ID: TP30-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 9402		Analyst: NG
Naphthalene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
2-Methylnaphthalene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
1-Methylnaphthalene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Acenaphthylene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Acenaphthene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Fluorene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Phenanthrene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Anthracene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Fluoranthene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Pyrene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Benz(a)anthracene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Chrysene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Benzo(b)fluoranthene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Benzo(k)fluoranthene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Benzo(a)pyrene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Indeno(1,2,3-cd)pyrene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Dibenz(a,h)anthracene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Benzo(g,h,i)perylene	ND	61.9		µg/Kg-dry	1	11/24/2014 2:39:00 PM
Surr: 2-Fluorobiphenyl	74.3	42.7-132		%REC	1	11/24/2014 2:39:00 PM
Surr: Terphenyl-d14 (surr)	94.0	48.8-157		%REC	1	11/24/2014 2:39:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R18097		Analyst: SB
Percent Moisture	23.9			wt%	1	11/18/2014 12:23:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/24/2014

Work Order: 1411166
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **LCS-9402** SampType: **LCS** Units: **µg/Kg** Prep Date: **11/21/2014** RunNo: **18267**
Client ID: **LCSS** Batch ID: **9402** Analysis Date: **11/24/2014** SeqNo: **364432**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	877	50.0	1,000	0	87.7	61.6	125				
2-Methylnaphthalene	872	50.0	1,000	0	87.2	58.2	129				
1-Methylnaphthalene	871	50.0	1,000	0	87.1	56.4	132				
Acenaphthylene	860	50.0	1,000	0	86.0	52.2	133				
Acenaphthene	849	50.0	1,000	0	84.9	54	131				
Fluorene	885	50.0	1,000	0	88.5	53.4	131				
Phenanthrene	841	50.0	1,000	0	84.1	55.6	128				
Anthracene	884	50.0	1,000	0	88.4	51	132				
Fluoranthene	852	50.0	1,000	0	85.2	48.4	134				
Pyrene	851	50.0	1,000	0	85.1	48.6	135				
Benz(a)anthracene	850	50.0	1,000	0	85.0	41.9	136				
Chrysene	897	50.0	1,000	0	89.7	51.4	135				
Benzo(b)fluoranthene	906	50.0	1,000	0	90.6	39.7	137				
Benzo(k)fluoranthene	797	50.0	1,000	0	79.7	45.7	138				
Benzo(a)pyrene	885	50.0	1,000	0	88.5	40.9	141				
Indeno(1,2,3-cd)pyrene	901	50.0	1,000	0	90.1	45.4	137				
Dibenz(a,h)anthracene	940	50.0	1,000	0	94.0	37.6	140				
Benzo(g,h,i)perylene	872	50.0	1,000	0	87.2	45	134				
Surr: 2-Fluorobiphenyl	450		500.0		89.9	42.7	132				
Surr: Terphenyl-d14 (surr)	470		500.0		93.9	48.8	157				

Sample ID: **MB-9402** SampType: **MBLK** Units: **µg/Kg** Prep Date: **11/21/2014** RunNo: **18267**
Client ID: **MBLKS** Batch ID: **9402** Analysis Date: **11/24/2014** SeqNo: **364433**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	50.0									
2-Methylnaphthalene	ND	50.0									
1-Methylnaphthalene	ND	50.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Work Order: 1411166
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **MB-9402** SampType: **MBLK** Units: **µg/Kg** Prep Date: **11/21/2014** RunNo: **18267**
Client ID: **MBLKS** Batch ID: **9402** Analysis Date: **11/24/2014** SeqNo: **364433**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthylene	ND	50.0									
Acenaphthene	ND	50.0									
Fluorene	ND	50.0									
Phenanthrene	ND	50.0									
Anthracene	ND	50.0									
Fluoranthene	ND	50.0									
Pyrene	ND	50.0									
Benz(a)anthracene	ND	50.0									
Chrysene	ND	50.0									
Benzo(b)fluoranthene	ND	50.0									
Benzo(k)fluoranthene	ND	50.0									
Benzo(a)pyrene	ND	50.0									
Indeno(1,2,3-cd)pyrene	ND	50.0									
Dibenz(a,h)anthracene	ND	50.0									
Benzo(g,h,i)perylene	ND	50.0									
Surr: 2-Fluorobiphenyl	428		500.0		85.7	42.7	132				
Surr: Terphenyl-d14 (surr)	445		500.0		89.0	48.8	157				

Sample ID: **1411166-001ADUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **11/21/2014** RunNo: **18267**
Client ID: **TP27-2** Batch ID: **9402** Analysis Date: **11/24/2014** SeqNo: **364584**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	80.3						0		30	
2-Methylnaphthalene	ND	80.3						0		30	
1-Methylnaphthalene	ND	80.3						0		30	
Acenaphthylene	ND	80.3						0		30	
Acenaphthene	ND	80.3						0		30	
Fluorene	ND	80.3						0		30	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/24/2014

Work Order: 1411166
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **1411166-001ADUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **11/21/2014** RunNo: **18267**
Client ID: **TP27-2** Batch ID: **9402** Analysis Date: **11/24/2014** SeqNo: **364584**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phenanthrene	ND	80.3						0		30	
Anthracene	ND	80.3						0		30	
Fluoranthene	ND	80.3						0		30	
Pyrene	ND	80.3						0		30	
Benz(a)anthracene	ND	80.3						0		30	
Chrysene	ND	80.3						0		30	
Benzo(b)fluoranthene	ND	80.3						0		30	
Benzo(k)fluoranthene	ND	80.3						0		30	
Benzo(a)pyrene	ND	80.3						0		30	
Indeno(1,2,3-cd)pyrene	ND	80.3						0		30	
Dibenz(a,h)anthracene	ND	80.3						0		30	
Benzo(g,h,i)perylene	ND	80.3						0		30	
Surr: 2-Fluorobiphenyl	350		803.2		43.6	42.7	132		0		
Surr: Terphenyl-d14 (surr)	760		803.2		94.6	48.8	157		0		

Sample ID: **1411166-002AMS** SampType: **MS** Units: **µg/Kg-dry** Prep Date: **11/21/2014** RunNo: **18267**
Client ID: **TP28-2** Batch ID: **9402** Analysis Date: **11/24/2014** SeqNo: **364585**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	1,070	61.3	1,225	0	86.9	42.9	138				
2-Methylnaphthalene	1,180	61.3	1,225	0	96.2	42.8	151				
1-Methylnaphthalene	1,140	61.3	1,225	0	92.7	41.6	148				
Acenaphthylene	1,130	61.3	1,225	0	92.5	32.6	160				
Acenaphthene	1,130	61.3	1,225	0	92.1	46.3	142				
Fluorene	1,160	61.3	1,225	0	95.0	43.4	153				
Phenanthrene	1,060	61.3	1,225	0	86.4	45.5	140				
Anthracene	1,160	61.3	1,225	0	94.5	32.6	160				
Fluoranthene	1,080	61.3	1,225	0	88.5	44.6	161				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Date: 11/24/2014

Work Order: 1411166
CLIENT: Libby Environmental
Project: Havens Estate

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **1411166-002AMS** SampType: **MS** Units: **µg/Kg-dry** Prep Date: **11/21/2014** RunNo: **18267**

Client ID: **TP28-2** Batch ID: **9402** Analysis Date: **11/24/2014** SeqNo: **364585**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pyrene	1,090	61.3	1,225	0	89.1	48.3	158				
Benz(a)anthracene	1,100	61.3	1,225	0	89.6	57.5	169				
Chrysene	1,190	61.3	1,225	0	97.0	45.2	146				
Benzo(b)fluoranthene	1,270	61.3	1,225	0	104	42.2	168				
Benzo(k)fluoranthene	1,010	61.3	1,225	0	82.4	48	161				
Benzo(a)pyrene	1,200	61.3	1,225	0	97.7	34.4	179				
Indeno(1,2,3-cd)pyrene	1,210	61.3	1,225	0	99.0	41.1	165				
Dibenz(a,h)anthracene	1,260	61.3	1,225	0	103	38.1	166				
Benzo(g,h,i)perylene	1,160	61.3	1,225	0	95.1	45.6	157				
Surr: 2-Fluorobiphenyl	377		612.7		61.6	42.7	132				
Surr: Terphenyl-d14 (surr)	595		612.7		97.0	48.8	157				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Fremont Analytical

Sample Log-In Check List

Client Name:	LIBBY	Work Order Number:	1411166
Logged by:	Erica Silva	Date Received:	11/17/2014 3:15:00 PM

Chain of Custody

1. Is Chain of Custody complete? — Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? — UPS

Log In

3. Coolers are present? — Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? — Yes ☑ No ☐
5. Custody seals intact on shipping container/cooler? — Yes ☐ No ☑ Not Required ☐
6. Was an attempt made to cool the samples? — Yes ☑ No ☐ NA ☐
7. Were all coolers received at a temperature of >0°C to 10.0°C — Yes ☑ No ☐ NA ☐
8. Sample(s) in proper container(s)? — Yes ☑ No ☐
9. Sufficient sample volume for indicated test(s)? — Yes ☑ No ☐
10. Are samples properly preserved? — Yes ☑ No ☐
11. Was preservative added to bottles? — Yes ☐ No ☑ NA ☐
12. Is the headspace in the VOA vials? — Yes ☐ No ☐ NA ☑
13. Did all samples containers arrive in good condition(unbroken)? — Yes ☑ No ☐
14. Does paperwork match bottle labels? — Yes ☑ No ☐
15. Are matrices correctly identified on Chain of Custody? — Yes ☑ No ☐
16. Is it clear what analyses were requested? — Yes ☑ No ☐
17. Were all holding times able to be met? — Yes ☑ No ☐

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? — Yes ☐ No ☐ NA ☑

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

19. Additional remarks:

Item Information

Item #	Temp °C	Condition
Cooler	9.2	Good
Sample	7.1	Good

Libby Environmental, Inc.

4139 Libby Road NE Ph 360-352-2110
Olympia, WA 98506 Fax 360-352-4154

Chain of Custody Record

1411166

www.LibbyEnvironmental.com

Client: LIBBY ENVIRONMENTAL
Address: SEE ABOVE
City: State: Zip:
Phone: Fax:
Client Project #

Date: 11.13.14 Page: 1 of 1
Project Manager: JAYMIE DEYMAN
Project Name: HAVENS ESTATE
Location City, State: OLYMPIA WA
Collector: Date of Collection: 11.11.14
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-Gx	BTEX 8021	NWTPH-HCID	NWTPH-Dx	NWTPH-Dx/Dx	cPAH 8270	PAH 8270	Semi Vol 8270	PCB 8082	MTCA 5 Metals	RCRA 8 Metals			Field Notes
1	TP27-2	2	10:51	Soil	JAR								X							
2	TP 28-2	2	11:00	↓	↓								↓							
3	TP 29-2	2	11:10	↓	↓								↓							
4	TP 30-2	2	11:15	↓	↓								↓							
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by	Date / Time	Received by	Date / Time
[signature]	11/13/14 / 11:00	[signature]	15:15 11/13/14
Relinquished by	Date / Time	Received by	Date / Time
Relinquished by	Date / Time	Received by	Date / Time

Sample Receipt

Good Condition?	Y N
Temp	°C
Seals Intact?	Y N N/A
Total Number of Containers	

Remarks:

TAT: 24HR 48HR 5-DAY

DRAGON ANALYTICAL LABORATORY

530 A1 Ronlee Ln. Olympia, WA 98502
(360) 866-0543

Hazardous Waste, Microbiology, NPDES, Potable and Non-potable Water
Mobile Environmental Laboratory

Libby Environmental, Inc.
4139 Libby Road NE
Olympia, WA 98506

Sampled By: Unknown

DAL Project No.: 141120-05

Project Name: Havens Estate
Project No.: L141111-2
P.O. No.: n/a
Date Collected: 11/11/2014, 10:54 to 11:15
Date Received: 11/20/2014; 12:17
Temperature Received (°C): n/a
Report Date: 11/25/2014

Preparation Method: US EPA 3550C
Analytical Method: US EPA 8082A
Date Prepared: 11/20/2014
Date Analyzed: 11/20/2014
Analyst: TM
Data Reviewed By:

Units: mg/kg
Matrix: Soil
Reporting Limits: Standard
Injection Volume: 2 uL
Instrument ID: Agilent 9074
Lab Data File: 14112001

PCB's
ANALYTICAL RESULTS

Sample Identification	CAS No.	MRL	Method Blank	TP 27-2	TP 28-2	TP 29-2	TP 30-2	TP 30-2 Dup.
PCB Aroclor 1016	12674-11-2	0.50	nd	nd	nd	nd	nd	nd
PCB Aroclor 1221	1104-28-2	0.50	nd	nd	nd	nd	nd	nd
PCB Aroclor 1232	11141-16-5	0.50	nd	nd	nd	nd	nd	nd
PCB Aroclor 1242	53469-21-9	0.50	nd	nd	nd	nd	nd	nd
PCB Aroclor 1248	12672-29-6	0.50	nd	nd	nd	nd	nd	nd
PCB Aroclor 1254	11097-69-1	0.50	nd	nd	nd	nd	nd	nd
PCB Aroclor 1260	11096-82-5	0.50	nd	nd	nd	nd	nd	nd
Percent Solids (%)				63.2	73.4	64.4	77.1	85.5
Dilution Factor				10	10	10	10	10
Data Flags								

DRAGON ANALYTICAL LABORATORY

530 A1 Ronlee Ln, Olympia, WA 98502
(360) 866-0543

Hazardous Waste, Microbiology, NPDES, Potable and Non-potable Water
Mobile Environmental Laboratory

Libby Environmental, Inc.
DAL Project No.: 141120-05

Project Name: Havens Estate
Project No.: L141111-2

PCB's
QUALITY CONTROL RESULTS

SURROGATE RECOVERY

Surrogate	Limits (%)	Method Blank	TP 27-2	TP 28-2	TP 29-2	TP 30-2	TP 30-2 Dup.
TCMX	30-150	97.8	105	102	102	105	104
DCBP	30-150	102	107	106	104	107	107

LABORATORY CONTROL SAMPLE AND MATRIX SPIKE

QC Batch ID: 141120-PCB
MS/MSD Sample ID: 141120-PCB MS/MSD
LCS Sample ID: 141120-PCB LCS

Analyte	MS/MSD Limits (%)	MS/MSD/ LCS Level (mg/kg)	Sample Conc. (mg/kg)	MS Recovery (mg/kg)	MS Percent Recovery	MSD Recovery (mg/kg)	MSD Percent Recovery	MS/MSD RPD Limits	RPD	LCS Limits (%)	LCS Recovery (mg/kg)	LCS Percent Recovery	LCSD Recovery (mg/kg)	LCSD Percent Recovery
Arochlor 1016	29-135	400	nd	406	101%	389	97.3%	≤ 22%	2.0	50-120	418	105%	393	98.3%
Arochlor 1260	29-135	400	nd	363	90.8%	351	87.8%	≤ 15%	1.7	50-120	423	106%	362	90.4%

WA-DOE-Laboratory Certification No.: C890
"nd" indicates the analyte was not detected at or above the listed Method Reporting Limit.
"n/a" indicates not applicable
Sample results based on dry weight.

Comments and Explanations: None.

Libby Environmental, Inc. — Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Date: 11/11/14 Page: 1 of 1

Client: Robinson-Noble

Address: 3011 S Huson St Ste A

City: Tacoma State: WA Zip: 98409

Phone: 253-475-7711 Fax: 253-472-5846

Client Project # 2491-001F

Project Manager: Max Wills

Project Name: Havens Estate

Location: 411 93rd Ave E City, State: Olympia, WA

Collector: Kari Thomas Date of Collection: 11/11/14

Email: kthomas@robinson-noble

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals (copper, zinc, nickle)			Field Notes
1	TP27-2	2	10:54	Soil	Jar			X			X		X	X	X	X			
2	TP28-2	2	11:00																
3	TP29-2	2	11:10																
4	TP30-2	2	11:15																
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	11/11/13 1308	[signature]	11/11/14 13:08

Sample Receipt:
- Good Condition?
- Cold?
- Seals Intact?
- Total Number of Containers

Remarks: EIM STANDARD TURN

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law

Distribution: White - Lab, Yellow - File, Pink - Originator

APPENDIX E

Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

October 17, 2014

Max Wills
Robinson Noble
17625 130th Avenue NE, Suite 102
Woodinville, WA 98072

Dear Mr. Wills:

Please find enclosed the analytical data report for the Havens Estate Project located in Olympia, Washington. Water samples were analyzed for Total Metals Arsenic, Cadmium, Chromium, Lead, Zinc and Copper by EPA Method 7010 Series and Mercury by EPA Method 7471, Total Nickel by EPA Method 200.7 on October 12, 14 & 15, 2014.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. An invoice for this analytical work has been sent to Alan Wertjes.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Lab Manager / Senior Chemist
Libby Environmental, Inc.

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141009-1
Client Project # 2491-001F

Analyses of Total Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead µg/L	Cadmium µg/L	Chromium µg/L	Arsenic µg/L
Method Blank	10/12/14	nd	nd	nd	nd
MW-1	10/12/14	nd	nd	nd	nd
MW-1 Dup	10/12/14	nd	nd	nd	nd
Practical Quantitation Limit		5.0	0.5	5.0	3.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141009-1
Client Project # 2491-001F

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	10/12/14	119%	97%	92%	84%
MW-1 MS	10/12/14	111%	81%	88%	87%
MW-1 MSD	10/12/14	109%	84%	86%	87%
RPD	10/12/14	2%	4%	2%	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

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HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141009-1
Client Project # 2491-001F

Analyses of Total Mercury in Water by EPA Method 7470

Sample Number	Date Analyzed	Mercury µg/L
Method Blank	10/15/14	nd
MW-1	10/15/14	nd
MW-1 Dup	10/15/14	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141009-1
Client Project # 2491-001F

QA/QC for Mercury by EPA Method 7470

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	10/15/14	105%
MW-1 MS	10/15/14	96%
MW-1 MSD	10/15/14	96%
RPD	10/15/14	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141009-1
Client Project # 2491-001F

Analyses of Total Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper µg/L	Zinc µg/L
Method Blank	10/12/14	nd	nd
MW-1	10/12/14	nd	47.9
MW-1 Dup	10/12/14	nd	52.3
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L141009-1
Client Project # 2491-001F

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	10/12/14	105%	117%
MW-1 MS	10/12/14	106%	94%
MW-1 MSD	10/12/14	103%	106%
RPD	10/12/14	3%	11%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

SPECTRA Laboratories

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

10/14/2014

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Jamie Deyman

Project:	Havens Estate
Client ID:	MW-1
Sample Matrix:	Water
Date Sampled:	10/10/2014
Date Received:	10/13/2014
Spectra Project:	2014100327
Spectra Number:	1

Analyte	Result	Units	Method
Nickel	< 0.015	mg/L	EPA 200.7

ICP analysis: 10-14-14 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a6/scj

SPECTRA Laboratories

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

10/14/2014

Libby Environmental, Inc
4139 Libby Rd. NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2014100327
Applies to Spectra #'s	1

QUALITY CONTROL RESULTS

ICP Metals SW846 6010B - Water/Liquid

Method Blank

Date Digested: 10/14/2014 Date Analyzed: 10/14/2014

Element	Result
Nickel	< 0.015

Blank Spike (LCS)

Date Digested: 10/14/2014 Date Analyzed: 10/14/2014

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	1.0	1.005	100.5

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 10/14/2014 Date Analyzed: 10/14/2014
Sample Spiked: 2014100327-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.000	1.0	1.056	105.6	1.065	106.5	0.8

Recovery Limits 75-125%
RPD Limit 20

Spectra Laboratories

Steven G. Hibbs
Laboratory Manager

Libby Environmental, Inc.

4139 Libby Road NE Ph: 360-352-2110
Olympia, WA 98506 Fax: 360-352-4154

Chain of Custody Record 2014100327

www.LibbyEnvironmental.com

Client: LIBBY ENVIRONMENTAL
Address: SEE ABOVE
City: State: Zip:
Phone: Fax:
Client Project #

Date: 10.10.14 Page: 1 of 1
Project Manager: JAMIE DEYMAN
Project Name: HAVENS ESTATE
Location: City, State:
Collector: Date of Collection: 10.9.14
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	Ni: Total			Field Notes
1	MW-1		11:30	H_2O	Polly												X			
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
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17																				

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[signature]	10.10.14/2:00	[signature]	10/13/14 @ 1319
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: Robinson Noble	Date: 10-9-14 Page: 1 of 1
Address: 3011 S Huson St Ste A	Project Manager: Max Wills
City: Tacoma State: WA Zip: 98409	Project Name: Havens Estate
Phone: 253-475-7711 Fax: 253-472-5846	Location: Olympia City, State: Olympia, WA
Client Project # 2491-001F	Collector: Kari Thomas Date of Collection: 10-9-14
	Email: kthomas@robinson-noble.com

Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals total	zinc, nickel, copper			Field Notes
1 MW-1		11:30	GW	3 unpres											X	X			
2				poly, 1															
3				HNO3															
4				poly															
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	10-9-14/1240	K. Peng [signature]	10.9.14/1240
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:	
Good Condition?	✓
Cold? 10.4°C	
Seals Intact?	N/A
Total Number of Containers	4

Remarks: E/M

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

January 16, 2015

Max Wills
Robinson Noble
17625 130th Avenue NE, Suite 102
Woodinville, WA 98072

Dear Mr. Wills:

Please find enclosed the analytical data report for the Havens Estate Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Kurt Johnson
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com

www.LibbyEnvironmental.com

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150108-2
Client Project # 2491-001F

Analyses of Total Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead µg/L	Cadmium µg/L	Chromium µg/L	Arsenic µg/L
Method Blank	1/11/15	nd	nd	nd	nd
MW-1	1/11/15	nd	nd	nd	nd
MW-1 Dup	1/11/15	nd	nd	nd	nd
Practical Quantitation Limit		5.0	0.5	5.0	3.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150108-2
Client Project # 2491-001F

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	1/11/15	91%	103%	92%	113%
MW-1 MS	1/11/15	106%	97%	90%	96%
MW-1 MSD	1/11/15	100%	95%	90%	101%
RPD	1/11/15	6%	2%	0%	5%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150108-2
Client Project # 2491-001F

Analyses of Total Mercury in Water by EPA Method 7470

Sample Number	Date Analyzed	Mercury µg/L
Method Blank	1/15/15	nd
MW-1	1/15/15	nd
MW-1 Dup	1/15/15	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150108-2
Client Project # 2491-001F

QA/QC for Mercury by EPA Method 7470

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	1/15/15	91%
MW-1 MS	1/15/15	91%
MW-1 MSD	1/15/15	91%
RPD	1/15/15	0%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Ramses Osorio

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150108-2
Client Project # 2491-001F

Analyses of Total Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper µg/L	Zinc µg/L
Method Blank	1/11/15	nd	nd
MW-1	1/11/15	nd	nd
MW-1 Dup	1/11/15	nd	nd
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS ESTATE PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150108-2
Client Project # 2491-001F

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	1/11/15	110%	115%
MW-1 MS	1/11/15	89%	111%
MW-1 MSD	1/11/15	86%	115%
RPD	1/11/15	3%	4%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

SPECTRA Laboratories

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

01/13/2015

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Jamie Deyman

Project:	Havens
Client ID:	MW-1
Sample Matrix:	Water
Date Sampled:	01/08/2015
Date Received:	01/09/2015
Spectra Project:	2015010192
Spectra Number:	1

Analyte	Result	Units	Method
Nickel	< 0.5	µg/L	EPA 200.8

ICPMS analysis: 1-13-15 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a6/scj

SPECTRA Laboratories

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

January 13, 2015

Libby Environmental, Inc.		Units:	ug/L
4139 Libby Rd NE		Spectra Project:	2015010192
Olympia, WA 98506		Applies to Spectra #'s	1

QUALITY CONTROL RESULTS

ICP-MS Metals - EPA Method 200.8 - Water

Laboratory Reagent Blank

Date Digested: 1/13/2015 Date Analyzed: 1/13/2015

Element	CAS #	Result
Nickel	7439-98-7	< 0.5

Laboratory Fortified Blank (LFB)

Date Digested: 1/13/2015 Date Analyzed: 1/13/2015

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	100.0	97.61	97.6

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 1/13/2015 Date Analyzed: 1/13/2015

Sample Spiked 2015010192-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.00	100.0	96.08	96.1	94.51	94.5	1.6

Recovery Limits 70-130%

RPD Limit 20

SPECTRA LABORATORIES

Steven G. Hibbs

Laboratory Manager

2015010192

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Client: Libby Environmental, Inc.
Address: (see above)
City: State: Zip:
Phone: Fax:
Client Project #

Date: 1-8-15 Page: 1 of 1
Project Manager: Sherry Chilcutt
Project Name: Havens
Location: City, State: Olympia, WA
Collector: Date of Collection: 1-8-15
Email:

Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-Gx	BTEX 8021	NWTPH-HCID	NWTPH-Dx	NWTPH-Dx/Dx	c PAH 8270	PAH 8270	Semi Vol 8270	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	Total Ni	Dissolved Ni		Field Notes
1 MW-1		1215	H2O	Poly													X			Hold diss
2																				pending total
3																				results.
4																				
5																				
6																				
7																				
8																				
9																				
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Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Temp.		°C
Seals Intact?	Y N	N/A
Total Number of Containers	2	

Remarks: EDD

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE Ph: 360-352-2110
Olympia, WA 98506 Fax: 360-352-4154

Client: Robinson Noble	Date: 1-8-15 Page: 1 of 1
Address: 2105 S C Street	Project Manager: Max Wills
City: Tacoma State: WA Zip: 98402	Project Name: Havens
Phone: 253-475-7711 Fax: 253-472-5846	Location: 411 93rd City, State: Olympia, WA
Client Project # 2491-001F	Collector: K Thomas Date of Collection: 1-8-15
	Email: kthomas@robinson-noble.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-Gx	BTEX 8021	NWTPH-HCID	NWTPH-Dx	NWTPH-Dx/Dx	c PAH 8270	PAH 8270	Semi Vol 8270	PCB 8082	MTCA 5 Metals total	RCRA 8 Metals	zinc copper nickel total			Field Notes
1	MW-1		12:15	H2O	1 unpreserved											X		X			Hold dissolved
2					+1 HNO3																
3					poly																
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					
16																					
17																					

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Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Temp.	1.4	°C
Seals Intact?	Y N	N/A
Total Number of Containers	2	

Remarks: EIM

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.
4139 Libby Road NE • Olympia, WA 98506-2518

May 27, 2015

Max Wills
Robinson Noble
17625 130th Avenue NE, Suite 102
Woodinville, WA 98072

Dear Mr. Wills:

Please find enclosed the analytical data report for the Wertjes Havens Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Kurt Johnson
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com
www.LibbyEnvironmental.com

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

WERTJES HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150505-2
Client Project # 2491-001F

Analyses of Total Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead µg/L	Cadmium µg/L	Chromium µg/L	Arsenic µg/L
Method Blank	5/10/15	nd	nd	nd	nd
MW-1	5/10/15	nd	nd	nd	nd
MW-1 Dup	5/10/15	nd	nd	nd	nd
Practical Quantitation Limit		5.0	0.5	5.0	3.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

WERTJES HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150505-2
Client Project # 2491-001F

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	5/10/15	102%	87%	83%	99%
MW-1 MS	5/10/15	117%	83%	81%	120%
MW-1 MSD	5/10/15	111%	84%	84%	114%
RPD	5/10/15	5%	1%	4%	5%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

WERTJES HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150505-2
Client Project # 2491-001F

Analyses of Total Mercury in Water by EPA Method 7470

Sample Number	Date Analyzed	Mercury µg/L
Method Blank	5/12/15	nd
MW-1	5/12/15	nd
MW-1 Dup	5/12/15	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

WERTJES HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150505-2
Client Project # 2491-001F

QA/QC for Mercury by EPA Method 7470

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	5/12/15	106%
MW-1 MS	5/12/15	97%
MW-1 MSD	5/12/15	111%
RPD	5/12/15	13%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

WERTJES HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150505-2
Client Project # 2491-001F

Analyses of Total Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper µg/L	Zinc µg/L
Method Blank	5/10/15	nd	nd
MW-1	5/10/15	nd	5.7
MW-1 Dup	5/10/15	nd	nd
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

WERTJES HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150505-2
Client Project # 2491-001F

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	5/10/15	117%	92%
MW-1 MS	5/10/15	111%	105%
MW-1 MSD	5/10/15	108%	111%
RPD	5/10/15	3%	6%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

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

05/11/2015

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Jamie Deyman

Project:	Wertjes Havens
Client ID:	MW-1
Sample Matrix:	Water
Date Sampled:	05/05/2015
Date Received:	05/07/2015
Spectra Project:	2015050160
Spectra Number:	1

Analyte	Result	Units	Method
Nickel	< 0.015	mg/L	EPA 200.7

ICP analysis: 5-11-15 SCJ

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a6/scj

SPECTRA Laboratories

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

May 11, 2015

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2015050160
Applies to Spectra #'s	1

QUALITY CONTROL RESULTS

ICP Metals - EPA Method 200.7 - Water

Laboratory Reagent Blank (LRB)

Date Digested: 5/11/2015 | Date Analyzed: 5/11/2015

Element	Result
Nickel	< 0.015

Laboratory Fortified Blank (LFB)

Date Digested: 5/11/2015 | Date Analyzed: 5/11/2015

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	1.0	1.032	103.2

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 5/11/2015 | Date Analyzed: 5/11/2015
Sample Spiked: 2015050180-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.000	1.0	1.015	101.5	0.992	99.2	2.3

Recovery Limits 70-130%
RPD Limit 20

Spectra Laboratories

Steven G. Hibbs
Laboratory Manager

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Chain of Custody Record 20150501(60)

Client: Libby Environmental
Address: See above
City: State: Zip:
Phone: Fax:
Client Project # L150505-2

Date: 5-7-15 Page: 1 of 1
Project Manager: Sherry Chilcutt
Project Name: ~~Wertjes Havens~~ Wertjes Havens
Location: City, State: Olympia WA
Collector: Date of Collection: 5-5-15
Email:

Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	Total Ni	Diss Ni	Field Notes
1 MW-1	—	1235	H_2O	2 poly												X		✓ Hold diss Ni; Not Field filtered
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Relinquished by:	Date / Time	Received by:	Date / Time
[illegible]	5-7-15 1254	[illegible]	5/7 12:54
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N	
Temp.		°C	
Seals Intact?	Y	N	N/A
Total Number of Containers			

Remarks:
~~Record pH here:~~
Std

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: Robinson Noble
Address: 2105 S C street
City: tacoma State: WA Zip: 98402
Phone: 253-475-7711 Fax: 253-472-5846
Client Project # 2491-001F

Date: 5/5/15 Page: 1 of 1
Project Manager: Max wills
Project Name: Werties Havens
Location: Olymia City, State: Olympia, WA
Collector: KAT Date of Collection: 5/5/15
Email: kthomas@robinson-noble.com

	Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper	Zinc, Copper, ~~Lead~~ Ni, T...	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	total MTCA 5+			Field Notes
1	MW-1	—	1235	H_2O	2 poly					X							X			HOLD for dissolved
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	5/5/15 1:38	[signature]	5/5/15 138pm

Sample Receipt

Good Condition?	Y N (Y circled)
Temp.	12.4 °C
Seals Intact?	Y N N/A (Y circled)
Total Number of Containers	2

Remarks:
Record pH here:
STANDARD TAT
EIM

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Libby Environmental, Inc.
4139 Libby Road NE • Olympia, WA 98506-2518

August 25, 2015

Max Wills
Robinson Noble
17625 130th Avenue NE, Suite 102
Woodinville, WA 98072

Dear Mr. Wills:

Please find enclosed the analytical data report for the Havens-Wertjes Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com
www.LibbyEnvironmental.com

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS-WERTJES PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150812-1
Client Project # 2491-001F

Analyses of Total Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (µg/l)	Cadmium (µg/l)	Chromium (µg/l)	Arsenic (µg/l)
Method Blank	8/18/15	nd	nd	nd	nd
MW-1	8/18/15	16	nd	nd	nd
MW-1 Dup	8/18/15	15	nd	nd	nd
Practical Quantitation Limit		5.0	1.0	5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS-WERTJES PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150812-1
Client Project # 2491-001F

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)	Cadmium (% Recovery)	Chromium (% Recovery)	Arsenic (% Recovery)
LCS	8/18/15	116%	89%	116%	119%
MW-1 MS	8/18/15	101%	108%	106%	87%
MW-1 MSD	8/18/15	110%	115%	96%	82%
RPD	8/18/15	9%	6%	10%	6%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS-WERTJES PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150812-1
Client Project # 2491-001F

Analyses of Total Mercury in Water by EPA Method 7471

Sample Number	Date Analyzed	Mercury (μg/l)
Method Blank	8/19/15	nd
MW-1	8/19/15	nd
MW-1 Dup	8/19/15	nd
Practical Quantitation Limit		0.5

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS-WERTJES PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150812-1
Client Project # 2491-001F

QA/QC for Mercury by EPA Method 7471

Sample Number	Date Analyzed	Mercury (% Recovery)
LCS	8/19/15	98%
MW-1 MS	8/19/15	112%
MW-1 MSD	8/19/15	93%
RPD	8/19/15	19%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS-WERTJES PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150812-1
Client Project # 2491-001F

Analyses of Total Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper µg/L	Zinc µg/L
Method Blank	8/18/15	nd	nd
MW-1	8/18/15	nd	16
MW-1 Dup	8/18/15	nd	15
Practical Quantitation Limit		5.0	5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS-WERTJES PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150812-1
Client Project # 2491-001F

QA/QC for Metals in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Copper (% Recovery)	Zinc (% Recovery)
LCS	8/18/15	103%	124%
MW-1 MS	8/18/15	111%	85%
MW-1 MSD	8/18/15	107%	93%
RPD	8/18/15	4%	9%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS-WERTJES PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150812-1
Client Project # 2491-001F

Analyses of Total Disolved Lead in Water by EPA 7010 Series

Sample Number	Date Analyzed	Lead µg/L
Method Blank	8/24/15	nd
MW-1	8/24/15	7.5
MW-1 Dup	8/24/15	5.9
Practical Quantitation Limit		5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS-WERTJES PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L150812-1
Client Project # 2491-001F

QA/QC for Dissolved Lead in Water by EPA 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)
LCS	8/24/15	104%
MW-1 MS	8/24/15	105%
MW-1 MSD	8/24/15	92%
RPD	8/24/15	13%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Jamie Deyman

SPECTRA Laboratories

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

08/17/2015

Libby Environmental, Inc.
4139 Libby Rd NE
Olympia, WA 98506
Attn: Jamie Deyman

Project:	Havens-Wertjes
Client ID:	MW1
Sample Matrix:	Water
Date Sampled:	08/12/2015
Date Received:	08/14/2015
Spectra Project:	2015080340
Spectra Number:	1

Analyte	Result	Units	Method
Nickel	< 0.015	mg/L	EPA 200.7

ICP analysis: 8-17-15 SCJ

SPECTRA LABORATORIES

for

Steve Hibbs, Laboratory Manager
a6/scj

SPECTRA Laboratories

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

August 17, 2015

Libby Environmental, Inc.		Units:	mg/L
4139 Libby Rd NE		Spectra Project:	2015080340
Olympia, WA 98506		Applies to Spectra #'s	1

QUALITY CONTROL RESULTS

ICP Metals - EPA Method 200.7 - Water

Laboratory Reagent Blank (LRB)

Date Digested: 8/17/2015 Date Analyzed: 8/17/2015

Element	Result
Nickel	< 0.015

Laboratory Fortified Blank (LFB)

Date Digested: 8/17/2015 Date Analyzed: 8/17/2015

Element	Spike Added	LCS Conc.	LCS %Rec
Nickel	1.0	1.054	105.4

LCS Recovery limits 85-115%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 8/17/2015 Date Analyzed: 8/17/2015

Sample Spiked: 2015080318-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Nickel	0.000	1.0	0.974	97.4	0.955	95.5	2.0

Recovery Limits 70-130%

RPD Limit 20

Spectra Laboratories

for

Steven G. Hibbs

Laboratory Manager

Libby Environmental, Inc. Chain of Custody Record 2015080340

www.LibbyEnvironmental.com

4139 Libby Road NE Ph: 360-352-2110
Olympia, WA 98506 Fax: 360-352-4154

Client: Libby Environmental
Address: See above
City: State: Zip:
Phone: Fax:
Client Project #

Date: 8/13/15 Page: 1 of 1
Project Manager:
Project Name: Havens - Wieres
Location: City, State: Olympia, WA
Collector: Date of Collection: 8/12/15
Email: libbyenv@aol.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-Gx	BTEX 8021	NWTPH-HCID	NWTPH-Dx	NWTPH-Dx/Dx	c PAH 8270	PAH 8270	Semi Vol 8270	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	Total Ni	Dissolved Ni		Field Notes
1	MW1	—	11:00	H20	Poly													X	X		Hold for dissolved
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					
16																					
17																					

Relinquished by:	Date / Time	Received by:	Date / Time
Mora Fredrick	8/13/15	UPS	
UPS		Lori Hamilton	8-14-15 10:2

Sample Receipt

Good Condition? Y N
Temp. 14.1°C
Seals Intact? Y N N/A
Total Number of Containers: 2

Remarks:

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Chain of Custody Record

Client: Robinson Noble
Address: 2105 C Street
City: Tacoma State: WA Zip: 98402
Phone: 253-475-7711 Fax: 253-472-5846
Client Project # 2491-001F

Date: 8/12/15 Page: 1 of 1
Project Manager: Max Wills
Project Name: Havens - ~~Wjeres~~ Wertjes
Location: 4H 93rd City, State: Olympia
Collector: KAT Date of Collection: 8/12/15
Email: kthomas@robinson-noble.com

Sample Number	Depth	Time	Sample Type	Container Type	pH	Turbidity	Oil & Grease	Zinc, Copper total nickel	Zinc, Copper, Lead	TSS	BOD 5	Nitrate/Nitrite	Total Phosphorus	COD	TPH	MTCA5 metals	Diss Lead		Field Notes
1 MW1	—	11:00	water	1 HNO3 poly, 1 unpres poly				X								X	X		Hold for dissolved
2																			
3																			8-24-15: Added
4																			Dissolved Lead per
5																			May via email. STD
6																			
7																			
8																			
9																			
10																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	8/12/15 12:00	[signature]	8/12/15 12:00

Sample Receipt:

Good Condition?	Y
Cold?	Y
Seals Intact?	Y
Total Number of Containers	2

Remarks:
Record pH here:
STANDARD TAT
Email please.

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

APPENDIX F

Table F-1: Analytical Results for Soils

ROBINSON NOBLE

AOC	Sample #	Depth (feet)	Field Screening Notes	PID (ppm)	Gasoline (mg/kg)	Diesel (mg/kg)	Oil (mg/kg)	BTEX (mg/kg)				VOCs (mg/kg)	Metals (mg/kg)										cPAH (ug/kg)	PAH (ug/kg)	Semi-VOCs (ug/kg)	PCB (mg/kg)
								Benzene	Toluene	Ethylbenzene	Xylenes		Pb	Pb-TCLP	Cd	Cr (total)	Cr VI	As	Hg	Cu	Zn	Ni				
MTCA					100/30	2,000	2,000	0.03	6	7	9	specific	250	5 mg/L (RCRA)	2	2,000	19	20	2	3,200 (B-nc)	24,000 (B-nc)	1,600 (B-nc)	specific	specific	specific	1
1	TP12-1	1	no indications	0.3	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	13	-	nd	27	-	7	nd	15	nd	24	-	-	-	nd
1	TP12-3	3	no indications	0.0	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	34	<1	9	nd	12	9	23	-	-	-	-
1	TP13-1	1	no indications	0.3	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	13	-	nd	8	-	7	nd	10	nd	24	-	-	-	nd
1	TP13-3	3	no indications	0.1	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	7	-	nd	13	-	8	nd	13	7	23	-	-	-	nd
1	TP14-1.5	1.5	no indications	0.2	nd	nd	416	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	5552	3.4	nd	116	<1	8	nd	3113	nd	26	nd (SIM)	-	-	0.5
1	TP14-3	3	no indications	0.1	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	21	-	nd	23	-	7	nd	15	nd	23	nd (SIM)	-	-	nd
1	TP15-1	1	no indications	0.1	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	7	-	nd	9	-	7	nd	10	nd	16	nd (SIM)	-	-	nd
1	TP15-3	3	no indications	0.0	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	46	<1	9	nd	12	nd	20	nd (SIM)	-	-	nd
1	TP16-1	1	no indications	0.1	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	17	-	nd	39	<1	7	nd	10	nd	21	-	-	-	nd
1	TP16-3	3	no indications	0.1	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	25	-	8	nd	12	nd	23	-	-	-	-
1	TP17-1	1	no indications	0.0	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	85	<1	8	nd	12	nd	20	nd (SIM)	-	-	nd
1	TP17-3	3	no indications	0.1	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	15	-	7	nd	10	nd	19	nd (SIM)	-	-	nd
1	TP18-1	1	no indications	0.1	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	57	<1	7	nd	11	nd	20	nd (SIM)	-	-	nd
1	TP18-3	3	no indications	0.1	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	11	-	7	nd	20	6	21	nd (SIM)	-	-	nd
1	TP19-1	1	no indications	0.0	-	nd (Mineral Oil only)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	nd (SIM)	-	-	nd
1	TP19-3	3	no indications	0.0	-	nd (Mineral Oil only)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	nd (SIM)	-	-	nd
1	TP20-1	1	no indications	0.0	-	nd (Mineral Oil only)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	nd (SIM)	-	-	nd
1	TP20-3	3	no indications	0.0	-	nd (Mineral Oil only)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	nd (SIM)	-	-	nd
1	TP21-1	1	no indications	0.2	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	56	-	8	nd	11	nd	19	nd (SIM)	-	-	nd
1	TP21-3	3	no indications	0.0	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	72	<1	8	nd	12	nd	23	nd (SIM)	-	-	nd
1	TP22-1	1	no indications	0.3	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	5	-	nd	59	<1	5	nd	5	9	18	nd (SIM)	-	-	nd
1	TP22-3	3	no indications	0.0	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	9	-	7	nd	nd	nd	20	-	-	-	-
1	TP23-1	1	no indications	0.3	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	34	-	5	nd	6	nd	16	nd (SIM)	-	-	nd
1	TP23-4	4	no indications	0.2	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	37	<0.5	7	nd	6	7	18	nd (SIM)	-	-	nd
1	TP24-1	1	no indications	0.0	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	53	<1	5	nd	7	nd	16	nd (SIM)	-	-	nd
1	TP24-3	3	no indications	0.1	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	23	-	nd	nd	8	nd	22	-	-	-	-
1	TP25-1	1	no indications	0.2	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	16	-	nd	19	-	7	nd	13	nd	24	nd (SIM)	-	-	nd
1	TP25-3	3	no indications	0.1	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	83	<0.5	7	nd	7	nd	26	nd (SIM)	-	-	nd
1	TP26-2	2	no indications	0.1	-	-	-	-	-	-	-	-	8	-	nd	8	-	nd	nd	nd	nd	4	nd	nd	negligible[1]	-
1	TP27-2	2	no indications	0.2	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	11	-	nd	nd	nd	nd	9	nd (SIM)	nd (SIM)	-	nd
1	TP28-2	2	no indications	0.3	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	10	-	nd	nd	nd	nd	15	nd (SIM)	nd (SIM)	-	nd
1	TP29-2	2	no indications	0.3	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	11	-	nd	nd	nd	nd	8	nd (SIM)	nd (SIM)	-	nd
1	TP30-2	2	no indications	0.4	nd	nd	nd	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd (see VOCs)	nd	nd	-	nd	11	-	nd	nd	nd	nd	15	nd (SIM)	nd (SIM)	-	nd

[1] denotes compounds detected above PQL but below applicable MTCA cleanup limit

APPENDIX G

Groundwater Sampling Record

Robinson Noble, Inc.
2105 South C Street
Tacoma, Washington 98402
(253) 475-7711

Project Name: John's Auto Wrecking

Project Number: 2491-001G

Project field book no.: ___________

Well Name: MW-1

Date: 10/9/2014

Physical Setting

Depth to water (ft)	9.30	Time collected:	11:30
Total well depth (ft)	17	Collected by:	KAT
Screened interval (ft)	7-17	Weather:	Partly cloudy
Pumping method:	Bladder Pump	Notes/Comments:	
Pump setting:	14		

Sampling and Water Quality Parameters

Time	Elapsed time (min)	Volume (gal)	Temp (°C)	Specific Conductivity (ms/cm/°C)	Total Dissolved Solids (g/L)	Dissolved Oxygen (mg/L)	pH	Oxidation Reduction Potential (mV)	Turbidity (NTU)
11:00	0	START PURGE							
11:07	7	1	12.02	0.132	0.036	5.08	6.28	162	1.2
11:15	15	3	11.85	0.132	0.086	3.95	5.69	222	1.0
11:18	18	3.5	11.84	0.132	0.085	3.76	5.62	232	1.1
11:21	21	4	11.85	0.131	0.085	3.63	5.59	237	1.0
11:24	24	4.5	11.83	0.132	0.086	3.48	5.58	241	1.0
11:27	27	5	11.81	0.132	0.086	3.40	5.57	244	1.0
11:30	30	5.25	11.82	0.132	0.086	3.33	5.55	246	1.0

Sample Information

Time sampled:	11:30	Containers filled:	Preserved and unpreserved polys
t (min) sampled:	30	Sampled by:	KAT
Analysis performed:	Metals	Laboratory name:	Libby Environmental
Date of delivery:	10/9/2014	Date of analysis:	10/12/2014

Groundwater Sampling Record

Robinson Noble, Inc.
2105 South C Street
Tacoma, Washington 98402
(253) 475-7711

Project Name: John's Auto Wrecking

Project Number: 2491-001G

Project field book no.: ___________

Well Name: MW-1

Date: 1/8/2015

Physical Setting

Depth to water (ft)	8.57	Time collected:	12:15
Total well depth (ft)	17	Collected by:	KAT
Screened interval (ft)	7-17	Weather:	Partly cloudy
Pumping method:	Bladder Pump	Notes/Comments:	
Pump setting:	14		

Sampling and Water Quality Parameters

Time	Elapsed time (min)	Volume (gal)	Temp (°C)	Specific Conductivity (ms/cm/°C)	Total Dissolved Solids (g/L)	Dissolved Oxygen (mg/L)	pH	Oxidation Reduction Potential (mV)	Turbidity (NTU)
11:45	0	START PURGE							
11:52	7	1.25	12.05	0.139	0.042	4.98	6.40	192	1.4
12:00	15	3	11.64	0.138	0.093	3.70	5.54	243	1.2
12:03	18	3.25	11.52	0.139	0.093	3.76	5.66	241	1.1
12:06	21	4	11.64	0.139	0.093	3.54	5.59	242	1.2
12:09	24	4.5	11.62	0.139	0.094	3.43	5.57	240	1.1
12:12	27	5	11.65	0.138	0.093	3.33	5.58	245	1.1
12:15	30	5.25	11.64	0.138	0.094	3.29	5.57	243	1.1

Sample Information

Time sampled:	12:15	Containers filled:	Preserved and unpreserved polys
t (min) sampled:	30	Sampled by:	KAT
Analysis performed:	Metals	Laboratory name:	Libby Environmental
Date of delivery:	1/8/2015	Date of analysis:	1/11/2015

Groundwater Sampling Record

Robinson Noble, Inc.
2105 South C Street
Tacoma, Washington 98402
(253) 475-7711

ROBINSON NOBLE

Project Name: John's Auto Wrecking

Project Number: 2491-001G

Project field book no.: ___________

Well Name: MW-1

Date: 5/5/2015

Physical Setting

Depth to water (ft)	5.11	Time collected:	12:34
Total well depth (ft)	17	Collected by:	KAT
Screened interval (ft)	7-17	Weather:	Clear
Pumping method:	Bladder Pump	Notes/Comments:	
Pump setting:	12		

Sampling and Water Quality Parameters

Time	Elapsed time (min)	Volume (gal)	Temp (°C)	Specific Conductivity (ms/cm/°C)	Total Dissolved Solids (g/L)	Dissolved Oxygen (mg/L)	pH	Oxidation Reduction Potential (mV)	Turbidity (NTU)
12:05	0	START PURGE							
12:09	4	0.25	12.62	0.153	0.095	9.58	7.57	99	47.5
12:12	7	0.4	11.43	0.139	0.090	8.82	6.91	172	31.8
12:15	10	0.5	11.05	0.136	0.089	8.17	6.45	211	21.1
12:19	14	0.75	10.96	0.136	0.088	7.66	6.68	219	15.3
12:23	18	1	10.83	0.134	0.089	7.17	6.61	235	11.3
12:28	23	1.25	10.71	0.134	0.087	7.00	6.55	249	11.2
12:31	26	1.5	10.67	0.134	0.087	6.87	6.51	258	8.9
12:34	29	1.75	10.62	0.133	0.086	6.36	6.38	272	8.1

Sample Information

Time sampled:	12:34	Containers filled:	Preserved and unpreserved polys
t (min) sampled:	29	Sampled by:	KAT
Analysis performed:	Metals	Laboratory name:	Libby Environmental
Date of delivery:	5/5/2015	Date of analysis:	5/10/2015

Groundwater Sampling Record

Robinson Noble, Inc.
2105 South C Street
Tacoma, Washington 98402
(253) 475-7711

ROBINSON NOBLE

Project Name: John's Auto Wrecking

Project Number: 2491-001G

Project field book no.: ___________

Well Name: MW-1

Date: 8/12/2015

Physical Setting

Depth to water (ft)	6.57	Time collected:	11:00
Total well depth (ft)	17	Collected by:	KAT
Screened interval (ft)	7-17	Weather:	Clear
Pumping method:	Bladder Pump	Notes/Comments:	
Pump setting:	13		

Sampling and Water Quality Parameters

Time	Elapsed time (min)	Volume (gal)	Temp (°C)	Specific Conductivity (ms/cm/°C)	Total Dissolved Solids (g/L)	Dissolved Oxygen (mg/L)	pH	Oxidation Reduction Potential (mV)	Turbidity (NTU)
10:30	0	START PURGE							
10:38	8	1	12.40	0.641	0.121	6.42	7.43	72	53.6
10:42	12	1.75	11.33	0.223	0.115	5.29	6.82	164	45.8
10:45	15	2.5	11.21	0.198	0.097	4.48	6.37	234	40.2
10:48	18	3	10.83	0.153	0.096	4.21	6.38	228	33.1
10:52	22	3.5	10.84	0.152	0.095	3.98	6.25	236	19.8
10:55	25	4.75	10.74	0.153	0.096	4.02	6.31	245	15.8
10:57	27	5	10.72	0.151	0.096	4.10	6.29	235	14.1
11:00	30	5.25	10.73	0.155	0.098	4.05	6.31	256	14.3

Sample Information

Time sampled:	11:00	Containers filled:	Preserved and unpreserved polys
t (min) sampled:	30	Sampled by:	KAT
Analysis performed:	Metals	Laboratory name:	Libby Environmental
Date of delivery:	8/12/2015	Date of analysis:	8/18/2015

APPENDIX H

WETLAND DELINEATION REPORT

John's Wrecking Yard
411 93rd Avenue Southeast
Olympia, Washington

Prepared by
Normandeau Associates, Inc.
1904 Third Avenue, Suite 1010
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Prepared for
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Cooper Pt. Road SW, Building 3
Kent, Washington 98032

October 14, 2014

NORMANDEAU
environmental consultants

Table of Contents

1.0 INTRODUCTION

This report has been prepared in response to a Washington State Department of Ecology request for wetland delineation for the John's Wrecking Yard site (the Site). The Site is enrolled in the Voluntary Cleanup Program ([VCP] VCP Project No. SW1127), and is currently being investigated and remediated. This report is intended to provide the formal wetland boundary delineation, establish the extent and quality of three wetlands previously identified, and provide supporting information regarding the species of plants and animals present on the Site.

2.0 GENERAL SITE DESCRIPTION

2.1 Land Use and Landscape Setting

The address of the Site is 411 93rd Avenue Southeast, and it is located within Section 23 of Township 17 north, Range 2 west, Willamette Meridian. Figure 1 shows the location of the Site. The Site comprises six contiguous parcels (Figure 2) identified by Thurston County Assessor-Treasurer records as parcel numbers 12723210100, 12723220200, 12723210400, 12723210401, 12723210700, and 12723210000. Thurston County Assessor-Treasurer records indicate these six parcels cover an area of approximately 15 acres.

The topography at the Site is relatively flat with a gentle slope to the south toward Hopkins Ditch (see Figures 1 and 2). Land surface elevations range from 202 feet above mean sea level (MSL) at the northern end of the Site, to 195 feet MSL near the south end of the Site along Hopkins Ditch.

A report by Robinson Noble (2013) indicates that the Site is underlain by glacial deposits of Vashon recessional outwash, a mix of poorly sorted silt, sand, and gravel, with an average thickness of approximately 25 feet. Underlying deposits are composed of advance outwash from the Vashon glaciation that consists of an admixture of clay, silt, sand, and gravel. These sediments are typically compact and have relatively low permeability.

Soils in the area of the Site have been mapped by the United States Department of Agriculture Natural Resources Conservation Service (NRCS 1990, NRCS 2013) as Nisqually loamy fine sand (covering approximately the northern three-quarters of the Site) and Norma fine sandy loam (covering approximately the southern quarter of the Site). Smaller areas of the Site are mapped as Everett very gravelly sandy loam and Tisch silt loam (the southeast corner of the Site), and a small area of Mukilteo muck (in the southwest). A summary of the characteristics of these soils is provided in Table 1.

Table 1. Summary of Soils Mapped at the Site (NRCS 2013, 1990).

Soil Map Unit	Taxonomy	Landform	Parent Material	Drainage Class	Hydric? (inclusions)
Nisqually loamy fine sand, 0 to 3 percent slopes	Vitrandic Xerumbrepts	Terraces	Sandy glacial outwash	Somewhat excessively drained	No Norma (**Yes**)
Norma fine sandy loam	Aquandic Humaquepts	Depressions and drainageways	Alluvium	Poorly drained	**Yes**
Everett very gravelly sandy loam, 3 to 15 percent slopes	Vitrandic Xerochrepts	Terraces	Glacial outwash	Somewhat excessively drained	No
Tisch silt loam	Typic Endoaquands	Depressions and drainageways	alluvium, volcanic ash, and diatomaceous earth	Very poorly drained	**Yes**
Mukilteo muck	Terric Medisaprists	Depressions	Herbaceous organic material	Very poorly drained	**Yes** Shalcar (**Yes**)

Three of the mapped soils on the Site (Mukilteo muck, Norma fine sandy loam, and Tisch silt loam) are hydric soils. One of the remaining soils (Nisqually loamy fine sand) is not hydric, but it has inclusions of Shalcar soils, which are hydric. Overall, the soils mapped for the Site are likely to support wetlands.

2.2 Waters of the State

Surface water features present on the Site includes Hopkins Ditch, which is a small seasonal stream that traverses the southern portion of the Site from east to west. There is also a small pond present on the southern half of parcel 12723210700, just north of Hopkins Ditch. Hopkins Ditch typically only contains water during the wetter portions of the year and is often nearly dry in the late summer. Previous reports by Robinson Noble (2013) indicate that when there is water in the ditch it does not appear to flow and the ditch is, in fact, more akin to a linear series of small disconnected ponds. A similar observation was made during the wetland delineation. No flows were observed in Hopkins Ditch though water was present, and no culverts were positively identified at access road crossings.

The head of Hopkins Ditch is located just east of the Site, and the Site itself lies within the headwater-area of the Salmon Creek drainage basin, a part of Upper Chehalis Water Resource Inventory Area (WRIA) #23. Maps of this area show that Hopkins Ditch becomes Salmon Creek approximately 2 miles west of the Site (near Little Creek Road).

Salmon Creek then flows into the Black River approximately 3 miles further west. The Black River eventually flows into the Chehalis River, which then flows to the sea at Grays Harbor.

Salmon Creek is identified in the WDFW PHS database as habitat for resident cutthroat trout (*Oncorhynchus clarki clarki*) (WDFW 2014), and in Salmonscape (WDFW 2014) as habitat for coho salmon (*Oncorhynchus kisutch*). WDFW also indicated that bridgelip sucker (*Catostomus columbianus*),Western brook lamprey (*Lampetra richardsonii*), speckled dace (*Rhinichthys osculus*), redside shiner (*Richardsonius balteatus*), Pacific lamprey (*Lampetra tridentata*), Northern pikeminnow (*Ptychocheilus oregonensis*), and sculpin (species in the family *Cottoidea*) are possibly present in Salmon Creek, and Olympic mudminnow (*Novumbra hubbsi*) habitat may be present in associated wetlands (T. Nation, Pers. comm.). Although sources do not show any of these species in Hopkins Ditch, no barriers to fish passage are identified downstream of the site that would preclude their presence.

2.3 Precipitation Data and Analysis

A comparison of historical precipitation data obtained from the WETS Station Olympia Weather Service Forecast Office (WSFO) (NRCS 2014) and recent observations from the National Weather Service (NWS) Olympia Airport station (NWS 2014) show that overall precipitation exceeded the high normal for the area by 0.59 inch for the 2 months preceding the delineation (Table 2). There were 0.09 inches of precipitation for the 2 weeks prior to the site visit, and none the preceding week. However, overall precipitation for the months of March and May exceeded the normal high, and April precipitation matched the normal high. Although little rain fell in the 2 weeks preceding the delineation (Table 3), approximately 0.50 inch of precipitation fell within 3 weeks of the site visit (May 23 to May 26). As a result, we believe the overall hydrologic conditions at the time of the wetland delineation likely reflected relatively normal summer conditions.

Table 2. Summary of Precipitation in Olympia, Washington (NRCS 2014, NWS 2014).

Month	Total Precipitation (inches)	Normal Range WETS (inches)	Within Normal Range	Average (inches)	Departure from Normal (inches)
March	9.17	3.84 - 6.23	**Exceeds**	5.29	2.94
April	4.26	2.48 - 4.26	**Yes**	3.58	0
May	3.34	1.37 - 2.75	**Exceeds**	2.27	0.59
June	0.88	1.20 - 2.13*	**No**	1.78*	-0.32
TOTAL	***17.65***	***5.05 - 9.14***	***Exceeds***	***12.92***	**2.28**

*These numbers reflect monthly totals.

Table 3. Daily Precipitation for 1 Week and 2 Weeks Prior to the Site Visit – Olympia Airport (NWS 2014).

Site Visit Date	Prior 7-Day Total (inches)	Prior 14-Day Total (inches)
June 10, 2014	0.0	0.09

The NRCS growing season recorded in the Olympia Airport WETS table, based on 28°F for the 50 percentile, is 194 days beginning on April 14 and ending on October 25 (NRCS 2014). The date of the wetland delineation (June 10) falls within these growing season dates.

3.0 METHODS

Wetland determinations followed the U.S. Army Corps of Engineers (USACE) *Wetland Delineation Manual* (1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0)* (2010). A background review was performed, including an assessment of the Site topography (Figures 1 and 2), Thurston County Wetland Inventory (Figure 3), hydric soils as identified by NRCS and Thurston County (Figure 4), and priority Habitats and Species information (WDFW 2014 http://wdfw.wa.gov/mapping/phs/). Plant names and wetland indicator status followed the 2014 National Wetland Plant List (NWPL) (Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner 2014).

The wetland review consisted of assessing vegetation, soil, and hydrologic characteristics to identify areas meeting the three-parameter wetland criteria. Normandeau staff completed the site reconnaissance and wetland delineation on June 10, 2014.

Site-specific methods for conducting the field investigation were used at the data plots. Factors such as type of wetland boundary (e.g., gradual versus abrupt), topography, and water flow were taken into account when selecting sample plot locations and determining boundaries. The paired sample plot was chosen to best represent the wetland and adjacent non-wetland.

The wetland boundaries and paired data plots were flagged in the field using numbered, colored surveyor pin-flags or tape, and the locations were collected by professional land surveyors (Larson and Associates). The wetlands were classified using the U.S. Fish and Wildlife Service Cowardin system (Cowardin, et al. 1979) and rated using the *Washington State Wetland Rating System for Western Washington—Revised* (Hruby 2004) (see Appendix C).

4.0 RESULTS

Three wetlands were identified on the Site (Wetland A, B, and C). Wetland A the largest of these 3 wetlands, and occupies the areas on either bank of Hopkins Ditch, extending upslope to the north and south. Wetland A extends off of the Site to the east and west. Wetland B is a smaller wetland located to the north of Wetland A (Figure 3). This wetland occupies a series of shallow depressions that adjoin the north side of Wetland A.

Wetland C is a small wetland that occupies a steep sided depression in the southeast corner of the Site, south of Wetland A. Detailed descriptions are provided below.

4.1 Wetland A

Description

Wetland A is a palustrine forested and emergent wetland approximately 50 acres in size, located along the banks of Hopkins Ditch. Approximately 3.8 acres (166,092 square feet) of this wetland are located on the Site (Figure 3). The wetland crosses the southern portion of the Site, sloping gently from east to west. The wetland is largely within the valley bottom of Hopkins Ditch, though it extends upslope to the north and south, as much as 200 feet in some places.

Vegetation in Wetland A includes forested and emergent habitats (Photos 1, 2 and 3). The forested portion of the wetland is largely dominated by black cottonwood (*Populus balsamifera*), Scouler's willow (*Salix scouleriana*), and cluster rose (*Rosa pisocarpa*), with an herbaceous stratum dominated by common bedstraw (*Gallium aparine*) (see Data Form A-W1, Photo 4). Along the southern boundary of Wetland A, this forested community includes Pacific willow (*Salix lasiandra*), salmonberry (*Rubus spectabilis*), reed canarygrass (*Phalaris arundinacea*), and climbing nightshade (*Solanum dulcamara*). This community extends offsite to the east. The emergent habitat onsite is dominated by reed canarygrass (see Data Form A-W2, Photo 5). Southwest of the Site, the emergent community includes areas of common cattail (*Typha latifolia*) and shallowly inundated areas that may result from downstream beaver activity.

The dominant species present in Wetland A are adapted to saturated soil conditions. The presence of these species satisfies the wetland vegetation criteria.

Hydrology

Hydrology in Wetland A appears to be primarily associated with surface water runoff and groundwater captured in Hopkins Ditch. These waters appear to inundate the areas beyond the ditch banks. These inundated areas include several small depressions that retain water. Areas to the south of the Site were shallowly inundated at the time of the wetland delineation.

Indicators of wetland hydrology observed at Plot A-W1 included saturated soils at 18 inches, algal crust, water stained leaves, and a sparsely vegetated concave surface. The determination of wetland hydrology at Plot A-W2 was based on the presence of secondary indicators, including landscape position, the presence of drainage patterns, adjacent areas with clear wetland hydrology, and the predominance of a plant community dominated by hydrophytic species. Offsite areas to the southwest of the Site include areas of shallow inundation. Presence of the indicators satisfies the wetland hydrology criterion.

Soils

Soils observed in Wetland A included a very dark gray (10YR 3/1) sandy loam overlying black (10YR 2/1) silt loam (extending from 9 to 18 inches below the surface). Below 18 inches, the soil matrix color changes to a dark grayish brown (2.5Y 4/2) with approximately 10 percent dark brown (10YR 3/3) redox concentrations, indicating a reduced matrix (see Data Form A-W1). Small pieces of the surface soils (very dark gray sandy loam) were also mixed into this stratum. These soils meet the criteria for a thick dark surface (A12) and satisfy the hydric soil criterion.

At plot location A-W2, the observed soils were composed of a very dark brown (10YR 2/2) sandy loam extending to 9 inches below the surface. From 9 to 18 inches below the surface, the soil color is a very dark grayish brown (10YR 3/2) with approximately 5 percent dark yellowish brown (10YR 3/4) redoximorphic features in the pore linings. Below 16 inches and extending to 21 inches, the matrix color changes to a very dark brown (10YR 2/2) and the percentage of redoximorphic features increases from 5 to approximately 10 percent. Soils at this location appear to meet the redox dark surface (F6) indicator, which meets the hydric soil criterion.

Adjacent Uplands

The northern buffer of Wetland A is disturbed upland meadow. Himalayan blackberry (*Rubus armeniacus*) and Scotch broom (*Cytisus scoparius*) are the dominant shrubs. The herbaceous species present include reed canarygrass, common velvetgrass (*Holcus lanatus*), bird's-foot trefoil (*Lotus corniculatus*), sweet vernalgrass (*Anthoxanthum odoratum*), annual bluegrass (*Poa annua*), white clover (*Trifolium repens*), red clover (*Trifolium pratense*), and common dandelion (*Taraxacum officinale*). Soils in this area were very dark grayish brown to very dark brown (10YR 3/2 and 2/2) sandy loams with no redoximorphic features, and appeared well drained. Glass, metal, and plastic were present throughout the soil profile, indicating past grading/filling activities on the Site (see Data Forms A-U0, A-U1, A-U2).

The southern buffer in Wetland A is predominantly upland coniferous forest. The dominant species present include Douglas-fir (*Pseudotsuga menziesii*), with the shrub understory dominated by dull oregongrape (*Mahonia nervosa*), snowberry (*Symphoricarpos albus*), beaked hazelnut (*Corylus cornuta*), Indian plum (*Oemleria cerasiformis*), and vine maple (*Acer circinatum*). Himalayan blackberry is present in this buffer in smaller quantities than to the north. The herbaceous layer is predominantly western swordfern (*Polystichum munitum*) and brackenfern (*Pteridium aquilinum*), although trailing dewberry (*Rubus ursinus*) are common, and some tiger lily (*Lilium columbianum)* was also identified in this area. Soils to the south are similar to the northern buffer (see Data Forms A-U1, A-U2, and C-U1), and do not exhibit hydric soil characteristics.

Rating, Function and Buffers

The wetland was rated as both depression and riverine wetland to determine the highest rating category. Wetland A scored low to moderate (20 points) for water quality, moderate to high (26 points) for hydrologic function, and low habitat (18 points) function, resulting in an overall rating of Category II.

The relatively low water quality score reflects the relatively limited area of shallow depression that can retain and treat water in Wetland A. The higher score for hydrologic function generally reflects the width of the wetland relative to the stream, the presence of dense vegetation that can slow water flows, and the potential for downstream flooding that this wetland has the opportunity to alleviate. The overall habitat function in Wetland A is limited by the disturbed buffers and limited connectivity of the system.

Category II wetlands in Thurston County with a habitat score below 18 require a 100-foot buffer to preserve habitat quality and water quality function (Thurston County Code [TCC] 24.30.045).

4.2 Wetland B

Description

Wetland B is a small (2,595 square feet~0.06 acre in size) palustrine emergent depressional wetland located in the southeast portion of the Site (Figure 3). The wetland occupies a series of shallow depressions on densely compacted soil, and is partially contiguous with Wetland A (Photo 6). Soil compaction in this area appears to result from use as an access road, and the surface materials appear consistent with gravel fill.

Vegetation

Vegetation in Wetland B is relatively sparse due to the compacted surface. The dominant species observed in Wetland B were common chickweed (*Stellaria media*) and tapertip rush (*Juncus acuminatus*). Small amounts of reed canarygrass and soft rush (*Juncus effusus*) were also present (see Data Form B-W1). The presence of these species satisfies the wetland vegetation criterion.

Hydrology

Wetland B appears to derive its moisture from surface runoff in the surrounding area. The shallow depressions and their compacted surfaces retain the water long enough to support a wetland plant community. Indicators of wetland hydrology observed in Wetland B include water marks and surface soil cracks. The presence of these indicators meets the wetland hydrology criterion.

Soils

Soils in Wetland B are extremely compacted due to past filling and use as an access road, and soil textures were visually estimated due to the presence of glass in the soil. The upper stratum is a very dark gray (10YR 3/1) extremely gravelly silt loam extending to 9 inches. Beneath this stratum and extending to 12 inches, the soil is a very dark grayish brown (10YR 3/2) very gravelly silt loam, with approximately 10 percent dark yellowish brown (10YR 4/4) redoximorphic features. The soil from 12 to 13 inches is a very dark gray (2.5Y 3/1) silt loam. Excavation below this depth was not possible due to the extremely compact nature of the soils (Photo 7). This soil is close to meeting the criteria for the redox dark surface (F6) indicator, lacking only an additional inch of the strata above 12 inches. Hydric soils were assumed to be present for this area based on the compacted surface that acts as an aquatard, as well as the presence of a plant community dominated by wetland species. This approach is consistent with the “man induced” wetland approach described in the 1987 manual, which uses human induced changes in hydrology and the presence of wetland vegetation without clear indicators of hydric soils to determine the presence of wetlands.

Adjacent Uplands

The adjoining uplands to the east of Wetland B are dominated by birdsfoot trefoil (*Lotus cormiculatus*), colonial bentgrass (*Agrostis capillaris*), and white clover (*Trifolium repens*) (see Data Form B-W1). Soil in the sample pit consisted of a dark gray (10YR 4/1) very gravelly silt loam extending to approximately 5 inches, overlying a very dark grayish brown (10YR 3/2) very gravelly silt loam extending to 10 inches. No redoximorphic features were observed. Excavation was not possible below 10 inches. Wetland A is located to the south and west.

Rating, Function and Buffers

Wetland B scored low for water quality, hydrologic, and habitat functions (10, 4, and 11 points, respectively), resulting in an overall rating of Category IV.

The water quality function of Wetland B is limited by its small size, sparse vegetation, and small area of seasonal ponding. Hydrologic function is similarly limited by the small storage potential of the wetland and the absence of seasonally inundated areas that would provide water quality improvement. Wetland B has a single vegetation type and low plant diversity, resulting in limited habitat complexity and interspersion.

Category IV wetlands in Thurston County with a habitat score below 18 that drain to a Category II wetland (Wetland A) require a 100-foot buffer to preserve habitat quality and water quality function (TCC 24.30.045).

4.3 Wetland C

Description

Wetland C is a depression emergent wetland approximately 6,300 square feet (0.15 acre) in size, and is located in the southeast corner of the Site (Figure 3). The wetland occupies a steep-sided depression (Photo 8) and is not connected to the other wetlands on the Site.

Vegetation

Vegetation in Wetland C is primarily emergent, although a narrow (~ 5 feet wide) fringe of shrub vegetation is present along the banks. Vegetation in Wetland C is dominated by reed canarygrass, although smaller amount of climbing nightshade (*Solanum dulcamara*), a veronica species (likely grass-leaved speedwell [*Veronica scutellata*]), and common duckweed (*Lemna minor*) were observed. Hardhack (*Spiraea douglasii*) is present on the fringe of the wetland (See Data Form C-W1, Photo 9). The presence of these species meets the wetland plants criterion.

Hydrology

Wetland C appears to derive its water largely from runoff the surrounding uplands. Groundwater, however, may play a role in the water supply as indicated by presence of open water in June. Observed indicators of wetland hydrology include the presence of a high water table and surface inundation. The presence of these indicators meets the wetland hydrology criterion.

Soils

Soils observed in Wetland C were difficult to sample due to the inundation present during the delineation. A very dark brown (10YR 2/2) very gravelly loam extends from the surface to a depth of approximately 9 inches. Sampling below this depth was impractical due to the inundation, and redoximorphic features are difficult to discern under these conditions. Indicators of hydric soils were assumed due to the presence of a wetland dominated plant community that includes obligate species and the presence of surface inundation.

Adjacent Uplands

The upland to the north of Wetland C is the same upland forest described for the southern buffer of Wetland A. Species present include Douglas-fir, dull oregongrape, snowberry, beaked hazelnut, Indian plum, and vine maple, with smaller quantities of Himalayan blackberry. Herbaceous species present include western swordfern, brackenfern, trailing dewberry, and tiger lily (Photo 10). Soils in this adjacent upland are characterized in Data Form C-U1, and did not exhibit hydric soil characteristics (Photo 11). No indicators of wetland hydrology were observed in this area.

Rating, Function and Buffers

Wetland C scored low for water quality, hydrologic, and habitat functions (12, 18, and 15 points, respectively), resulting in an overall rating of Category III.

Water quality function in Wetland C is limited by the absence of seasonally inundated area (seasonal storage capacity above the permanently inundated areas) that would provide water quality improvement. Hydrologic function is limited by the small watershed that contributes to Wetland C. The primary limitations on habitat function in

Wetland C are the limited hydrologic structure, absence of multiple habitat types, and lack of complexity.

Category III wetlands in Thurston County with a habitat score below 18 that are less than 10,000 square feet are not a functional part of a mosaic wetland, do not support priority wildlife species, and do not drain to a stream or a Category I or II wetland, require a 50-foot buffer to preserve habitat quality and water quality function (TCC 24.30.045).

4.4 Wildlife Observed at the Site

Wildlife observed at the Site included red-tailed hawks (*Buteo jamaicensis* – Not PHS listed) sighted on the north side of Wetland A, and a great blue heron (*Ardea Herodias* – PHS listed species) sighted near Wetland B. Tracks from deer (likely Columbian black-tailed deer [*Odocoileus hemionus columbianus*] - PHS listed species), and raccoon (*Procyon lotor* – not PHS listed) were also observed near Wetland B. Inundated areas to the south of the Site may indicate the presence of beaver (*Castor canadensis* – not PHS listed) to the southwest. However, no gnawed stumps or cuttings were observed on the Site, even though there are willow present that provide desirable forage.

Hopkins Ditch has been straightened and channelized on the Site. The banks are approximately 12 to 18 inches high, and the channel, where observed, varied from 5 – 7 feet in width. Water observed in the ditch channel during the delineation was 12 to 18 inches deep, heavily stained with organic materials, and stagnant. No flowing water was observed during the field investigation. The channel appears to be blocked in at least one location, which would limit fish access to upstream areas during some flow conditions. Due to these conditions, the portions of Hopkins Ditch on the Site appear to provide limited potential habitat for fish species.

5.0 REFERENCES

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APPENDIX A – FIGURES

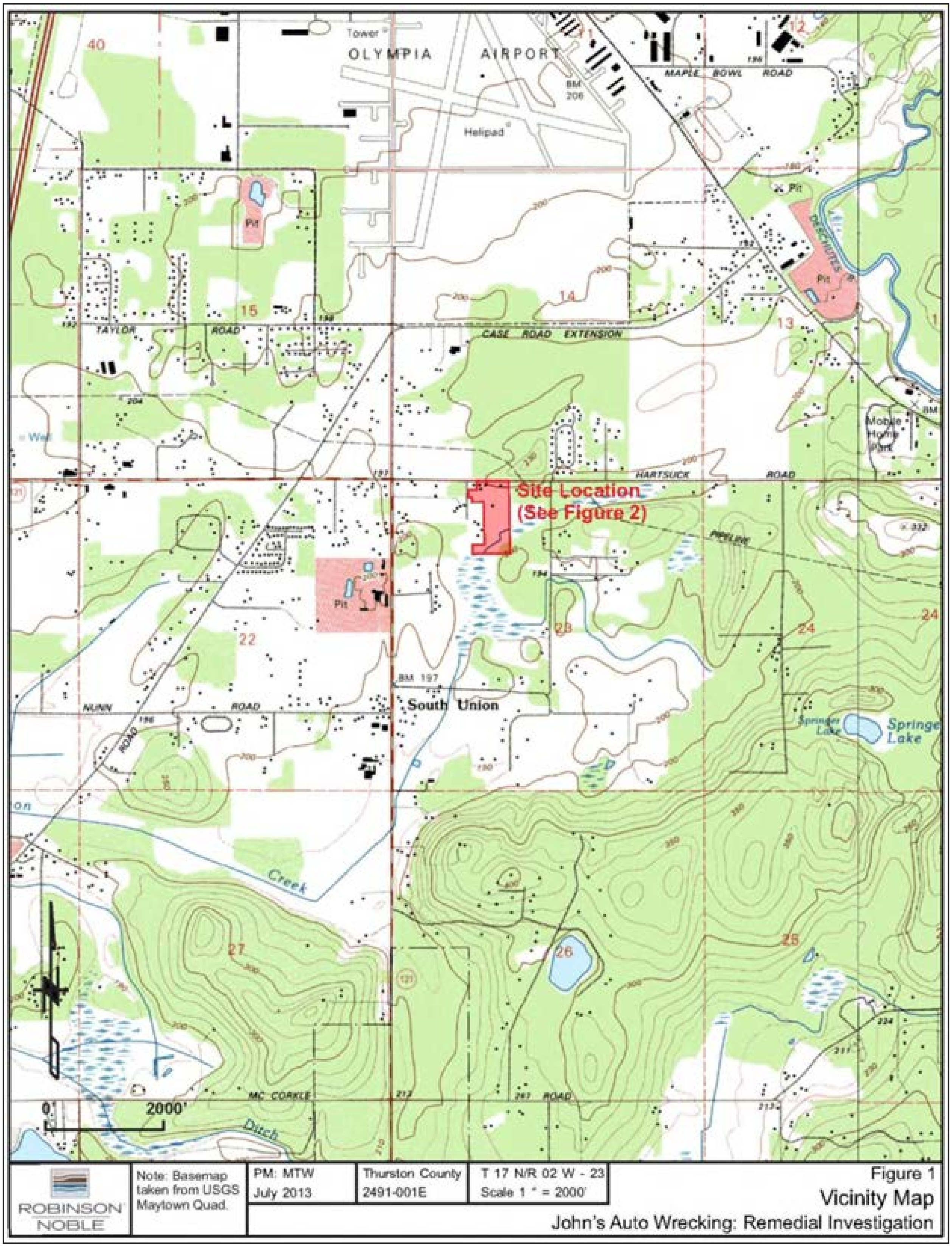


Figure 1. Project Vicinity Map (Robinson Noble 2013).

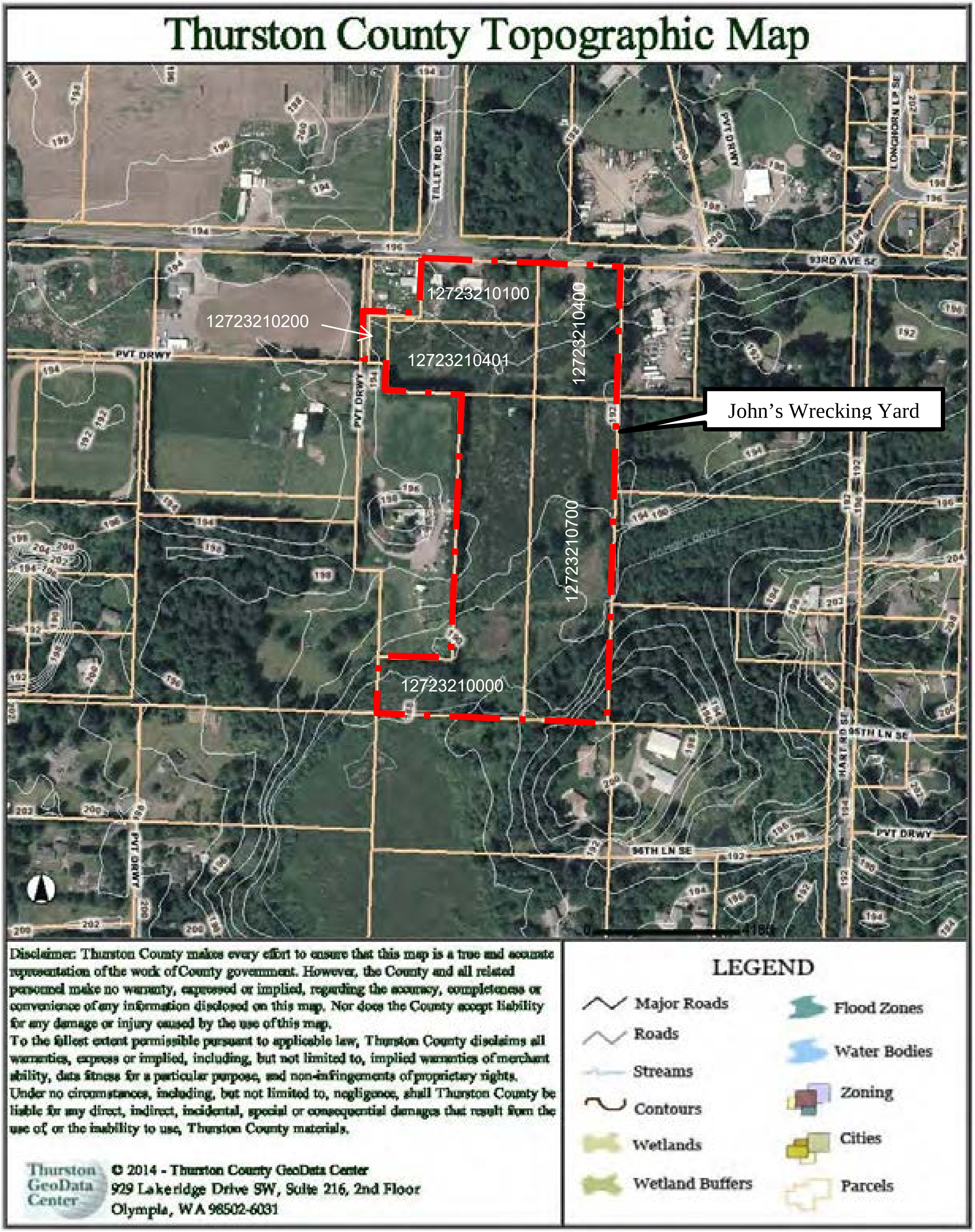


Figure 2. Topography within the Site Vicinity (Thurston County GIS 2014).

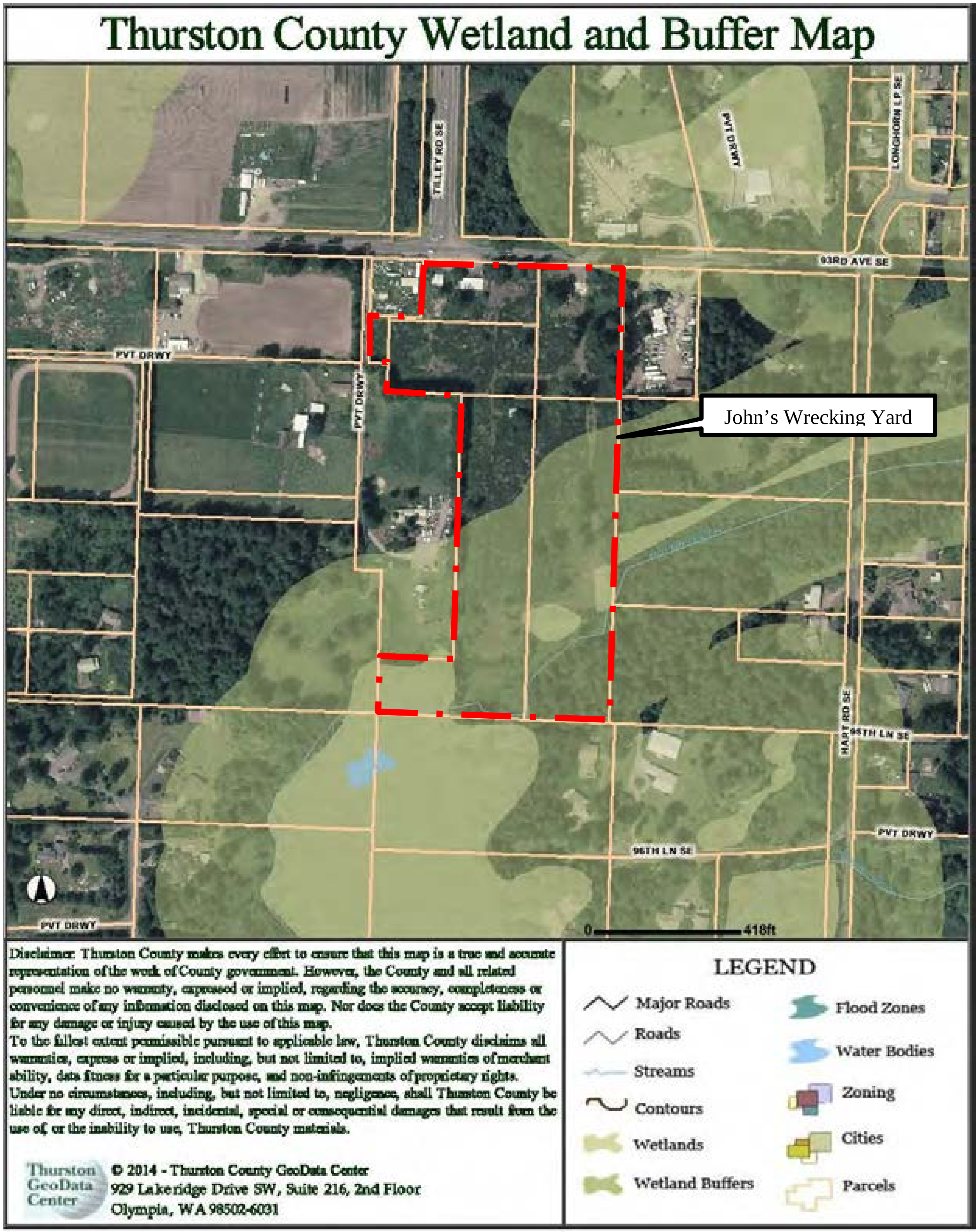


Figure 3. Thurston County and National Wetland Inventory Wetlands within the Site Vicinity (Thurston County GIS 2014).

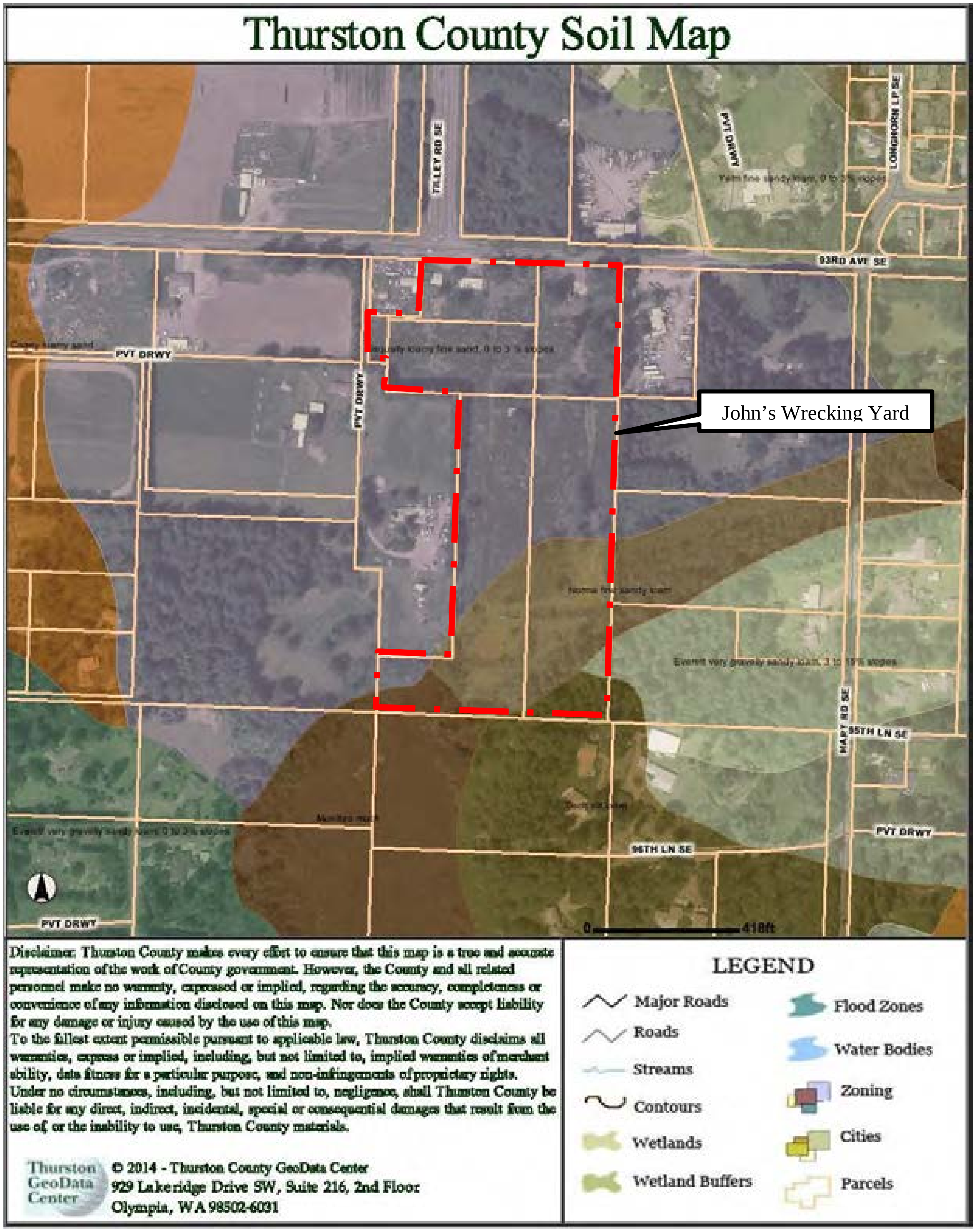


Figure 4. Soil Map Units within the Site Vicinity (Thurston County GIS 2014).

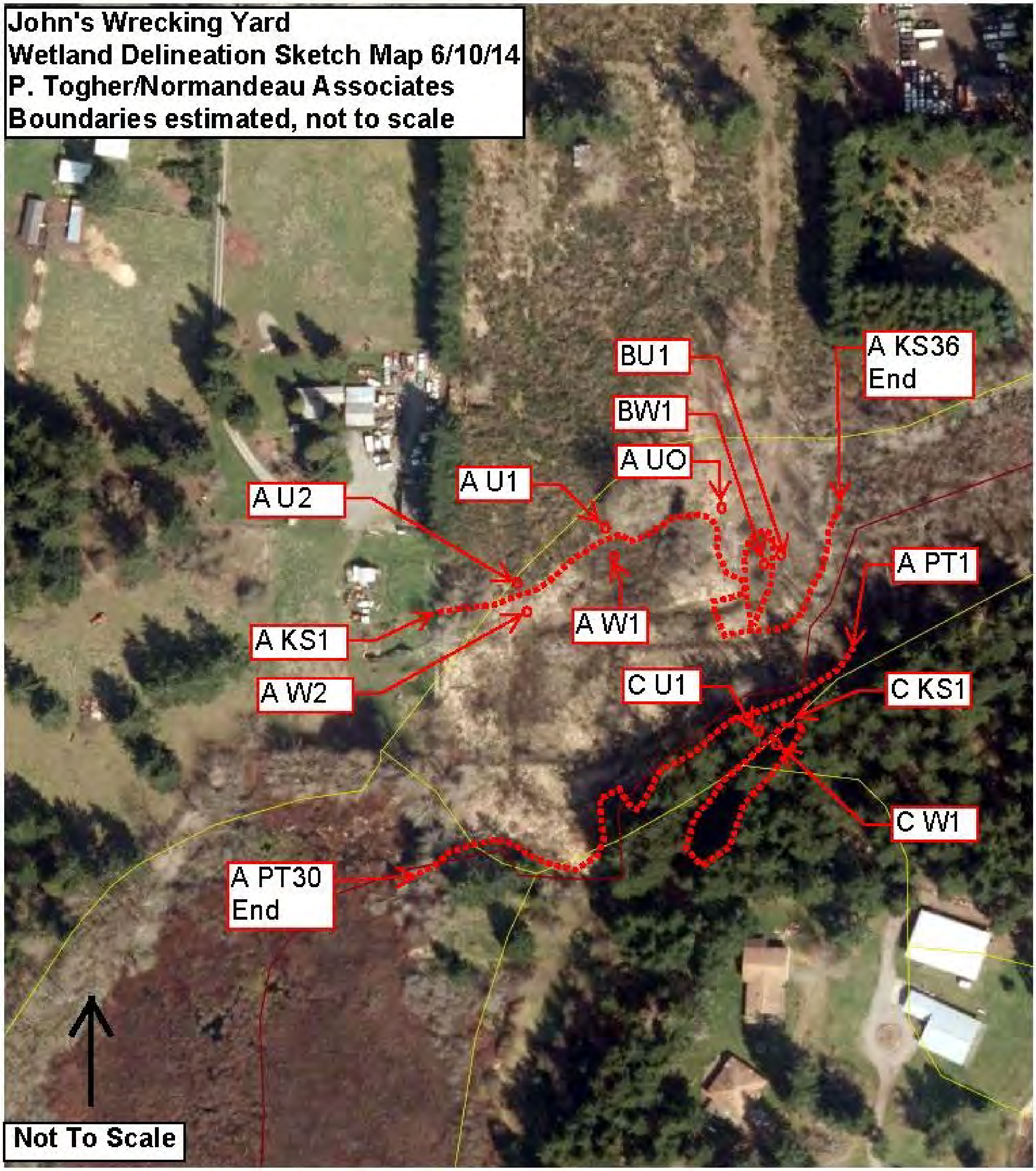
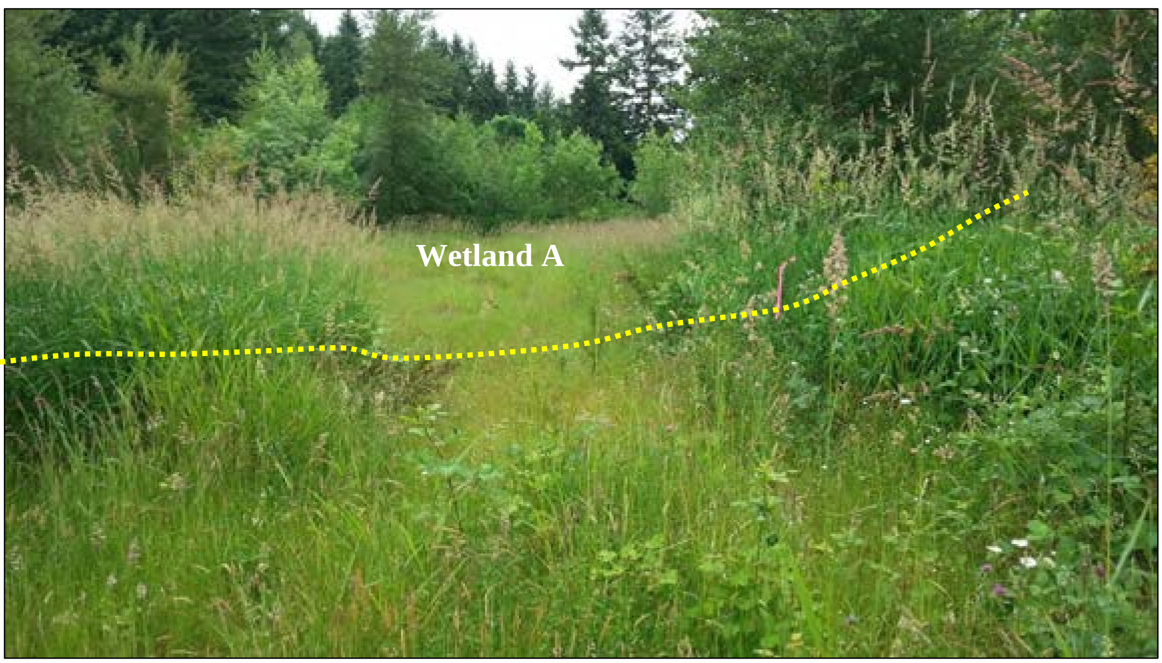


Figure 5. Wetland Delineation Field Sketch.

APPENDIX B – SITE PHOTOGRAPHS

Photograph 1. Wetland A, looking south at inundated area from west end of Site. (June 10, 2014).

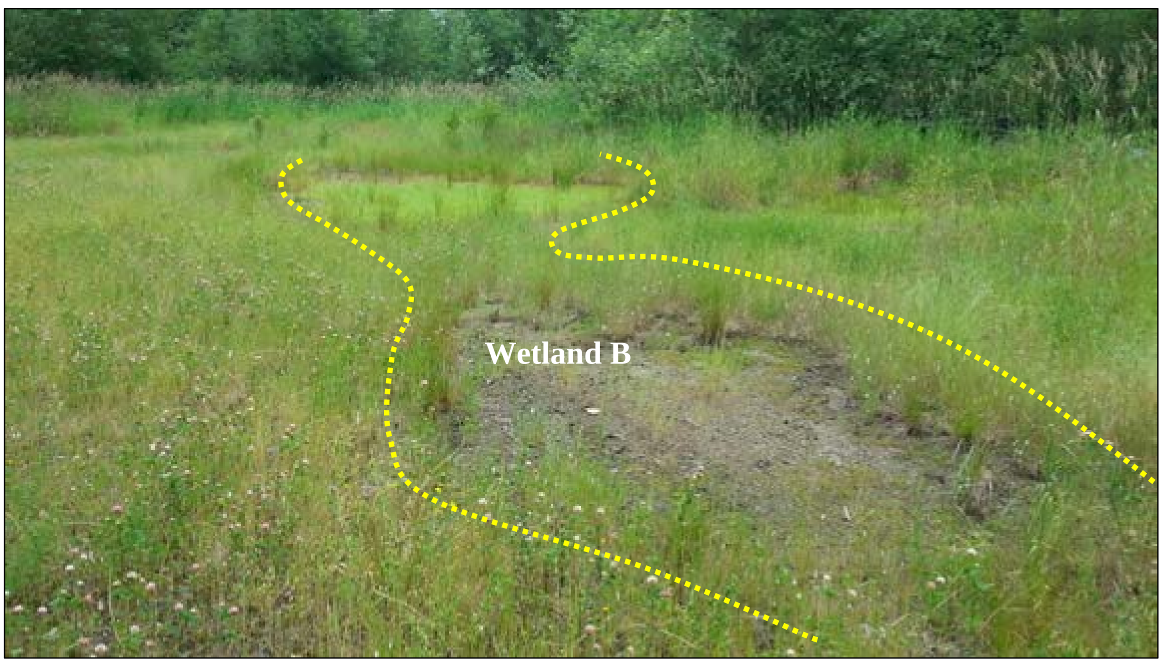


Photograph 2. Wetland A, facing south from north side (June 10, 2014)

Photograph 3. Wetland A, forested component facing south from north side (June 10, 2014).

Photograph 4. Wetland A, Wetland Plot A-W1 (June 10, 2014).

Photograph 5. Wetland A, Wetland Plot A-W 2 (June 10, 2014).



Photograph 6. Wetland B (June 10, 2014).

Photograph 7. Wetland B, Wetland Plot B-W1 (June 10, 2014).

Photograph 8. Wetland C, facing east. Note inundation (June 10, 2014).

Photograph 9. Wetland C, Wetland Plot C-W1 (June 10, 2014).

Photograph 10. Wetland C, adjoining upland to the west (June 10, 2014).

Photograph 11. Wetland C, Upland Plot C-U1 (June 10, 2014).

APPENDIX C – WETLAND DETERMINATION FORMS

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: John's Wrecking Yard | City/County: Tumwater/Thurston | Sampling Date: 6-10-14

Applicant/Owner: Alan Wertjes | State: WA | Sampling Point: A-U0

Investigator(s): P. Togher, K. Snyder | Section, Township, Range: S. 23, T 17N, R2W

Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): Flat | Slope (%): <5%

Subregion (LRR): A | Lat: 46.95065 | Long: -122.900217 | Datum: WGS 83

Soil Map Unit Name: Nisqually loamy fine sand (Vitrandic Xerumbrepts) | NWI Classification: Upland

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y		
Hydric soil present?	N	**Is the sampled area within a wetland?**	N
Indicators of wetland hydrology present?	N	f yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Plot is located near a ditch on the edge of the upland meadow that predominates on the site. The nearest flag is A-KS 14, located to the south. Wetland vegetation was present, but hydric soils and wetland hydrology were absent.

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominan t Species	Indicator Staus
Tree Stratum (Plot size: 10 meter)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 5 meters)			
1 *Salix scouleriana*	25	Y	FAC
2 *Spiraea douglasii*	10	Y	FACW
3 *Sambucus racemosa*	1	N	FACU
4			
5			
	36	= Total Cover	
Herb stratum (Plot size: 1 meter)			
1 *Holcus lanatus*	50	Y	FAC
2 *Phalaris arundinacea*	25	Y	FACW
3 *Anthoxanthum odoratum*	25	Y	FAC
4 *Rumex acetosa*	10	N	FAC
5 *Lotus corniculatus*	5	N	FAC
6			
7			
8			
9			
10			
	115	= Total Cover	
Woody vine stratum (Plot size: 5 meters)			
1 *Rubus armeniacus*	25	Y	FACU
2			
	25	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC:	5	(A)
Total Number of Dominant Species Across all Strata:	6	(B)
Percent of Dominant Species that are OBL, FACW, or FAC:	83.33%	(A/B)

Prevalence Index Worksheet

Total % Cover of:			
OBL species	0	x 1 =	0
FACW species	35	x 2 =	70
FAC species	115	x 3 =	345
FACU species	26	x 4 =	104
UPL species	0	x 5 =	0
Column totals	176 (A)		519 (B)

Prevalence Index = B/A = 2.95

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Vegetation in the sample location meets the hydrophytic vegetation criterion.

SOIL

Sampling Point: A-U0

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-3	10YR 2/2	100					Silt loam	
3-12	10YR 3/2	70					Silt loam	
	10YR 3/4	30					Silt loam	
12-16	10YR 3/2	100					Silt loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ SandyRedox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric soil present? N

Remarks:
No hydric soil indicators found. Plastic found at 10" in pit, glass fragments in pit faces indicate past filling.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor(C4)
___ Oxidized Rhisospheres Along Living Roots (C3)
___ Presence of Resuced Iron (C4)
___ Recent Iron Reduction in Thin Soils (C6)
___ Stunted or Stressed Plants (D1)(**LRRA**)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquatard (D3)
___ FAC-Neutral Test (D5)
___ Raied Ant Mounds (D6)(**LRR A**)
___ Frost Heave Hummocks (D7)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):	

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No indicators of wetland hydrology found in pit. Nearby ditch was also investigated, soils similar, no hydrology in that pit to 20+ inches.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: John's Wrecking Yard | City/County: Tumwater/Thurston | Sampling Date: 6-10-14
Applicant/Owner: Alan Wertjes | State: WA | Sampling Point: A-U1
Investigator(s): P. Togher, K. Snyder | Section, Township, Range: S. 23, T 17N, R2W
Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): Flat | Slope (%): <5%
Subregion (LRR): A | Lat: 46.95023605 | Long: -122.9010812 | Datum: WGS 83
Soil Map Unit Name: Nisqually loamy fine sand (Vitrandic Xerumbrepts) | NWI Classification: upland

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS
(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y			
Hydric soil present?	N		Is the sampled area within a wetland?	N
Indicators of wetland hydrology present?	N		If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)
Plot is located near A-KS 9, on terrace above wetland A. Wetland vegetation was present (primarily rooted in the wetland), but hydric soils and wetland hydrology were absent.

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 10 meter)			
1 *Salix sitchensis*	35	Y	FACW
2 *Populus balsamifera*	15	Y	FAC
3			
4			
5			
	50	= Total Cover	
Sapling/Shrub stratum (Plot size: 5 meters)			
1 *Cytisus scoparius*	15	Y	NI
2 *Rosa pisocarpa*	5	Y	FAC
3			
4			
5			
	20	= Total Cover	
Herb stratum (Plot size: 1 meter)			
1 *Phalaris arundinacea*	100	Y	FACW
2			
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	
Woody vine stratum (Plot size: 5 meters)			
1 *Rubus armeniacus*	10	Y	FACU
2			
	10	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC:	4	(A)
Total Number of Dominant Species Across all Strata:	6	(B)
Percent of Dominant Species that are OBL, FACW, or FAC:	66.67%	(A/B)

Prevalence Index Worksheet

Total % Cover of:			
OBL species	0	x 1 =	0
FACW species	135	x 2 =	270
FAC species	20	x 3 =	60
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column totals	165 (A)		370 (B)

Prevalence Index = B/A = 2.24

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)
Vegetation in the sample location meets the hydrophytic vegetation criterion.

SOIL

Sampling Point: A-U1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-6	10YR 2/2	100					Silt loam	
6-16	10YR 3/2	100					Silt loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ SandyRedox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric soil present? N

Remarks:
No hydric soil indicators found. Plastic bag found at 12" in pit indicative of past filling.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor(C4)
___ Oxidized Rhisospheres Along Living Roots (C3)
___ Presence of Resuced Iron (C4)
___ Recent Iron Reduction in Thin Soils (C6)
___ Stunted or Stressed Plants (D1)(**LRRA**)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquatard (D3)
___ FAC-Neutral Test (D5)
___ Raied Ant Mounds (D6)(**LRR A**)
___ Frost Heave Hummocks (D7)

Field Observations:

Surface water present?	Yes ___	No	X	Depth (inches):	___
Water table present?	Yes ___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes ___	No	X	Depth (inches):	___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No indicators of wetland hydrology found in pit.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site John's Wrecking Yard City/County: Tumwater/Thurston Sampling Date: 6-10-14
Applicant/Owner: Alan Wertjes State: WA Sampling Point: A-W1
Investigator(s): P. Togher, K. Snyder Section, Township, Range: S. 23, T 17N, R2W
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Flat Slope (%) <5%
Subregion (LRR A Lat: 46.9502361 Long: -122.9010812 Datum: WGS 83
Soil Map Unit Name Norma fine sandy loam (Aquandic Humaquepts) NWI Classification: PFO
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y		
Hydric soil present?	Y	**Is the sampled area within a wetland?**	Y
Indicators of wetland hydrology present?	Y	f yes, optional wetland site ID:	A

Remarks: (Explain alternative procedures here or in a separate report.)
Plot is located near A-KS 9 in wetland A. All three criteria present - the sample location is in a wetland.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 10 meter)	Absolute % Cover	Dominant Species	Indicator Staus
1 *Salix sitchensis*	100	Y	FACW
2 *Populus balsamifera*	10	N	FAC
3			
4			
5			
	110	= Total Cover	
Sapling/Shrub stratum (Plot size: 5 meters)			
1 *Rosa pisocarpa*	10	Y	FAC
2			
3			
4			
5			
	10	= Total Cover	
Herb stratum (Plot size: 1 meter)			
1 *Phalaris arundinacea*	25	Y	FACW
2 *Galium aparine*	5	N	FACU
3			
4			
5			
6			
7			
8			
9			
10			
	30	= Total Cover	
Woody vine stratum (Plot size: 5 meters)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across all Strata: 3 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:			
OBL species	0	x 1 =	0
FACW species	125	x 2 =	250
FAC species	20	x 3 =	60
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column totals	150 (A)		330 (B)

Prevalence Index = B/A = 2.20

Hydrophytic Vegetation Indicators:

__ Rapid test for hydrophytic vegetation
X Dominance test is >50%
X Prevalence index is ≤3.0*
__ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
__ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)
Vegetation in the sample location meets the hydrophytic vegetation criterion.

SOIL

Sampling Point: A-W1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
+2-0	-	100					Duff	
0-9	10YR 3/1	100					Sandy loam	
9-18	10YR 2/1	100					Silt loam	
18-20+	2.5Y 4/2	70	10YR 3/1	20			Silt loam	Mixing of overlying horizon
			10YR 3/3	10	C	M	Silt loam	Saturated

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ SandyRedox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric soil present? Y

Remarks:
Observed soils appear to meet the definition of thick dark surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery
- X Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor(C4)
- ___ Oxidized Rhisospheres Along Living Roots (C3)
- ___ Presence of Resuced Iron (C4)
- ___ Recent Iron Reduction in Thin Soils (C6)
- ___ Stunted or Stressed Plants (D1)(**LRRA**)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquatard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raied Ant Mounds (D6)(**LRR A**)
- ___ Frost Heave Hummocks (D7)

Field Observations:

	Yes		No		Depth (inches):
Surface water present?	Yes		No	X	
Water table present?	Yes		No	X	
Saturation present? (includes capillary fringe)	Yes	X	No		~18

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Primary indicators of wetland hydrology found at sample location.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site John's Wrecking Yard — City/County: Tumwater/Thurston — Sampling Date: 6-10-14

Applicant/Owner: Alan Wertjes — State: WA — Sampling Point: A-U2

Investigator(s): P. Togher, K. Snyder — Section, Township, Range: S. 23, T 17N, R2W

Landform (hillslope, terrace, etc.): slope — Local relief (concave, convex, none): convex — Slope (%) <5%

Subregion (LRR A — Lat: 46.95013114 — Long: -122.9014363 — Datum: WGS 83

Soil Map Unit Name Nisqually loamy fine sand (Vitrandic Xerumbrepts) — NWI Classification: PEM

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____ , soil ____ , or hydrology ____ significantly disturbed?

Are vegetation ____ , soil ____ , or hydrology ____ naturally problematic? Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y		
Hydric soil present?	N	**Is the sampled area within a wetland?**	N
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Plot is located near A-KS 5 and 6 in wetland A. Wetland vegetation was present, but hydric soils and wetland hydrology were not. The sample location is not within a wetland.

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 10 meter)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 5 meters)			
1 *Cytisus scoparius*	15	Y	NI
2			
3			
4			
5			
	15	= Total Cover	
Herb stratum (Plot size: 1 meter)			
1 *Phalaris arundinacea*	60	Y	FACW
2 *Holcus lanatus*	30	Y	FAC
3 *Equisetum telmateia*	20	N	FACW
4 *Lotus corniculatus*	15	N	FAC
5 *Anthoxanthum odoratum*	10	N	FAC
6 *Poa annua*	10	N	FACU
7			
8			
9			
10			
	145	= Total Cover	
Woody vine stratum (Plot size: 5 meters)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across all Strata:	3	(B)
Percent of Dominant Species that are OBL, FACW, or FAC:	66.67%	(A/B)

Prevalence Index Worksheet

Total % Cover of:			
OBL species	0	x 1 =	0
FACW species	80	x 2 =	160
FAC species	55	x 3 =	165
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column totals	145 (A)		365 (B)

Prevalence Index = B/A = 2.52

Hydrophytic Vegetation Indicators:

- __ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- __ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- __ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Vegetation in the sample location meets the hydrophytic vegetation criterion.

SOIL

Sampling Point: A-U2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Redox Type*	Redox Loc**	Texture	Remarks
0-3	10YR 2/2	100					Sandy loam	Fill material
3-6	10YR 3/2	100					Sandy loam	
6-16	10YR 3/3	40					Sandy loam	
	10YR 3/1	20					Sandy loam	
	10YR 4/3	15					Sandy loam	
	10YR 4/1	10					Sandy loam	
	10YR 6/6	5						
	-	5						N2 Carbon/charcoal

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ SandyRedox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric soil present? N

Remarks:
Soils include a mix of low and high chroma materials, fill, carbon, and glass shards. Striations in the lower profile may represent overlapping fill events.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor(C4)
___ Oxidized Rhisospheres Along Living Roots (C3)
___ Presence of Resuced Iron (C4)
___ Recent Iron Reduction in Thin Soils (C6)
___ Stunted or Stressed Plants (D1)(**LRRA**)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquatard (D3)
___ FAC-Neutral Test (D5)
___ Raied Ant Mounds (D6)(**LRR A**)
___ Frost Heave Hummocks (D7)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):	

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No indicators of wetland hydrology were observed.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site John's Wrecking Yard City/County: Tumwater/Thurston Sampling Date: 6-10-14
Applicant/Owner: Alan Wertjes State: WA Sampling Point: A-W2
Investigator(s): P. Togher, K. Snyder Section, Township, Range: S. 23, T 17N, R2W
Landform (hillslope, terrace, etc.): slope Local relief (concave, convex, none): convex Slope (%) <5%
Subregion (LRR A Lat: 46.95011182 Long: -122.901337 Datum: WGS 83
Soil Map Unit Name Norma fine sandy loam (Aquandic Humaquepts) NWI Classification: PEM
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	Is the sampled area within a wetland?	Y
Hydric soil present?	Y	f yes, optional wetland site ID:	A
Indicators of wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)
Plot is located near A-KS 5 and 6 in wetland A. All three criteria present - the sample location is in a wetland.

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominan t Species	Indicator Staus
Tree Stratum (Plot size: 10 meter)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 5 meters)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 1 meter)			
1 *Phalaris arundinacea*	100	Y	FACW
2			
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	
Woody vine stratum (Plot size: 5 meters)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across all Strata:	1	(B)
Percent of Dominant Species that are OBL, FACW, or FAC:	100.00%	(A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0	
FACW species	100	x 2 =	200	
FAC species	0	x 3 =	0	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	100	(A)	200	(B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)
Vegetation in the sample location meets the hydrophytic vegetation criterion.

SOIL

Sampling Point: A-W2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(Inches)	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-9	10YR 2/2	100					Sandy loam	Fill material
9-16	10YR 3/2	95	10YR 3/4	5	C	PL	Sandy loam	
16-21+	10YR 2/2	90	10YR 3/4	10	C	PL	Sandy loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ SandyRedox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric soil present? Y

Remarks:
Redox features begin at approximately 9 inches from the surface. Observed soils appear to most closely approach the F6 indicator.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor(C4)
___ Oxidized Rhisospheres Along Living Roots (C3)
___ Presence of Resuced Iron (C4)
___ Recent Iron Reduction in Thin Soils (C6)
___ Stunted or Stressed Plants (D1)(**LRRA**)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
X Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
X Geomorphic Position (D2)
___ Shallow Aquatard (D3)
X FAC-Neutral Test (D5)
___ Raied Ant Mounds (D6)(**LRR A**)
___ Frost Heave Hummocks (D7)

Field Observations:

	Yes	No	Depth (inches):
Surface water present?		X	
Water table present?		X	
Saturation present? (includes capillary fringe)		X	

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Wetland hydrology assumed based on the presence of secondary indicators. The data plot is located in a marginal area connecting two more clearly defined wetland communities.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site John's Wrecking Yard   City/County: Tumwater/Thurston   Sampling Date: 6-10-14
Applicant/Owner: Alan Wertjes   State: WA   Sampling Point: B-U1
Investigator(s): P. Togher, K. Snyder   Section, Township, Range: S. 23, T 17N, R2W
Landform (hillslope, terrace, etc.): Terrace   Local relief (concave, convex, none): convex   Slope (%) <5%
Subregion (LRR A   Lat: 46.95029348   Long: -122.900293   Datum: WGS 83
Soil Map Unit Name Norma fine sandy loam (Aquandic Humaquepts)   NWI Classification: Upland
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?
Are vegetation ____, soil ____, or hydrology ____ naturally problematic?   Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y		
Hydric soil present?	N	**Is the sampled area within a wetland?**	N
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID	

Remarks: (Explain alternative procedures here or in a separate report.)
Plot is located upslope and east of shallow depression near flags B PT 6 and 7. Wetland vegetation was present, but hydric sols and wetland hydrology were absent. The sample location is not within a wetland.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 10 meter)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 5 meters)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 1 meter)			
1 *Lotus corniculatus*	50	Y	FAC
2 *Agrostis capillaris*	10	N	FAC
3 *Trifolium repens*	1	N	FACU
4			
5			
6			
7			
8			
9			
10			
	61	= Total Cover	
Woody vine stratum (Plot size: 5 meters)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across all Strata: 1 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	60	x 3 =	180
FACU species	1	x 4 =	4
UPL species	0	x 5 =	0
Column totals	61 (A)		184 (B)

Prevalence Index = B/A = 3.02

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)
Species present in the sample location meets the hydrophytic vegetation criterion.

SOIL

Sampling Point: B-U1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-5	10YR 4/1	100					Very gravelly silt loam	Compacted fill
5-10	10YR 3/2	100					Very gravelly silt loam	Compacted fill
10+								Shovel refused

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ SandyRedox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: Compacted layer
Depth (inches): Surface

Hydric soil present? N

Remarks:
Soil is extremely compacted and likely composed primarily of fill materials. Rootlets present but no roots. No redox features apparent, prominent ones not obvious.

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor(C4)
___ Oxidized Rhisospheres Along Living Roots (C3)
___ Presence of Resuced Iron (C4)
___ Recent Iron Reduction in Thin Soils (C6)
___ Stunted or Stressed Plants (D1)(**LRRA**)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquatard (D3)
___ FAC-Neutral Test (D5)
___ Raied Ant Mounds (D6)(**LRR A**)
___ Frost Heave Hummocks (D7)

Field Observations:

	Yes		No		Depth (inches):
Surface water present?	Yes		No	X	
Water table present?	Yes		No	X	
Saturation present? (includes capillary fringe)	Yes		No	X	

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No indicators of wetland hydrology were observed.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site John's Wrecking Yard | City/County: Tumwater/Thurston | Sampling Date: 6-10-14

Applicant/Owner: Alan Wertjes | State: WA | Sampling Point: B-W1

Investigator(s): P. Togher, K. Snyder | Section, Township, Range: S. 23, T 17N, R2W

Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): concave | Slope (%) <5%

Subregion (LRR A | Lat: 46.95029348 | Long: -122.900293 | Datum: WGS 83

Soil Map Unit Name Norma fine sandy loam (Aquandic Humaquepts) | NWI Classification: PEM

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	f yes, optional wetland site ID:	B

Remarks: (Explain alternative procedures here or in a separate report.)

Plot is located in a shallow depression near flags B PT 6 and 7. All three wetland criteria are present. The sample location is within a wetland, but likely man induced due to roadway compaction.

Tree Stratum (Plot size: 10 meter)	Absolute % Cover	Dominan t Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 5 meters)			
1 *Populus balsamifera*	10	Y	FAC
2			
3			
4			
5			
	10	= Total Cover	
Herb stratum (Plot size: 1 meter)			
1 *Stellaria media*	70	Y	FACU
2 *Juncus acuminatus*	15	N	OBL
3 *Phalaris arundinacea*	1	N	FACW
4 *Juncus effusus*	1	N	FACW
5			
6			
7			
8			
9			
10			
	87	= Total Cover	
Woody vine stratum (Plot size: 5 meters)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:			
OBL species	15	x 1 =	15
FACW species	2	x 2 =	4
FAC species	10	x 3 =	30
FACU species	70	x 4 =	280
UPL species	0	x 5 =	0
Column totals	97	(A)	329 (B)

Prevalence Index = B/A = 3.39

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Chickweed is recent growth and appears to be seasonal. Other vegetation in the sample location meets the hydrophytic vegetation criterion.

SOIL

Sampling Point: B-W1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-9	10YR 3/1	100					Ex gravelly silt loam	Fill material
9-12	10YR 3/2	80	10YR 4/4	10	C	M	V. gravelly silt loam	
			10YR 4/1	10	C	M		
12-13	2/5Y 3/1	100					Silt loam	
13+								Shovel refused

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ SandyRedox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: Compacted layer

Depth (inches): Surface

Hydric soil present? Y

Remarks:

Textures estimated due to glass in profile. Hydric soils assumed based on visible indicators of surface inundation (cracked soils), and the presence of plant community dominated by species to hydric soil conditions. This soil is close to meeting the criteria for the redox dark surface (F6) indicator, lacking one inch of the B above 12 inches.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- X Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor(C4)
- ___ Oxidized Rhisospheres Along Living Roots (C3)
- ___ Presence of Resuced Iron (C4)
- ___ Recent Iron Reduction in Thin Soils (C6)
- ___ Stunted or Stressed Plants (D1)(**LRRA**)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquatard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raied Ant Mounds (D6)(**LRR A**)
- ___ Frost Heave Hummocks (D7)

Field Observations:

	Yes		No		Depth (inches):	
Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):	

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Primary indicators of wetland hydrology were observed. The sample location is within a wetland.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: John's Wrecking Yard City/County: Tumwater/Thurston Sampling Date: 6-10-14
Applicant/Owner: Alan Wertjes State: WA Sampling Point: C-U1
Investigator(s): P. Togher, K. Snyder Section, Township, Range: S. 23, T 17N, R2W
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): convex Slope (%): <5%
Subregion (LRR: A Lat: 46.94951371 Long: -122.9003055 Datum: WGS 83
Soil Map Unit Name: Tisch silt loam (Typic Endoaquands) NWI Classification: Upland
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? N	
Hydric soil present? N	**Is the sampled area within a wetland?** N
Indicators of wetland hydrology present? N	If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
Plot is located at the top of the slope north of Wetland C near flag C KS-1. All three criteria were absent. The sample location is not within a wetland.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 10 meter)			
1 *Pseudotsuga menziesii*	50	Y	FACU
2			
3			
4			
5			
	50	= Total Cover	
Sapling/Shrub stratum (Plot size: 5 meters)			
1 *Cytisus scoparius*	50	Y	NI
2			
3			
4			
5			
	50	= Total Cover	
Herb stratum (Plot size: 1 meter)			
1 *Pteridium aquilinum*	40	Y	FACU
2 *Lotus corniculatus*	10	N	FAC
3 *Agrostis capillaris*	1	N	FAC
4			
5			
6			
7			
8			
9			
10			
	51	= Total Cover	
Woody vine stratum (Plot size: 5 meters)			
1 *Rubus armeniacus*	20	Y	FACU
2 *Rubus ursinus*	5	Y	FAC
	25	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across all Strata: 5 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 20.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:			
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	16	x 3 =	48
FACU species	110	x 4 =	440
UPL species	0	x 5 =	0
Column totals	126 (A)		488 (B)

Prevalence Index = B/A = 3.87

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)
Vegetation in the sample location is domimated by uplands species.

SOIL **Sampling Point:** C-U1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(Inches)	Color (moist)	%	Color (moist)	%	Type*	Loc**	Texture	Remarks
0-3	10YR 2/2	100					V. gravelly sandy loam	Fill
3-13	10YR 3/2	100					V. gravelly sandy loam	Fill
13-15+	10YR 3/3	100					Sandy loam	Buried A horizon, moist

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ SandyRedox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: Compacted layer
Depth (inches): Surface

Hydric soil present? N

Remarks:
Colors are composite. The soil is composed primarily of fill materials - auto glass and small metal car parts found throughout the profile. The soils do not meet the hydric soils criterion.

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor(C4)
___ Oxidized Rhisospheres Along Living Roots (C3)
___ Presence of Resuced Iron (C4)
___ Recent Iron Reduction in Thin Soils (C6)
___ Stunted or Stressed Plants (D1)(**LRRA**)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquatard (D3)
___ FAC-Neutral Test (D5)
___ Raied Ant Mounds (D6)(**LRR A**)
___ Frost Heave Hummocks (D7)

Field Observations:
Surface water present? Yes ___ No X Depth (inches): ___
Water table present? Yes ___ No X Depth (inches): ___
Saturation present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No indicators of wetland hydrology were observed.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: John's Wrecking Yard | City/County: Tumwater/Thurston | Sampling Date: 6-10-14

Applicant/Owner: Alan Wertjes | State: WA | Sampling Point: C-W1

Investigator(s): P. Togher, K. Snyder | Section, Township, Range: S. 23, T 17N, R2W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): concave | Slope (%): <5%

Subregion (LRR): A | Lat: 46.94950969 | Long: -122.9003033 | Datum: WGS 83

Soil Map Unit Name: Tisch silt loam (Typic Endoaquands) | NWI Classification: PEM

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y		
Hydric soil present?	Y	**Is the sampled area within a wetland?**	Y
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	C

Remarks: (Explain alternative procedures here or in a separate report.)

Plot is located at the top of the slope north of Wetland C near flag C KS-1. All three criteria were present. The sample location is within a wetland.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 10 meter)			
1 *Pseudotsuga menziesii*	20	Y	FACU
2			
3			
4			
5			
	20	= Total Cover	
Sapling/Shrub stratum (Plot size: 5 meters)			
1 *Alnus rubra*	30	Y	FACW
2 *Spiraea douglasii*	20	Y	FACW
3			
4			
5			
	50	= Total Cover	
Herb stratum (Plot size: 1 meter)			
1 *Phalaris arundinacea*	90	Y	FACW
2 *Solanum dulcamara*	5	Y	FAC
3 *Veronica scutellata*	3	N	OBL
4 *Lemna minor*	1	N	OBL
5			
6			
7			
8			
9			
10			
	99	= Total Cover	
Woody vine stratum (Plot size: 5 meters)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC:	4	(A)
Total Number of Dominant Species Across all Strata:	5	(B)
Percent of Dominant Species that are OBL, FACW, or FAC:	80.00%	(A/B)

Prevalence Index Worksheet

Total % Cover of:				
OBL species	4	x 1 =	4	
FACW species	140	x 2 =	280	
FAC species	5	x 3 =	15	
FACU species	20	x 4 =	80	
UPL species	0	x 5 =	0	
Column totals	169	(A)	379	(B)

Prevalence Index = B/A = 2.24

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

PSME rooted outside of the wetland. Vegetation in the sample location is dominated by hydrophytes.

SOIL

Sampling Point: C-W1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(Inches)	Color (moist)	%	Color (moist)	%	Type*	Loc**	Texture	Remarks
0-9	10YR 2/2	100					V. gravelly silt loam	
9+								Shovel refused

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ SandyRedox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric soil present? Y

Remarks:
Soils are too saturated to sample effectively.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

X Surface Water (A1)
___ High Water Table (A2)
X Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor(C4)
___ Oxidized Rhisospheres Along Living Roots (C3)
___ Presence of Resuced Iron (C4)
___ Recent Iron Reduction in Thin Soils (C6)
___ Stunted or Stressed Plants (D1)(**LRRA**)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Water-Stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquatard (D3)
___ FAC-Neutral Test (D5)
___ Raied Ant Mounds (D6)(**LRR A**)
___ Frost Heave Hummocks (D7)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	1-4"
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Primary indicators of wetland hydrology were observed. The sample location is within a wetland.

APPENDIX D – WETLAND RATING FORMS

WETLAND RATING FORM – WESTERN WASHINGTON

Version 2 – Updated July 2006 to increase accuracy and reproducibility among users
Updated Oct. 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): A Date of site visit: 6-10-14

Rated by: P. Togher Trained by Ecology? Yes ☒ No ☐ Date of training: 5/2005

SEC: 23 TOWNSHP: 17N RNGE: 2W Is S/T/R in Appendix D? Yes ☐ No ☒

Map of wetland unit: Figure _____ Estimated size ~50 acres

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland: ☐ **I** ☒ **II** ☐ **III** ☐ **IV**

Category I =	Score > 70	Score for Water Quality Functions	**14D/20R**
Category II =	Score 51 - 69	Score for Hydrologic Functions	**16D/26R**
Category III =	Score 30 – 50	Score for Habitat Functions	**18**
Category IV =	Score < 30	TOTAL Score for Functions	**48D/64R**

Category based on SPECIAL CHARACTERISTCS of Wetland ☐ **I** ☐ **II** ☐ **Does not apply**

Final Category (choose the "highest" category from above") **II**

Summary of basic information about the wetland unit.

Wetland Unit has Special Characteristics		**Wetland HGM Class used for Rating**	
Estuarine	☐	**Depressional**	☒
Natural Heritage Wetland	☐	**Riverine**	☒
Bog	☐	**Lake-fringe**	☐
Mature Forest	☐	**Slope**	☐
Old Growth Forest	☐	**Flats**	☐
Coastal Lagoon	☐	**Freshwater Tidal**	☐
Interdunal	☐		☐
None of the above	☒	Check if unit has multiple HGM classes present	☒

Does the wetland being rated meet any of the criteria below? If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands that Need Additional Protection (in addition to the protection recommended for its category)	**YES**	**NO**
SP1. *Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered **animal or plant** species (T/E species)?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database.	☐	☒
SP2. *Has the wetland unit been documented as habitat for any State listed Threatened or Endangered **animal** species?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category 1 Natural Heritage Wetlands (see p. 19 of data form).	☐	☒
SP3. *Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?*	☒	☐
SP4. *Does the wetland unit have a local significance in addition to its functions?* For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.	☐	☒

<u>To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.</u>

The hydrogeomorphic classification groups wetlands in to those that function in similar ways. This simplifies the questions needed to answer how well the wetland functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.

Wetland name or number A

Classification of Vegetated Wetlands for Western Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides (i.e. except during floods)?
   ☒ NO – go to 2 ☐ **YES** – the wetland class is **Tidal Fringe**
   If yes, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?
   ☐ **YES – Freshwater Tidal Fringe** ☐ **NO – Saltwater Tidal Fringe (Estuarine)**
   If your wetland can be classified as a Freshwater Tidal Fringe use the forms for ***Riverine*** *wetlands. If it is a Saltwater Tidal Fringe it is rated as an* ***Estuarine*** *wetland.* Wetlands that were call estuarine in the first and second editions of the rating system are called Salt Water Tidal Fringe in the Hydrogeomorphic Classification. Estuarine wetlands were categorized separately in the earlier editions, and this separation is being kept in this revision. To maintain consistency between editions, the term "Estuarine" wetland is kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p. ______).

2. The entire wetland unit is flat and precipitation is only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.
   ☒ NO – go to 3 ☐ **YES** – The wetland class is **Flats**
   If your wetland can be classified as a "Flats" wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland meet both of the following criteria?
   ☐ The vegetated part of the wetland is on the shores of a body of permanent open water (without any vegetation on the surface) where at least 20 acres (8ha) in size;
   ☐ At least 30% of the open water area is deeper than 6.6 (2 m)?
   ☒ NO – go to 4 ☐ **YES** – The wetland class is **Lake-fringe (Lacustrine Fringe)**

4. Does the entire wetland meet all of the following criteria?
   ☒ The wetland is on a slope *(slope can be very gradual)*.
   ☒ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
   ☐ The water leaves the wetland **without being impounded**?
   NOTE: *Surface water does not pond in these types of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).*
   ☒ NO – go to 5 ☐ **YES** – The wetland class is **Slope**

5. Does the entire wetland meet all of the following criteria?
   ☒ The unit is in a valley or stream channel where it gets inundated by overbank flooding from that stream or river.
   ☒ The overbank flooding occurs at least once every two years.
   NOTE: *The riverine unit can contain depressions that are filled with water when the river is not flooding..*
   ☐ NO – go to 6 ☒ **YES** – The wetland class is **Riverine**

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time of the year. This means that any outlet, if present is higher than the interior of the wetland.
   ☐ NO – go to 7 ☒ **YES** – The wetland class is **Depressional**

7. Is the entire wetland located in a very flat area with no obvious depression and no overbank flooding. The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.
   ☐ No – go to 8 ☐ **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit, classify the wetland using the class that represents more than 90% of the total area.

HGM Classes within the wetland unit being rated	*HGM Class to Use in Rating*
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine along stream within boundary	Depressional
Depressional + Lake-fringe	Depressional
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE under wetlands with special characteristics

If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

D	Depressional and Flat Wetlands	Points (only 1 score per box)
	WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.	
D 1	**Does the wetland have the potential to improve water quality?**	*(see p.38)*
	D 1.1 Characteristics of surface water flows out of the wetland: • Unit is a depression with no surface water leaving it (no outlet) .... points = 3 ☐ • Unit has an intermittently flowing, OR highly constricted, permanently flowing outlet ... points = 2 ☒ • Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) .. points = 1 ☐ • Unit is a "flat" depression (Q.7 on key), or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch .... points = 1 ☐ *(If ditch is not permanently flowing treat unit as "intermittently flowing")* **Provide photo or drawing**	**Figure** ☐ **2**
	D 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic (*use NRCS definitions*) YES points = 4 NO points = 0	0
	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class): • Wetland has persistent, ungrazed vegetation > = 95% of area .... points = 5 ☒ • Wetland has persistent, ungrazed vegetation > = 1/2 of area .... points = 3 ☐ • Wetland has persistent, ungrazed vegetation > = 1/10 of area .... points = 1 ☐ • Wetland has persistent, ungrazed vegetation < 1/10 of area .... points = 0 ☐ **Map of Cowardin vegetation classes**	**Figure** ☐ **5**
	D 1.4 Characteristics of seasonal ponding or inundation: *This is the area of the wetland that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 years.* • Area seasonally ponded is > 1/2 total area of wetland .... points = 4 ☐ • Area seasonally ponded is > 1/4 total area of wetland .... points = 2 ☐ • Area seasonally ponded is < 1/4 total area of wetland .... points = 0 ☒ **Map of Hydroperiods**	**Figure** ☐ **0**
	Total for D 1 *Add the points in the boxes above*	7
D 2	**Does the wetland have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* ☐ Grazing in the wetland or within 150 ft ☐ Untreated stormwater discharges to wetland ☐ Tilled fields or orchards within 150 ft. of wetland ☐ A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging ☐ Residential, urban areas, golf courses are within 150 ft. of wetland ☐ Wetland is fed by groundwater high in phosphorus or nitrogen ☒ Other Former industrial area ☒ YES multiplier is 2 ☐ NO multiplier is 1	*(see p. 44)* Multiplier 2
◆	**TOTAL – Water Quality Functions** Multiply the score from D1 by D2; then ***add score to table on p. 1***	**14**
	HYDROLOGIC FUNCTIONS – Indicators that wetland unit functions to reduce flooding and stream degradation.	
D 3	**Does the wetland have the potential to reduce flooding and erosion?**	*(see p.46)*
	D 3.1 Characteristics of surface water flows out of the wetland unit • Unit is a depression with no surface water leaving it (no outlet) .... points = 4 ☐ • Unit has an intermittently flowing, OR highly constricted permanently flowing outlet .... points = 2 ☒ • Unit is a "flat" depression (Q.7 on key) or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch .... points = 1 ☐ *(If ditch is not permanently flowing treat unit as "intermittently flowing")* • Unit has an unconstricted, or slightly constricted, surface outlet *(permanently flowing)* .... points = 0	2
	D 3.2 Depth of storage during wet periods. *Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).* • Marks of ponding are 3 ft. or more above the surface or bottom of the outlet .... points = 7 ☐ • The wetland is a "headwater" wetland .... points = 5 ☐ • Marks of ponding between 2 ft. to < 3 ft. from surface or bottom of outlet .... points = 5 ☐ • Marks are at least 0.5 ft. to < 2 ft. from surface or bottom of outlet .... points = 3 ☒ • Wetland is flat (yes to Q.2 or Q.7 on key) but has small depressions on the surface that trap water .points = 1 ☐ • Marks of ponding less than 0.5 ft .... points = 0 ☐	3
	D 3.3 Contribution of wetland unit to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* • The area of the basin is less than 10 times the area of unit .... points = 5 ☐ • The area of the basin is 10 to 100 times the area of the unit .... points = 3 ☒ • The area of the basin is more than 100 times the area of the unit .... points = 0 ☐ • Entire unit is in the FLATS class .... points = 5 ☐	3
	Total for D 3 *Add the points in the boxes above*	8

D 4	**Does the wetland have the opportunity to reduce flooding and erosion?** Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. *Note which of the following indicators of opportunity apply.* ☐ Wetland is in a headwater of a river or stream that has flooding problems. ☒ Wetland drains to a river or stream that has flooding problems ☐ Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems ☐ Other ______ ☐ YES multiplier is 2 ☐ NO multiplier is 1	*(see p. 49)* Multiplier 2
◆	**TOTAL – Hydrologic Functions** Multiply the score from D3 by D4; then ***add score to table on p. 1***	**16**

Comments: 16

R	Riverine and Freshwater Tidal Fringe Wetlands	Points
	WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.	(only 1 score per box)
R 1	**Does the wetland have the potential to improve water quality?** *(see p.52)*	
	R 1.1 Area of surface depressions within the riverine wetland that can trap sediments during a flooding event: • Depressions cover > 3/4 area of wetland .... points = 8 ☐ • Depressions cover > 1/2 area of wetland .... points = 4 ☐ **(If depressions > 1/2 of area of unit draw polygons on aerial photo or map)** • Depressions present but cover < 1/2 area of wetland. .... points = 2 ☒ • No depressions present .... points = 0 ☐	**Figure ☐** **2**
	R 1.2 Characteristics of the vegetation in the unit (areas with >90% cover at person height): • Trees or shrubs > 2/3 area of the unit .... points = 8 ☒ • Trees or shrubs > 1/3 area of the wetland .... points = 6 ☐ • Ungrazed, herbaceous plants > 2/3 area of unit .... points = 6 ☐ • Ungrazed herbaceous plants > 1/3 area of unit .... points = 3 ☐ • Trees, shrubs, and ungrazed herbaceous < 1/3 area of unit .... points = 0 ☐ **Aerial photo or map showing polygons of different vegetation types**	**Figure ☐** **8**
	Add the points in the boxes above	**10**
R 2	**Does the wetland have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* ☐ Grazing in the wetland or within 150 ft ☐ Untreated stormwater discharges to wetland ☐ Tilled fields or orchards within 150 ft. of wetland ☐ A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging ☐ Residential, urban areas, golf courses are within 150 ft. of wetland ☐ The river or stream linked to the wetland has a contributing basin where human activities have raised levels of sediment, toxic compounds or nutrients in the river water above standards for water quality. ☒ Other _____ YES multiplier is 2 NO multiplier is 1	*(see p. 53)* Multiplier 2
◆	**TOTAL – Water Quality Functions** Multiply the score from R1 by R2; then ***add score to table on p. 1***	**20**
	HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce flooding and stream erosion.	
R 3	**Does the wetland have the potential to reduce flooding and erosion?**	*(see p.54)*
	R 3.1 Characteristics of the overbank storage the wetland provides: *Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of unit) / (average width of stream between banks).* • If the ratio is more than 20 .... points = 9 ☐ • If the ratio is between 10 – 20 .... points = 6 ☒ • If the ratio is 5- <10 .... points = 4 ☐ • If the ratio is 1- <5 .... points = 2 ☐ • If the ratio is < 1 .... points = 1 ☐ **Aerial photo or map showing average widths**	**Figure ☐** **6**
	R 3.2 Characteristics of vegetation that slow down water velocities during floods: *Treat large woody debris as "forest or shrub". Choose the points appropriate for the best description. (polygons need to have >90% cover at person height NOT Cowardin classes):* • Forest or shrub for > 1/3 area OR herbaceous plants > 2/3 area .... points = 7 ☒ • Forest or shrub for > 1/10 area OR herbaceous plants > 1/3 area .... points = 4 ☐ • Vegetation does not meet above criteria .... points = 0 ☐ **Aerial photo or map showing polygons of different vegetation types**	**Figure ☐** **7**
	Add the points in the boxes above	**13**
R 4	**Does the wetland have the opportunity to reduce flooding and erosion?** Answer YES if the wetland is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. *Note which of the following conditions apply.* ☒ There are human structures and activities downstream (roads, buildings, bridges, farms) that can be damaged by flooding. ☐ There are natural resources downstream (e.g. salmon redds) that can be damaged by flooding ☐ Other _____ *(Answer NO if the major source of water to the wetland is controlled by a reservoir or the wetland is tidal fringe along the sides of a dike)* ☒ YES multiplier is 2 ☐ NO multiplier is 1	*(see p.57)* Multiplier 2
◆	**TOTAL – Hydrologic Functions** Multiply the score from R3 by R4; then ***add score to table on p. 1***	**26**

Comments: _____

These questions apply to wetlands of all HGM classes.		**Points**
	HABITAT FUNCTIONS – Indicators that wetland functions to provide important habitat.	(only 1 score per box)
H 1	**Does the wetland have the potential to provide habitat for many species?**	

H 1.1 Vegetation structure *(see P. 72)*:

Check the types of vegetation classes present (as defined by Cowardin) – Size threshold for each class is 1/4 acre or more than 10% of the area if unit is smaller than 2.5 acres.

☐ Aquatic Bed
☒ Emergent plants
☒ Scrub/shrub (areas where shrubs have > 30% cover)
☒ Forested (areas where trees have > 30% cover)

If the unit has a forested class check if:

☒ The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon.

Add the number of vegetation types that qualify. If you have: **Map of Cowardin vegetation classes**

4 structures or more .... points = 4 ☐ 3 structures .... points = 2 ☒
2 structures .... points = 1 ☐ 1 structure .... points = 0 ☐

Figure ☐ — **2**

H 1.2 Hydroperiods *(see p.73)*:

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or 1/4 acre to count (see text for descriptions of hydroperiods).

☒ Permanently flooded or inundated — 4 or more types present points = 3 ☒
☐ Seasonally flooded or inundated — 3 or more types present points = 2 ☐
☒ Occasionally flooded or inundated — 2 types present points = 1 ☐
☒ Saturated only — 1 type present points = 0 ☐
☒ Permanently flowing stream or river in, or adjacent to, the wetland
☐ Seasonally flowing stream in, or adjacent to, the wetland
☐ **Lake-fringe wetland .... = 2 points**
☐ **Freshwater tidal wetland .... = 2 points** **Map of hydroperiods**

Figure ☐ — **3**

H 1.3 Richness of Plant Species *(see p. 75)*:

Count the number of plant species in the wetland that cover at least 10 ft^2 *(different patches of the same species can be combined to meet the size threshold)*

You do not have to name the species. Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle. If you counted:

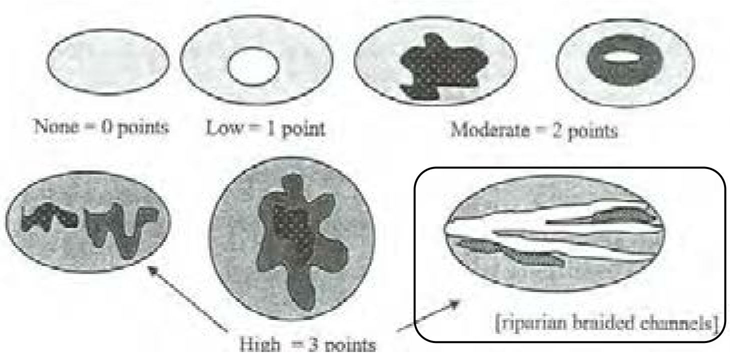
> 19 species .... points = 2 ☐
5 – 19 species.................... points = 1 ☒
< 5 species .... points = 0 ☐

List species below if you want to:

1

H 1.4 Interspersion of Habitats *(see p. 76)*:

Decided from the diagrams below whether interspersion between Cowardin vegetation (described in H1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.



Note: If you have 4 or more classes or 3 vegetation classes and open water, the rating is always "high".

Use map of Cowardin classes.

Figure ☐ — **3**

H 1.5 Special Habitat Features *(see p. 77)*:

Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.

☒ Large, downed, woody debris within the wetland (> 4 in. diameter and 6 ft. long)
☒ Standing snags (diameter at the bottom > 4 inches) in the wetland
☐ Undercut banks are present for at least 6.6 ft. (2m) and/or overhanging vegetation extends at least 3.3 ft. (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft. (10m)
☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey/brown)*
☐ At least 1/4 acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)*
☐ Invasive plants cover less than 25% of the wetland area in each stratum of plants
NOTE: The 20% stated in early printings of the manual on page 78 is an error.

2

H 1 TOTAL Score – potential for providing habitat *Add the points in the column above* **11**

H 2	Does the wetland have the opportunity to provide habitat for many species?	(only 1 score per box)
	H 2.1 Buffers *(see P. 80)*: *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed".* ☐ 100m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference. No structures are within the undisturbed part of buffer (relatively undisturbed also means no grazing, no landscaping, no daily human use)............ **points = 5** ☐ 100m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference .... **points = 4** ☐ 50m (170 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% circumference .... **points = 4** ☐ 100m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference .... **points = 3** ☐ 50m (170 ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference .... **points = 3** **If buffer does not meet any of the criteria above:** ☐ No paved areas (except paved trails) or buildings within 25m (80 ft) of wetland > 95% circumference. Light to moderate grazing or lawns are OK .... **points = 2** ☒ No paved areas of buildings within 50m of wetland for > 50% circumference. Light to moderate grazing or lawns are OK .... **points = 2** ☐ Heavy grazing in buffer .... **points = 1** ☐ Vegetated buffers are < 2m wide (6.6 ft) for more than 95% circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland) .... **points = 0** ☐ Buffer does not meet any of the criteria above .... **points = 1** **Arial photo showing buffers**	**Figure ☐** **2**
	H 2.2 Corridors and Connections *(see p. 81)* H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at least a 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? *(Dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor).* ☐ YES = **4 points** (go to H 2.3) ☒ NO = go to H 2.2.2 H. 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50 ft. wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR a Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? ☐ YES = **2 points** (go to H 2.3) ☒ NO = go to H 2.2.3 H. 2.2.3 Is the wetland: • Within 5 mi (8km) of a brackish or salt water estuary OR • Within 3 miles of a large field or pasture (> 40 acres) OR • Within 1 mile of a lake greater than 20 acres? ☒ YES = 1 point ☐ NO = 0 points	1

Comments: _____

	H 2.3 Near or adjacent to other priority habitats listed by WDFW (see p. 82): *(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)* Which of the following priority habitats are within 330 ft. (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.* ☐ **Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acre). ☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report p. 152*). ☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock. ☐ **Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. **(**Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest. ☐ **Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158*). ☒ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. ☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161*). ☐ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources. ☐ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A).* ☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human. ☐ **Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft. ☐ **Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs. ☐ **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long. If wetland has **3 or more** priority habitats **= 4 points** If wetland has **2** priority habitats = **3 points** If wetland has **1** priority habitat **= 1 point** No habitats = 0 points Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)	1
	H 2.4 Wetland Landscape: *Choose the **one** description of the landscape around the wetland that best fits (see p. 84)* • There are at least 3 other wetlands within 1/2 mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development.... points = 5 ☐ • The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within 1/2 mile .... points = 5 ☐ • There are at least 3 other wetlands within 1/2 mile, BUT the connections between them are disturbed. .... points = 3 ☒ • The wetland fringe on a lake **with** disturbance and there are 3 other lake-fringe wetlands within 1/2 mile .... points = 3 ☐ • There is at least 1 wetland within 1/2 mile .... points = 2 ☐ • There are no wetlands within 1/2 mile........ points = 0 ☐	3
	H 2 TOTAL Score – opportunity for providing habitat *Add the scores from H2.1, H2.2, H2.3, H2.4*	7
	TOTAL for H 1 from page 8	11
◆	**Total Score for Habitat Functions** Add the points for H 1 and H 2; then ***record the result on p. 1***	**18**

Comments: _____

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Please determine if the wetland meets the attributes described below and circle the appropriate answers and Category.

Wetland Type – *Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.*

SC1 **Estuarine wetlands?** *(see p.86)*

Does the wetland unit meet the following criteria for Estuarine wetlands?

- ☐ The dominant water regime is tidal,
- ☐ Vegetated, and
- ☐ With a salinity greater than 0.5 ppt.

☐ YES = Go to SC 1.1 ☒ NO

SC 1.1 Is the wetland unit within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? ☐ YES = Category I ☐ NO = go to SC 1.2

Cat. 1 ☐

SC 1.2 Is the wetland at least 1 acre in size and meets at least two of the following conditions?

☐ YES = Category I ☐ NO = Category II

- ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. If the non-native *Spartina* spp,. are only species that cover more than 10% of the wetland, then the wetland should be given a dual rating (I/II). The area of Spartina would be rated a Category II while the relatively undisturbed upper marsh with native species would be a Category 1. Do not, however, exclude the area of Spartina in determining the size threshold of 1 acre.
- ☐ At least 3/4 of the landward edge of the wetland has a 100 ft. buffer of shrub, forest, or un-grazed or un-mowed grassland
- ☐ The wetland has at least 2 of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.

Cat. I ☐ **Cat. II** ☐ **Dual Rating I/II** ☐

SC2 **Natural Heritage Wetlands** *(see p. 87)*

Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species.

SC 2.1 Is the wetland being rated in a Section/Township/Range that contains a natural heritage wetland? *(This question is used to screen out most sites before you need to contact WNHP/DNR.)*

☒ S/T/R information from Appendix D ☐ or accessed from WNHP/DNR web site

☐ YES Contact WNHP/DNR (see p. 79) and go to SC 2.2 ☒ NO

SC 2.2 Has DNR identified the wetland as a high quality undisturbed wetland or as a site with state threatened or endangered plant species?

☐ YES = Category 1 ☐ NO not a Heritage Wetland

Cat I ☐

SC3 **Bogs** *(see p. 87)*

Does the wetland **(or any part of the unit)** meet both the criteria for soils and vegetation in bogs? Use the key below to identify if the wetland is a bog. ***If you answer yes you will still need to rate the wetland based on its function.***

1. Does the unit have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of soil profile? (See Appendix B for a field key to identify organic soils)? ☐ YES = go to question 3 ☒ NO = go to question 2
2. Does the wetland have organic soils, either peats or mucks that are less than 16 inches deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on a lake or pond? ☐ YES = go to question 3 ☒ NO = is not a bog for purpose of rating
3. Does the unit have more than 70% cover of mosses at ground level, AND other plants, if present, consist of the "bog" species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)?
   ☐ YES = Is a bog for purpose of rating ☐ NO = go to question 4
   NOTE: If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16" deep. If the pH is less than 5.0 and the "bog" plant species in Table 3 are present, the wetland is a bog.
4. Is the unit forested (> 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann's spruce, or western white pine. WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover *(> 30% coverage of the total shrub/herbaceous cove*r)?
   ☐ YES = Category I ☐ NO = Is not a bog for purpose of rating

Cat. I ☐

SC4	**Forested Wetlands** *(see p. 90)* Does the wetland have at least 1 acre of forest that meet one of these criteria for the Department of Fish and Wildlife's forests as priority habitats? *If you answer yes you will still need to rate the wetland based on its function.* ☐ **Old-growth forests**: (west of Cascade Crest) Stands of at least two three species forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20 trees/hectare) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 inches (81 cm or more). NOTE: The criterion for dbh is based on measurements for upland forests. Two-hundred year old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is and "OR" so old-growth forests do not necessarily have to have trees of this diameter. ☐ **Mature forests**: (west of the Cascade Crest) Stands where the largest trees are 80 – 200 years old OR have an average diameters (dbh) exceeding 21 inches (53 cm); crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth. ☐ YES = Category I ☒ NO = not a forested wetland with special characteristics	**Cat. I** ☐
SC5	**Wetlands in Coastal Lagoons** *(see p. 91)* Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? ☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks. ☐ The lagoon in which the wetland is located contains surface water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom.)* ☐ YES = Go to SC 5.1 ☒ NO not a wetland in a coastal lagoon SC 5.1 Does the wetland meet all of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing) and has less than 20% cover of invasive plant species (see list of invasive species on p. 74). ☐ At least 3/4 of the landward edge of the wetland has a 100 ft. buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland is larger than 1/10 acre (4350 square ft.) ☐ YES = Category I ☐ NO = Category II	**Cat. I** ☐ **Cat. II** ☐
SC6	**Interdunal Wetlands** *(see p. 93)* Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ☐ YES = Go to SC 6.1 ☒ NO not an interdunal wetland for rating ***If you answer yes you will still need to rate the wetland based on its functions.*** In practical terms that means the following geographic areas: • Long Beach Peninsula -- lands west of SR 103 • Grayland-Westport -- lands west of SR 105 • Ocean Shores-Copalis – lands west of SR 115 and SR 109 SC 6.1 Is the wetland one acre or larger, or is it in a mosaic of wetlands that is one acre or larger? ☐ YES = Category II ☐ NO = go to SC 6.2 SC 6.2 Is the wetland between 0.1 and 1 acre, or is it in a mosaic of wetlands that is between 0.1 and 1 acre? ☐ YES = Category III	**Cat. II** ☐ **Cat. III** ☐
◆	**Category of wetland based on Special Characteristics** *Choose the "highest" rating if wetland falls into several categories, and record on p. 1.* If you answered NO for all types enter "Not Applicable" on p. 1	**N/A**

Comments: _____

WETLAND RATING FORM – WESTERN WASHINGTON

Version 2 – Updated July 2006 to increase accuracy and reproducibility among users
Updated Oct. 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): B Date of site visit: 6-10-14

Rated by: P. Togher Trained by Ecology? Yes ☒ No ☐ Date of training: 5/2005

SEC: 23 TOWNSHP: 17N RNGE: 2W Is S/T/R in Appendix D? Yes ☐ No ☒

Map of wetland unit: Figure _____ Estimated size ~0.15 acres

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland: ☐ **I** ☐ **II** ☐ **III** ☒ **IV**

Category I =	Score > 70	Score for Water Quality Functions	**10**
Category II =	Score 51 - 69	Score for Hydrologic Functions	**4**
Category III =	Score 30 – 50	Score for Habitat Functions	**11**
Category IV =	Score < 30	TOTAL Score for Functions	**25**

Category based on SPECIAL CHARACTERISTCS of Wetland ☐ **I** ☐ **II** ☐ **Does not apply**

Final Category (choose the "highest" category from above") **IV**

Summary of basic information about the wetland unit.

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine	☐	**Depressional**	☒
Natural Heritage Wetland	☐	**Riverine**	☐
Bog	☐	**Lake-fringe**	☐
Mature Forest	☐	**Slope**	☐
Old Growth Forest	☐	**Flats**	☐
Coastal Lagoon	☐	**Freshwater Tidal**	☐
Interdunal	☐		☐
None of the above	☒	Check if unit has multiple HGM classes present	☐

Does the wetland being rated meet any of the criteria below? If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands that Need Additional Protection (in addition to the protection recommended for its category)	YES	NO
SP1. *Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered **animal or plant** species (T/E species)?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database.	☐	☒
SP2. *Has the wetland unit been documented as habitat for any State listed Threatened or Endangered **animal** species?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category 1 Natural Heritage Wetlands (see p. 19 of data form).	☐	☒
SP3. *Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?*	☐	☒
SP4. *Does the wetland unit have a local significance in addition to its functions?* For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.	☐	☒

To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.

The hydrogeomorphic classification groups wetlands in to those that function in similar ways. This simplifies the questions needed to answer how well the wetland functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.

Classification of Vegetated Wetlands for Western Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides (i.e. except during floods)?

   ☒ NO – go to 2 ☐ **YES** – the wetland class is **Tidal Fringe**

   If yes, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   ☐ **YES – Freshwater Tidal Fringe** ☐ **NO – Saltwater Tidal Fringe (Estuarine)**

   *If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is a Saltwater Tidal Fringe it is rated as an **Estuarine** wetland.* Wetlands that were call estuarine in the first and second editions of the rating system are called Salt Water Tidal Fringe in the Hydrogeomorphic Classification. Estuarine wetlands were categorized separately in the earlier editions, and this separation is being kept in this revision. To maintain consistency between editions, the term "Estuarine" wetland is kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p. ______).

2. The entire wetland unit is flat and precipitation is only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   ☒ NO – go to 3 ☐ **YES** – The wetland class is **Flats**

   If your wetland can be classified as a "Flats" wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland meet both of the following criteria?

   ☐ The vegetated part of the wetland is on the shores of a body of permanent open water (without any vegetation on the surface) where at least 20 acres (8ha) in size;

   ☐ At least 30% of the open water area is deeper than 6.6 (2 m)?

   ☒ NO – go to 4 ☐ **YES** – The wetland class is **Lake-fringe (Lacustrine Fringe)**

4. Does the entire wetland meet all of the following criteria?

   ☒ The wetland is on a slope *(slope can be very gradual)*.

   ☒ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.

   ☐ The water leaves the wetland **without being impounded**?

   NOTE: *Surface water does not pond in these types of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).*

   ☒ NO – go to 5 ☐ **YES** – The wetland class is **Slope**

5. Does the entire wetland meet all of the following criteria?

   ☒ The unit is in a valley or stream channel where it gets inundated by overbank flooding from that stream or river.

   ☒ The overbank flooding occurs at least once every two years.

   NOTE: *The riverine unit can contain depressions that are filled with water when the river is not flooding..*

   ☒ NO – go to 6 ☐ **YES** – The wetland class is **Riverine**

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time of the year. This means that any outlet, if present is higher than the interior of the wetland.

   ☐ NO – go to 7 ☒ **YES** – The wetland class is **Depressional**

7. Is the entire wetland located in a very flat area with no obvious depression and no overbank flooding. The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

   ☒ No – go to 8 ☐ **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit, classify the wetland using the class that represents more than 90% of the total area.

HGM Classes within the wetland unit being rated	*HGM Class to Use in Rating*
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine along stream within boundary	Depressional
Depressional + Lake-fringe	Depressional
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE under wetlands with special characteristics

If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

D	Depressional and Flat Wetlands	Points
	WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.	(only 1 score per box)
D 1	**Does the wetland have the <u>potential</u> to improve water quality?**	*(see p.38)*
	D 1.1 Characteristics of surface water flows out of the wetland: • Unit is a depression with no surface water leaving it (no outlet) .... points = 3 ☐ • Unit has an intermittently flowing, OR highly constricted, permanently flowing outlet ... points = 2 ☒ • Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) .. points = 1 ☐ • Unit is a "flat" depression (Q.7 on key), or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch .... points = 1 ☐ *(If ditch is not permanently flowing treat unit as "intermittently flowing")* **Provide photo or drawing**	**Figure** ☐ **2**
	D 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic (*use NRCS definitions*) YES points = 4 NO points = 0	0
	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class): • Wetland has persistent, ungrazed vegetation > = 95% of area .... points = 5 ☐ • Wetland has persistent, ungrazed vegetation > = 1/2 of area .... points = 3 ☐ • Wetland has persistent, ungrazed vegetation > = 1/10 of area .... points = 1 ☒ • Wetland has persistent, ungrazed vegetation < 1/10 of area .... points = 0 ☐ **Map of Cowardin vegetation classes**	**Figure** ☐ **1**
	D 1.4 Characteristics of seasonal ponding or inundation: *This is the area of the wetland that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 years.* • Area seasonally ponded is > 1/2 total area of wetland .... points = 4 ☐ • Area seasonally ponded is > 1/4 total area of wetland .... points = 2 ☒ • Area seasonally ponded is < 1/4 total area of wetland .... points = 0 ☐ **Map of Hydroperiods**	**Figure** ☐ **2**
	Total for D 1 *Add the points in the boxes above*	**5**
D 2	**Does the wetland have the <u>opportunity</u> to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* ☐ Grazing in the wetland or within 150 ft ☐ Untreated stormwater discharges to wetland ☐ Tilled fields or orchards within 150 ft. of wetland ☐ A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging ☐ Residential, urban areas, golf courses are within 150 ft. of wetland ☐ Wetland is fed by groundwater high in phosphorus or nitrogen ☒ Other <u>Former industrial area</u> ☒ YES multiplier is 2 ☐ NO multiplier is 1	*(see p. 44)* Multiplier 2
◆	**<u>TOTAL</u> – Water Quality Functions** Multiply the score from D1 by D2; then ***add score to table on p. 1***	**10**
	HYDROLOGIC FUNCTIONS – Indicators that wetland unit functions to reduce flooding and stream degradation.	
D 3	**Does the wetland have the <u>potential</u> to reduce flooding and erosion?**	*(see p.46)*
	D 3.1 Characteristics of surface water flows out of the wetland unit • Unit is a depression with no surface water leaving it (no outlet) .... points = 4 ☐ • Unit has an intermittently flowing, OR highly constricted permanently flowing outlet .... points = 2 ☒ • Unit is a "flat" depression (Q.7 on key) or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch .... points = 1 ☐ *(If ditch is not permanently flowing treat unit as "intermittently flowing")* • Unit has an unconstricted, or slightly constricted, surface outlet *(permanently flowing)* .... points = 0	2
	D 3.2 Depth of storage during wet periods. *Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).* • Marks of ponding are 3 ft. or more above the surface or bottom of the outlet .... points = 7 ☐ • The wetland is a "headwater" wetland........ points = 5 ☐ • Marks of ponding between 2 ft. to < 3 ft. from surface or bottom of outlet .... points = 5 ☐ • Marks are at least 0.5 ft. to < 2 ft. from surface or bottom of outlet .... points = 3 ☐ • Wetland is flat (yes to Q.2 or Q.7 on key) but has small depressions on the surface that trap water .points = 1 ☐ • Marks of ponding less than 0.5 ft .... points = 0 ☒	0
	D 3.3 Contribution of wetland unit to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* • The area of the basin is less than 10 times the area of unit .... points = 5 ☐ • The area of the basin is 10 to 100 times the area of the unit .... points = 3 ☐ • The area of the basin is more than 100 times the area of the unit .... points = 0 ☒ • Entire unit is in the FLATS class .... points = 5 ☐	0
	Total for D 3 *Add the points in the boxes above*	2

D 4	**Does the wetland have the opportunity to reduce flooding and erosion?** Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. *Note which of the following indicators of opportunity apply.* ☐ Wetland is in a headwater of a river or stream that has flooding problems. ☒ Wetland drains to a river or stream that has flooding problems ☐ Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems ☐ Other ______ ☐ YES multiplier is 2 ☐ NO multiplier is 1	*(see p. 49)* Multiplier 2
◆	**TOTAL – Hydrologic Functions** Multiply the score from D3 by D4; then ***add score to table on p. 1***	**4**

Comments: 16

These questions apply to wetlands of all HGM classes.	Points (only 1 score per box)
HABITAT FUNCTIONS – Indicators that wetland functions to provide important habitat.	

H 1 Does the wetland have the potential to provide habitat for many species?

H 1.1 Vegetation structure *(see P. 72)*: — **Figure ☐**

Check the types of vegetation classes present (as defined by Cowardin) – Size threshold for each class is 1/4 acre or more than 10% of the area if unit is smaller than 2.5 acres.

☐ Aquatic Bed
☒ Emergent plants
☐ Scrub/shrub (areas where shrubs have > 30% cover)
☐ Forested (areas where trees have > 30% cover)

If the unit has a forested class check if:

☐ The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon.

Add the number of vegetation types that qualify. If you have: **Map of Cowardin vegetation classes**

4 structures or more .... points = 4 ☐ 3 structures .... points = 2 ☐
2 structures .... points = 1 ☐ 1 structure .... points = 0 ☒

0

H 1.2 Hydroperiods *(see p.73)*: — **Figure ☐**

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or 1/4 acre to count (see text for descriptions of hydroperiods).

☐ Permanently flooded or inundated — 4 or more types present points = 3 ☐
☐ Seasonally flooded or inundated — 3 or more types present points = 2 ☐
☒ Occasionally flooded or inundated — 2 types present points = 1 ☒
☒ Saturated only — 1 type present points = 0 ☐
☐ Permanently flowing stream or river in, or adjacent to, the wetland
☐ Seasonally flowing stream in, or adjacent to, the wetland
☐ **Lake-fringe wetland .... = 2 points**
☐ **Freshwater tidal wetland .... = 2 points**

Map of hydroperiods

1

H 1.3 Richness of Plant Species *(see p. 75)*:

Count the number of plant species in the wetland that cover at least 10 ft^2 *(different patches of the same species can be combined to meet the size threshold)*

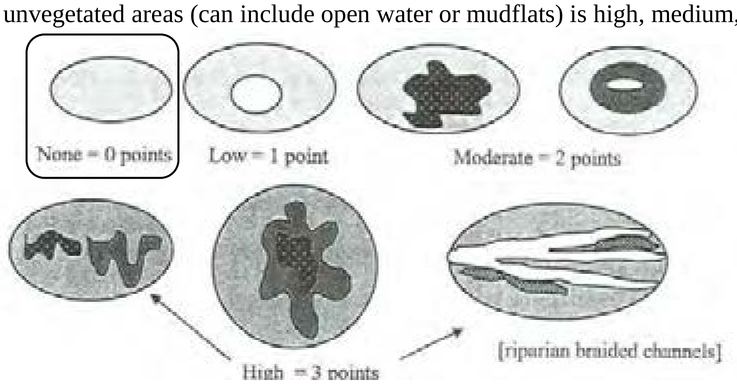
You do not have to name the species. Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle. If you counted:

> 19 species .... points = 2 ☐
5 – 19 species.................... points = 1 ☐
< 5 species .... points = 0 ☒

List species below if you want to:

H 1.4 Interspersion of Habitats *(see p. 76)*: — **Figure ☐**

Decided from the diagrams below whether interspersion between Cowardin vegetation (described in H1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.



Note: If you have 4 or more classes or 3 vegetation classes and open water, the rating is always "high".

Use map of Cowardin classes.

0

H 1.5 Special Habitat Features *(see p. 77)*:

Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.

☐ Large, downed, woody debris within the wetland (> 4 in. diameter and 6 ft. long)
☐ Standing snags (diameter at the bottom > 4 inches) in the wetland
☐ Undercut banks are present for at least 6.6 ft. (2m) and/or overhanging vegetation extends at least 3.3 ft. (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft. (10m)
☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey/brown)*
☐ At least 1/4 acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)*
☐ Invasive plants cover less than 25% of the wetland area in each stratum of plants
NOTE: The 20% stated in early printings of the manual on page 78 is an error.

0

H 1 TOTAL Score – potential for providing habitat *Add the points in the column above* **1**

H 2	Does the wetland have the opportunity to provide habitat for many species?	(only 1 score per box)
	H 2.1 Buffers *(see P. 80)*: *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed".* ☒ 100m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference. No structures are within the undisturbed part of buffer (relatively undisturbed also means no grazing, no landscaping, no daily human use)............ **points = 5** ☐ 100m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference .... **points = 4** ☐ 50m (170 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% circumference .... **points = 4** ☐ 100m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference .... **points = 3** ☐ 50m (170 ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference .... **points = 3** **If buffer does not meet any of the criteria above:** ☐ No paved areas (except paved trails) or buildings within 25m (80 ft) of wetland > 95% circumference. Light to moderate grazing or lawns are OK .... **points = 2** ☐ No paved areas of buildings within 50m of wetland for > 50% circumference. Light to moderate grazing or lawns are OK .... **points = 2** ☐ Heavy grazing in buffer .... **points = 1** ☐ Vegetated buffers are < 2m wide (6.6 ft) for more than 95% circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland) .... **points = 0** ☐ Buffer does not meet any of the criteria above .... **points = 1** **Arial photo showing buffers**	**Figure** ☐ **5**
	H 2.2 Corridors and Connections *(see p. 81)* H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at least a 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? *(Dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor).* ☐ YES = **4 points** (go to H 2.3) ☒ NO = go to H 2.2.2 H. 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50 ft. wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR a Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? ☐ YES = **2 points** (go to H 2.3) ☒ NO = go to H 2.2.3 H. 2.2.3 Is the wetland: • Within 5 mi (8km) of a brackish or salt water estuary OR • Within 3 miles of a large field or pasture (> 40 acres) OR ☒ YES = 1 point • Within 1 mile of a lake greater than 20 acres? ☐ NO = 0 points	1

Comments: _____

	H 2.3 Near or adjacent to other priority habitats listed by WDFW (see p. 82): *(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report* *http://wdfw.wa.gov/hab/phslist.htm*) Which of the following priority habitats are within 330 ft. (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.* ☐ **Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acre). ☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report p. 152*). ☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock. ☐ **Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. **(**Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest. ☐ **Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158*). ☒ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. ☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161*). ☐ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources. ☐ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A).* ☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human. ☐ **Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft. ☐ **Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs. ☐ **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long. If wetland has **3 or more** priority habitats **= 4 points** If wetland has **2** priority habitats = **3 points** If wetland has **1** priority habitat **= 1 point** No habitats = 0 points Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)	1
	H 2.4 Wetland Landscape: *Choose the **one** description of the landscape around the wetland that best fits (see p. 84)* • There are at least 3 other wetlands within 1/2 mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development.... points = 5 ☐ • The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within 1/2 mile .... points = 5 ☐ • There are at least 3 other wetlands within 1/2 mile, BUT the connections between them are disturbed. .... points = 3 ☒ • The wetland fringe on a lake **with** disturbance and there are 3 other lake-fringe wetlands within 1/2 mile .... points = 3 ☐ • There is at least 1 wetland within 1/2 mile .... points = 2 ☐ • There are no wetlands within 1/2 mile.................... points = 0 ☐	3
	H 2 TOTAL Score – opportunity for providing habitat *Add the scores from H2.1, H2.2, H2.3, H2.4*	10
	TOTAL for H 1 from page 8	1
◆	**Total Score for Habitat Functions** Add the points for H 1 and H 2; then ***record the result on p. 1***	**11**

Comments: _____

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Please determine if the wetland meets the attributes described below and circle the appropriate answers and Category.

	Wetland Type – *Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.*	
SC1	**Estuarine wetlands?** *(see p.86)* Does the wetland unit meet the following criteria for Estuarine wetlands? ☐ The dominant water regime is tidal, ☐ Vegetated, and ☐ With a salinity greater than 0.5 ppt. ☐ YES = Go to SC 1.1 ☒ NO	
	SC 1.1 Is the wetland unit within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? ☐ YES = Category I ☐ NO = go to SC 1.2	**Cat. 1** ☐
	SC 1.2 Is the wetland at least 1 acre in size and meets at least two of the following conditions? ☐ YES = Category I ☐ NO = Category II ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. If the non-native *Spartina* spp,. are only species that cover more than 10% of the wetland, then the wetland should be given a dual rating (I/II). The area of Spartina would be rated a Category II while the relatively undisturbed upper marsh with native species would be a Category 1. Do not, however, exclude the area of Spartina in determining the size threshold of 1 acre. ☐ At least 3/4 of the landward edge of the wetland has a 100 ft. buffer of shrub, forest, or un-grazed or un-mowed grassland ☐ The wetland has at least 2 of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.	**Cat. I** ☐ **Cat. II** ☐ **Dual Rating I/II** ☐
SC2	**Natural Heritage Wetlands** *(see p. 87)* Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species. SC 2.1 Is the wetland being rated in a Section/Township/Range that contains a natural heritage wetland? *(This question is used to screen out most sites before you need to contact WNHP/DNR.)* ☒ S/T/R information from Appendix D ☐ or accessed from WNHP/DNR web site ☐ YES Contact WNHP/DNR (see p. 79) and go to SC 2.2 ☒ NO SC 2.2 Has DNR identified the wetland as a high quality undisturbed wetland or as a site with state threatened or endangered plant species? ☐ YES = Category 1 ☐ NO not a Heritage Wetland	**Cat I** ☐
SC3	**Bogs** *(see p. 87)* Does the wetland **(or any part of the unit)** meet both the criteria for soils and vegetation in bogs? Use the key below to identify if the wetland is a bog. ***If you answer yes you will still need to rate the wetland based on its function.*** 1. Does the unit have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of soil profile? (See Appendix B for a field key to identify organic soils)? ☐ YES = go to question 3 ☒ NO = go to question 2 2. Does the wetland have organic soils, either peats or mucks that are less than 16 inches deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on a lake or pond? ☐ YES = go to question 3 ☒ NO = is not a bog for purpose of rating 3. Does the unit have more than 70% cover of mosses at ground level, AND other plants, if present, consist of the "bog" species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)? ☐ YES = Is a bog for purpose of rating ☐ NO = go to question 4 NOTE: If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16" deep. If the pH is less than 5.0 and the "bog" plant species in Table 3 are present, the wetland is a bog. 4. Is the unit forested (> 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann's spruce, or western white pine. WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover *(> 30% coverage of the total shrub/herbaceous cove*r)? ☐ YES = Category I ☐ NO = Is not a bog for purpose of rating	**Cat. I** ☐

SC4	**Forested Wetlands** *(see p. 90)* Does the wetland have at least 1 acre of forest that meet one of these criteria for the Department of Fish and Wildlife's forests as priority habitats? *If you answer yes you will still need to rate the wetland based on its function.* ☐ **Old-growth forests**: (west of Cascade Crest) Stands of at least two three species forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20 trees/hectare) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 inches (81 cm or more). NOTE: The criterion for dbh is based on measurements for upland forests. Two-hundred year old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is and "OR" so old-growth forests do not necessarily have to have trees of this diameter. ☐ **Mature forests**: (west of the Cascade Crest) Stands where the largest trees are 80 – 200 years old OR have an average diameters (dbh) exceeding 21 inches (53 cm); crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth. ☐ YES = Category I ☒ NO = not a forested wetland with special characteristics	**Cat. I** ☐
SC5	**Wetlands in Coastal Lagoons** *(see p. 91)* Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? ☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks. ☐ The lagoon in which the wetland is located contains surface water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom.)* ☐ YES = Go to SC 5.1 ☒ NO not a wetland in a coastal lagoon SC 5.1 Does the wetland meet all of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing) and has less than 20% cover of invasive plant species (see list of invasive species on p. 74). ☐ At least 3/4 of the landward edge of the wetland has a 100 ft. buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland is larger than 1/10 acre (4350 square ft.) ☐ YES = Category I ☐ NO = Category II	**Cat. I** ☐ **Cat. II** ☐
SC6	**Interdunal Wetlands** *(see p. 93)* Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ☐ YES = Go to SC 6.1 ☒ NO not an interdunal wetland for rating ***If you answer yes you will still need to rate the wetland based on its functions.*** In practical terms that means the following geographic areas: • Long Beach Peninsula -- lands west of SR 103 • Grayland-Westport -- lands west of SR 105 • Ocean Shores-Copalis – lands west of SR 115 and SR 109 SC 6.1 Is the wetland one acre or larger, or is it in a mosaic of wetlands that is one acre or larger? ☐ YES = Category II ☐ NO = go to SC 6.2 SC 6.2 Is the wetland between 0.1 and 1 acre, or is it in a mosaic of wetlands that is between 0.1 and 1 acre? ☐ YES = Category III	**Cat. II** ☐ **Cat. III** ☐
◆	**Category of wetland based on Special Characteristics** *Choose the "highest" rating if wetland falls into several categories, and record on p. 1.* If you answered NO for all types enter "Not Applicable" on p. 1	**N/A**

Comments: _____

WETLAND RATING FORM – WESTERN WASHINGTON

Version 2 – Updated July 2006 to increase accuracy and reproducibility among users
Updated Oct. 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): C   Date of site visit: 6-10-14

Rated by: P. Togher   Trained by Ecology? Yes ☒ No ☐   Date of training: 5/2005

SEC: 23   TOWNSHP: 17N   RNGE: 2W   Is S/T/R in Appendix D? Yes ☐ No ☒

Map of wetland unit: Figure _____ Estimated size ~0.15 acres

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland: ☐ **I** ☐ **II** ☒ **III** ☐ **IV**

Category I =	Score > 70	Score for Water Quality Functions	**12**
Category II =	Score 51 - 69	Score for Hydrologic Functions	**18**
Category III =	Score 30 – 50	Score for Habitat Functions	**15**
Category IV =	Score < 30	TOTAL Score for Functions	**45**

Category based on SPECIAL CHARACTERISTCS of Wetland ☐ **I** ☐ **II** ☐ **Does not apply**

Final Category (choose the "highest" category from above") **III**

Summary of basic information about the wetland unit.

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine	☐	Depressional	☒
Natural Heritage Wetland	☐	Riverine	☐
Bog	☐	Lake-fringe	☐
Mature Forest	☐	Slope	☐
Old Growth Forest	☐	Flats	☐
Coastal Lagoon	☐	Freshwater Tidal	☐
Interdunal	☐		☐
None of the above	☒	Check if unit has multiple HGM classes present	☐

Does the wetland being rated meet any of the criteria below? If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands that Need Additional Protection (in addition to the protection recommended for its category)	YES	NO
SP1. *Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered* ***animal or plant*** *species (T/E species)?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database.	☐	☒
SP2. *Has the wetland unit been documented as habitat for any State listed Threatened or Endangered* ***animal*** *species?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category 1 Natural Heritage Wetlands (see p. 19 of data form).	☐	☒
SP3. *Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?*	☐	☒
SP4. *Does the wetland unit have a local significance in addition to its functions?* For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.	☐	☒

<u>To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.</u>

The hydrogeomorphic classification groups wetlands in to those that function in similar ways. This simplifies the questions needed to answer how well the wetland functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.

Wetland name or number C

Classification of Vegetated Wetlands for Western Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides (i.e. except during floods)?
   ☒ NO – go to 2 ☐ **YES** – the wetland class is **Tidal Fringe**
   If yes, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?
   ☐ **YES – Freshwater Tidal Fringe** ☐ **NO – Saltwater Tidal Fringe (Estuarine)**
   *If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is a Saltwater Tidal Fringe it is rated as an **Estuarine** wetland.* Wetlands that were call estuarine in the first and second editions of the rating system are called Salt Water Tidal Fringe in the Hydrogeomorphic Classification. Estuarine wetlands were categorized separately in the earlier editions, and this separation is being kept in this revision. To maintain consistency between editions, the term "Estuarine" wetland is kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p. ______).

2. The entire wetland unit is flat and precipitation is only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.
   ☒ NO – go to 3 ☐ **YES** – The wetland class is **Flats**
   If your wetland can be classified as a "Flats" wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland meet both of the following criteria?
   ☐ The vegetated part of the wetland is on the shores of a body of permanent open water (without any vegetation on the surface) where at least 20 acres (8ha) in size;
   ☐ At least 30% of the open water area is deeper than 6.6 (2 m)?
   ☒ NO – go to 4 ☐ **YES** – The wetland class is **Lake-fringe (Lacustrine Fringe)**

4. Does the entire wetland meet all of the following criteria?
   ☒ The wetland is on a slope *(slope can be very gradual)*.
   ☒ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
   ☐ The water leaves the wetland **without being impounded**?
   NOTE: *Surface water does not pond in these types of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).*
   ☒ NO – go to 5 ☐ **YES** – The wetland class is **Slope**

5. Does the entire wetland meet all of the following criteria?
   ☒ The unit is in a valley or stream channel where it gets inundated by overbank flooding from that stream or river.
   ☒ The overbank flooding occurs at least once every two years.
   NOTE: *The riverine unit can contain depressions that are filled with water when the river is not flooding..*
   ☒ NO – go to 6 ☐ **YES** – The wetland class is **Riverine**

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time of the year. This means that any outlet, if present is higher than the interior of the wetland.
   ☐ NO – go to 7 ☒ **YES** – The wetland class is **Depressional**

7. Is the entire wetland located in a very flat area with no obvious depression and no overbank flooding. The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.
   ☒ No – go to 8 ☐ **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit, classify the wetland using the class that represents more than 90% of the total area.

HGM Classes within the wetland unit being rated	*HGM Class to Use in Rating*
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine along stream within boundary	Depressional
Depressional + Lake-fringe	Depressional
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE under wetlands with special characteristics

If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

D	Depressional and Flat Wetlands	Points
	WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.	(only 1 score per box)
D 1	**Does the wetland have the potential to improve water quality?**	*(see p.38)*
	D 1.1 Characteristics of surface water flows out of the wetland: • Unit is a depression with no surface water leaving it (no outlet) .... points = 3 ☒ • Unit has an intermittently flowing, OR highly constricted, permanently flowing outlet ... points = 2 ☐ • Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) .. points = 1 ☐ • Unit is a "flat" depression (Q.7 on key), or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch .... points = 1 ☐ *(If ditch is not permanently flowing treat unit as "intermittently flowing")* **Provide photo or drawing**	**Figure** ☐ **3**
	D 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic (*use NRCS definitions*) YES points = 4 NO points = 0	0
	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class): • Wetland has persistent, ungrazed vegetation > = 95% of area .... points = 5 ☐ • Wetland has persistent, ungrazed vegetation > = 1/2 of area .... points = 3 ☒ • Wetland has persistent, ungrazed vegetation > = 1/10 of area .... points = 1 ☐ • Wetland has persistent, ungrazed vegetation < 1/10 of area .... points = 0 ☐ **Map of Cowardin vegetation classes**	**Figure** ☐ **3**
	D 1.4 Characteristics of seasonal ponding or inundation: *This is the area of the wetland that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 years.* • Area seasonally ponded is > 1/2 total area of wetland .... points = 4 ☐ • Area seasonally ponded is > 1/4 total area of wetland .... points = 2 ☐ • Area seasonally ponded is < 1/4 total area of wetland .... points = 0 ☒ **Map of Hydroperiods**	**Figure** ☐ **0**
	Total for D 1 *Add the points in the boxes above*	**6**
D 2	**Does the wetland have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* ☐ Grazing in the wetland or within 150 ft ☐ Untreated stormwater discharges to wetland ☐ Tilled fields or orchards within 150 ft. of wetland ☐ A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging ☐ Residential, urban areas, golf courses are within 150 ft. of wetland ☐ Wetland is fed by groundwater high in phosphorus or nitrogen ☒ Other Former industrial area ☒ YES multiplier is 2 ☐ NO multiplier is 1	*(see p. 44)* Multiplier 2
◆	**TOTAL – Water Quality Functions** Multiply the score from D1 by D2; then ***add score to table on p. 1***	**12**
	HYDROLOGIC FUNCTIONS – Indicators that wetland unit functions to reduce flooding and stream degradation.	
D 3	**Does the wetland have the potential to reduce flooding and erosion?**	*(see p.46)*
	D 3.1 Characteristics of surface water flows out of the wetland unit • Unit is a depression with no surface water leaving it (no outlet) .... points = 4 ☒ • Unit has an intermittently flowing, OR highly constricted permanently flowing outlet .... points = 2 ☐ • Unit is a "flat" depression (Q.7 on key) or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch .... points = 1 ☐ *(If ditch is not permanently flowing treat unit as "intermittently flowing")* • Unit has an unconstricted, or slightly constricted, surface outlet *(permanently flowing)* .... points = 0	4
	D 3.2 Depth of storage during wet periods. *Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).* • Marks of ponding are 3 ft. or more above the surface or bottom of the outlet .... points = 7 ☐ • The wetland is a "headwater" wetland .... points = 5 ☐ • Marks of ponding between 2 ft. to < 3 ft. from surface or bottom of outlet .... points = 5 ☒ • Marks are at least 0.5 ft. to < 2 ft. from surface or bottom of outlet .... points = 3 ☐ • Wetland is flat (yes to Q.2 or Q.7 on key) but has small depressions on the surface that trap water .points = 1 ☐ • Marks of ponding less than 0.5 ft .... points = 0 ☐	5
	D 3.3 Contribution of wetland unit to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* • The area of the basin is less than 10 times the area of unit .... points = 5 ☐ • The area of the basin is 10 to 100 times the area of the unit .... points = 3 ☐ • The area of the basin is more than 100 times the area of the unit .... points = 0 ☒ • Entire unit is in the FLATS class .... points = 5 ☐	0
	Total for D 3 *Add the points in the boxes above*	9

D 4	**Does the wetland have the opportunity to reduce flooding and erosion?** Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. *Note which of the following indicators of opportunity apply.* ☐ Wetland is in a headwater of a river or stream that has flooding problems. ☒ Wetland drains to a river or stream that has flooding problems ☐ Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems ☐ Other ______ ☐ YES multiplier is 2 ☐ NO multiplier is 1	*(see p. 49)* Multiplier 2
◆	**TOTAL – Hydrologic Functions** Multiply the score from D3 by D4; then ***add score to table on p. 1***	**18**

Comments: 16

These questions apply to wetlands of all HGM classes. | **Points** (only 1 score per box)

HABITAT FUNCTIONS – Indicators that wetland functions to provide important habitat.

H 1 Does the wetland have the potential to provide habitat for many species?

H 1.1 Vegetation structure *(see P. 72)*:
Check the types of vegetation classes present (as defined by Cowardin) – Size threshold for each class is 1/4 acre or more than 10% of the area if unit is smaller than 2.5 acres.

☐ Aquatic Bed
☒ Emergent plants
☐ Scrub/shrub (areas where shrubs have > 30% cover)
☐ Forested (areas where trees have > 30% cover)

If the unit has a forested class check if:
☐ The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon.

Add the number of vegetation types that qualify. If you have: **Map of Cowardin vegetation classes**

4 structures or more....... points = 4 ☐
3 structures............. points = 2 ☐
2 structures.................... points = 1 ☐
1 structure .... points = 0 ☒

Figure ☐ | **0**

H 1.2 Hydroperiods *(see p.73)*:
Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or 1/4 acre to count (see text for descriptions of hydroperiods).

☒ Permanently flooded or inundated
☐ Seasonally flooded or inundated
☒ Occasionally flooded or inundated
☒ Saturated only
☐ Permanently flowing stream or river in, or adjacent to, the wetland
☐ Seasonally flowing stream in, or adjacent to, the wetland
☐ **Lake-fringe wetland..................... = 2 points**
☐ **Freshwater tidal wetland............. = 2 points**

4 or more types present points = 3 ☐
3 or more types present points = 2 ☒
2 types present points = 1 ☐
1 type present points = 0 ☐

Map of hydroperiods

Figure ☐ | **2**

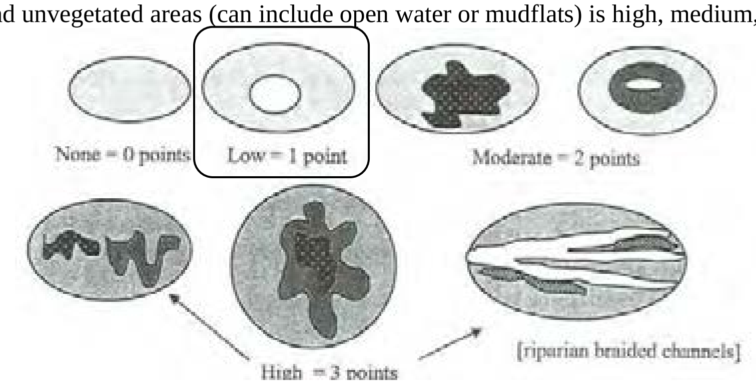
H 1.3 Richness of Plant Species *(see p. 75)*:
Count the number of plant species in the wetland that cover at least 10 ft^2 *(different patches of the same species can be combined to meet the size threshold)*
You do not have to name the species. Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle. If you counted:

> 19 species .... points = 2 ☐
5 – 19 species.................... points = 1 ☒
< 5 species .... points = 0 ☐

List species below if you want to:

1

H 1.4 Interspersion of Habitats *(see p. 76)*:
Decided from the diagrams below whether interspersion between Cowardin vegetation (described in H1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.



Note: If you have 4 or more classes or 3 vegetation classes and open water, the rating is always "high".
Use map of Cowardin classes.

Figure ☐ | **1**

H 1.5 Special Habitat Features *(see p. 77)*:
Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.

☐ Large, downed, woody debris within the wetland (> 4 in. diameter and 6 ft. long)
☐ Standing snags (diameter at the bottom > 4 inches) in the wetland
☐ Undercut banks are present for at least 6.6 ft. (2m) and/or overhanging vegetation extends at least 3.3 ft. (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft. (10m)
☒ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey/brown)*
☒ At least 1/4 acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)*
☐ Invasive plants cover less than 25% of the wetland area in each stratum of plants
NOTE: The 20% stated in early printings of the manual on page 78 is an error.

2

H 1 TOTAL Score – potential for providing habitat *Add the points in the column above* | **6**

H 2	Does the wetland have the opportunity to provide habitat for many species?	(only 1 score per box)
	H 2.1 Buffers *(see P. 80)*: *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed".* ☐ 100m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference. No structures are within the undisturbed part of buffer (relatively undisturbed also means no grazing, no landscaping, no daily human use)............ **points = 5** ☒ 100m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference .... **points = 4** ☐ 50m (170 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% circumference .... **points = 4** ☐ 100m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference .... **points = 3** ☐ 50m (170 ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference .... **points = 3** **If buffer does not meet any of the criteria above:** ☐ No paved areas (except paved trails) or buildings within 25m (80 ft) of wetland > 95% circumference. Light to moderate grazing or lawns are OK .... **points = 2** ☒ No paved areas of buildings within 50m of wetland for > 50% circumference. Light to moderate grazing or lawns are OK .... **points = 2** ☐ Heavy grazing in buffer .... **points = 1** ☐ Vegetated buffers are < 2m wide (6.6 ft) for more than 95% circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland) .... **points = 0** ☐ Buffer does not meet any of the criteria above .... **points = 1** **Arial photo showing buffers**	**Figure** ☐ **4**
	H 2.2 Corridors and Connections *(see p. 81)* H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at least a 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? *(Dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor).* ☐ YES = **4 points** (go to H 2.3) ☒ NO = go to H 2.2.2 H. 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50 ft. wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR a Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? ☐ YES = **2 points** (go to H 2.3) ☒ NO = go to H 2.2.3 H. 2.2.3 Is the wetland: • Within 5 mi (8km) of a brackish or salt water estuary OR • Within 3 miles of a large field or pasture (> 40 acres) OR ☒ YES = 1 point • Within 1 mile of a lake greater than 20 acres? ☐ NO = 0 points	1

Comments: _____

	H 2.3 Near or adjacent to other priority habitats listed by WDFW (see p. 82): *(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)* Which of the following priority habitats are within 330 ft. (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.* ☐ **Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acre). ☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report p. 152*). ☐ **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock. ☐ **Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. **(**Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest. ☐ **Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158*). ☒ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. ☐ **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161*). ☐ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources. ☐ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A).* ☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human. ☐ **Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft. ☐ **Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs. ☐ **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long. If wetland has **3 or more** priority habitats **= 4 points** If wetland has **2** priority habitats = **3 points** If wetland has **1** priority habitat **= 1 point** No habitats = 0 points Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)	1
	H 2.4 Wetland Landscape: *Choose the **one** description of the landscape around the wetland that best fits (see p. 84)* • There are at least 3 other wetlands within 1/2 mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development.... points = 5 ☐ • The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within 1/2 mile .... points = 5 ☐ • There are at least 3 other wetlands within 1/2 mile, BUT the connections between them are disturbed. .... points = 3 ☒ • The wetland fringe on a lake **with** disturbance and there are 3 other lake-fringe wetlands within 1/2 mile .... points = 3 ☐ • There is at least 1 wetland within 1/2 mile .... points = 2 ☐ • There are no wetlands within 1/2 mile........ points = 0 ☐	3
	H 2 TOTAL Score – opportunity for providing habitat *Add the scores from H2.1, H2.2, H2.3, H2.4*	9
	TOTAL for H 1 from page 8	6
◆	**Total Score for Habitat Functions** Add the points for H 1 and H 2; then ***record the result on p. 1***	**15**

Comments: _____

Wetland name or number C

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Please determine if the wetland meets the attributes described below and circle the appropriate answers and Category.

Wetland Type – *Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.*

SC1 **Estuarine wetlands?** *(see p.86)*

Does the wetland unit meet the following criteria for Estuarine wetlands?

☐ The dominant water regime is tidal,

☐ Vegetated, and

☐ With a salinity greater than 0.5 ppt.

☐ YES = Go to SC 1.1 ☒ NO

SC 1.1 Is the wetland unit within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? ☐ YES = Category I ☐ NO = go to SC 1.2

Cat. 1 ☐

SC 1.2 Is the wetland at least 1 acre in size and meets at least two of the following conditions?

☐ YES = Category I ☐ NO = Category II

☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. If the non-native *Spartina* spp,. are only species that cover more than 10% of the wetland, then the wetland should be given a dual rating (I/II). The area of Spartina would be rated a Category II while the relatively undisturbed upper marsh with native species would be a Category 1. Do not, however, exclude the area of Spartina in determining the size threshold of 1 acre.

☐ At least 3/4 of the landward edge of the wetland has a 100 ft. buffer of shrub, forest, or un-grazed or un-mowed grassland

☐ The wetland has at least 2 of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.

Cat. I ☐
Cat. II ☐
Dual Rating I/II ☐

SC2 **Natural Heritage Wetlands** *(see p. 87)*

Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species.

SC 2.1 Is the wetland being rated in a Section/Township/Range that contains a natural heritage wetland? *(This question is used to screen out most sites before you need to contact WNHP/DNR.)*

☒ S/T/R information from Appendix D ☐ or accessed from WNHP/DNR web site

☐ YES Contact WNHP/DNR (see p. 79) and go to SC 2.2 ☒ NO

SC 2.2 Has DNR identified the wetland as a high quality undisturbed wetland or as a site with state threatened or endangered plant species?

☐ YES = Category 1 ☐ NO not a Heritage Wetland

Cat I ☐

SC3 **Bogs** *(see p. 87)*

Does the wetland **(or any part of the unit)** meet both the criteria for soils and vegetation in bogs? Use the key below to identify if the wetland is a bog. ***If you answer yes you will still need to rate the wetland based on its function.***

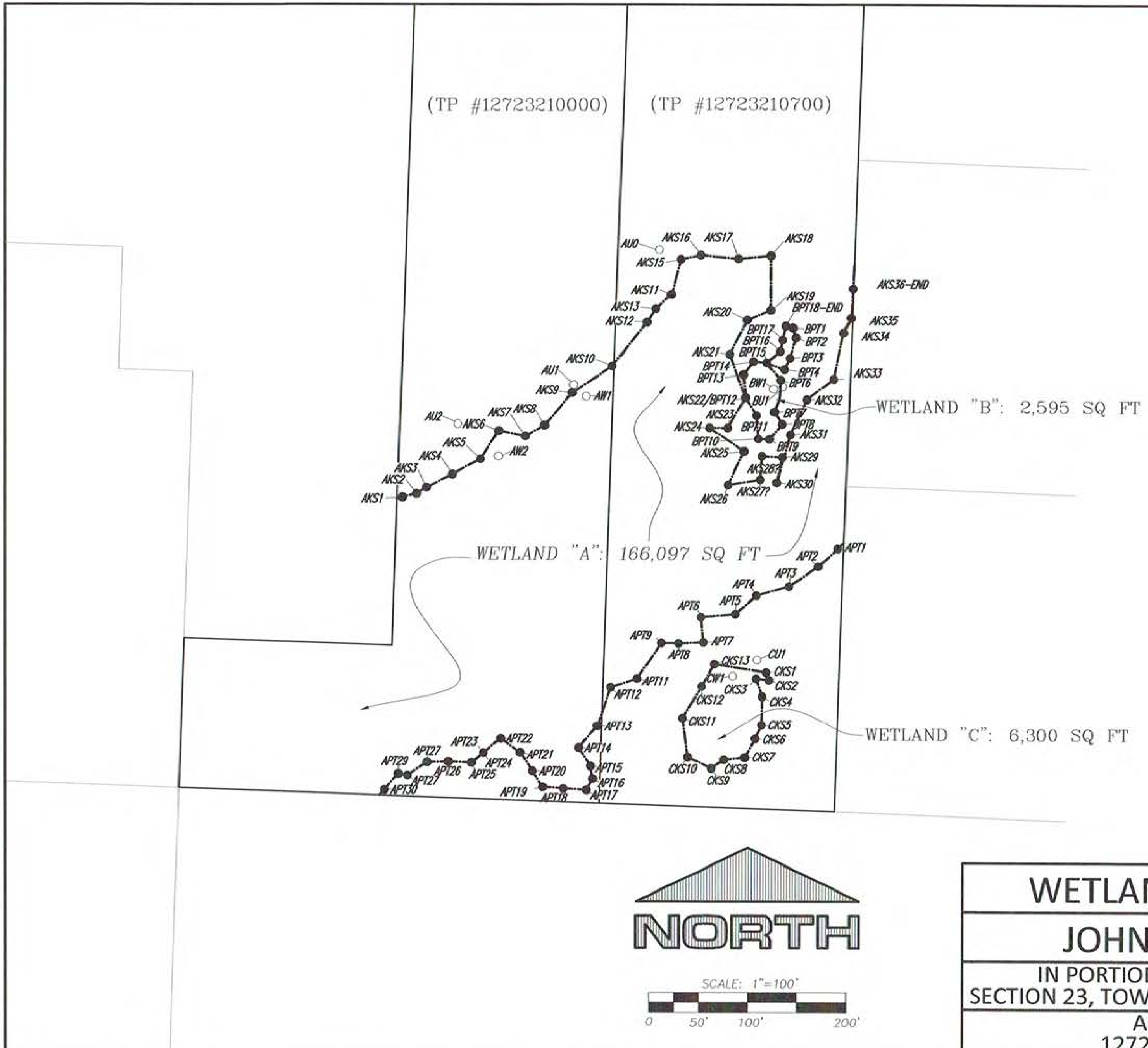
1. Does the unit have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of soil profile? (See Appendix B for a field key to identify organic soils)? ☐ YES = go to question 3 ☒ NO = go to question 2
2. Does the wetland have organic soils, either peats or mucks that are less than 16 inches deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on a lake or pond? ☐ YES = go to question 3 ☒ NO = is not a bog for purpose of rating
3. Does the unit have more than 70% cover of mosses at ground level, AND other plants, if present, consist of the "bog" species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)?
   ☐ YES = Is a bog for purpose of rating ☐ NO = go to question 4
   NOTE: If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16" deep. If the pH is less than 5.0 and the "bog" plant species in Table 3 are present, the wetland is a bog.
4. Is the unit forested (> 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann's spruce, or western white pine. WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover *(> 30% coverage of the total shrub/herbaceous cove*r)?
   ☐ YES = Category I ☐ NO = Is not a bog for purpose of rating

Cat. I ☐

SC4	**Forested Wetlands** *(see p. 90)* Does the wetland have at least 1 acre of forest that meet one of these criteria for the Department of Fish and Wildlife's forests as priority habitats? *If you answer yes you will still need to rate the wetland based on its function.* ☐ **Old-growth forests**: (west of Cascade Crest) Stands of at least two three species forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20 trees/hectare) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 inches (81 cm or more). NOTE: The criterion for dbh is based on measurements for upland forests. Two-hundred year old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is and "OR" so old-growth forests do not necessarily have to have trees of this diameter. ☐ **Mature forests**: (west of the Cascade Crest) Stands where the largest trees are 80 – 200 years old OR have an average diameters (dbh) exceeding 21 inches (53 cm); crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth. ☐ YES = Category I ☒ NO = not a forested wetland with special characteristics	**Cat. I** ☐
SC5	**Wetlands in Coastal Lagoons** *(see p. 91)* Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? ☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks. ☐ The lagoon in which the wetland is located contains surface water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom.)* ☐ YES = Go to SC 5.1 ☒ NO not a wetland in a coastal lagoon SC 5.1 Does the wetland meet all of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing) and has less than 20% cover of invasive plant species (see list of invasive species on p. 74). ☐ At least 3/4 of the landward edge of the wetland has a 100 ft. buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland is larger than 1/10 acre (4350 square ft.) ☐ YES = Category I ☐ NO = Category II	**Cat. I** ☐ **Cat. II** ☐
SC6	**Interdunal Wetlands** *(see p. 93)* Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ☐ YES = Go to SC 6.1 ☒ NO not an interdunal wetland for rating ***If you answer yes you will still need to rate the wetland based on its functions.*** In practical terms that means the following geographic areas: • Long Beach Peninsula -- lands west of SR 103 • Grayland-Westport -- lands west of SR 105 • Ocean Shores-Copalis – lands west of SR 115 and SR 109 SC 6.1 Is the wetland one acre or larger, or is it in a mosaic of wetlands that is one acre or larger? ☐ YES = Category II ☐ NO = go to SC 6.2 SC 6.2 Is the wetland between 0.1 and 1 acre, or is it in a mosaic of wetlands that is between 0.1 and 1 acre? ☐ YES = Category III	**Cat. II** ☐ **Cat. III** ☐
◆	**Category of wetland based on Special Characteristics** *Choose the "highest" rating if wetland falls into several categories, and record on p. 1.* If you answered NO for all types enter "Not Applicable" on p. 1	**N/A**

Comments: _____

APPENDIX E – WETLAND SURVEY



RICHARD R. LARSON
STATE OF WASHINGTON
18096
REGISTERED PROFESSIONAL LAND SURVEYOR

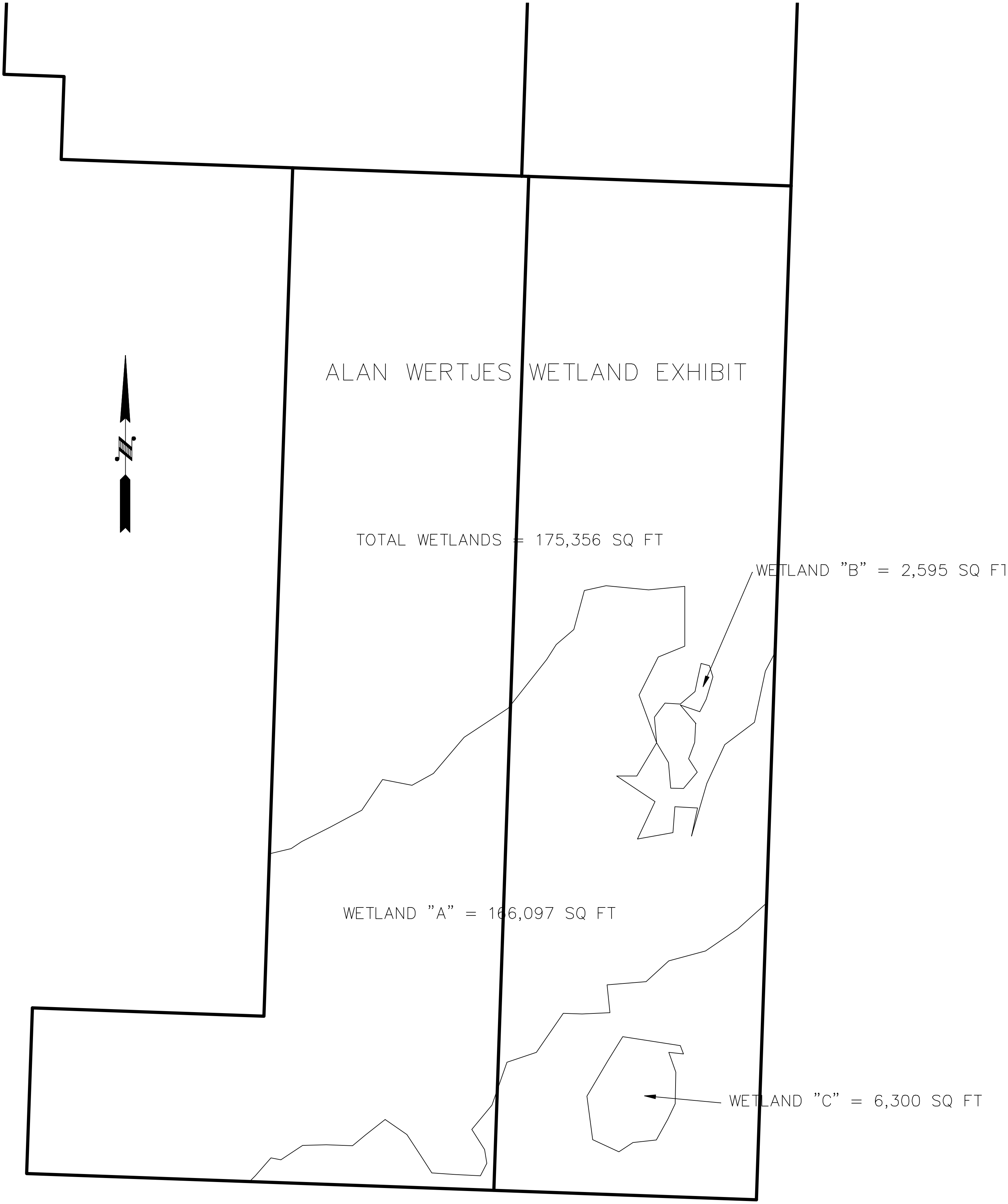
DATE SIGNED: 10-15-14

WETLAND DELINEATION MAP

JOHN'S AUTO WRECKING

IN PORTIONS OF THE NE 1/4 OF THE NW 1/4,
SECTION 23, TOWNSHIP 17 NORTH, RANGE. 2 WEST, W.M.

ASSESSOR'S PARCEL NO'S:
12723210000 & 12723210700


ALAN WERTJES WETLAND EXHIBIT
TOTAL WETLANDS = 175,356 SQ FT
WETLAND "B" = 2,595 SQ FT
WETLAND "A" = 166,097 SQ FT
WETLAND "C" = 6,300 SQ FT
N

APPENDIX I

TERRESTRIAL ECOLOGICAL EVALUATION

John's Auto Wrecking
411 93rd Ave SE
Olympia, Washington 98501-9701
Facility Site No. 57665495
VCP Project No. SW1613

Prepared for:

Havens Estate Investments, LLC
Seattle, WA

ROBINSON
NOBLE
Tacoma, WA

November 8, 2019

Prepared by:

Coho Environmental

Seattle, WA

Table of Contents

Tables

Figures

Acronyms

AOC	area of concern
COEC	chemical of ecological concern
MTCA	Model Toxic Control Act
PAHs	polycyclic aromatic hydrocarbons
TEE	Terrestrial Ecological Evaluation
UCL	upper confidence limit

WAC	Washington Administrative Code

1 Introduction

The Washington State Department of Ecology's Model Toxics Control Act (MTCA) Cleanup Regulation (Chapter 173-340 WAC) includes procedures for "characterizing existing or potential threats to terrestrial plants or animals exposed to hazardous substances in soil." These procedures, collectively designated as a Terrestrial Ecological Evaluation (TEE), provide a tiered approach of increasing complexity, depending on the characteristics of the site, resulting in one of three outcomes:

- Document an exclusion from further TEE evaluations (WAC 173-340-7491)
- Conduct a simplified TEE (WAC 173-340-7492)
- Conduct a site-specific TEE (WAC 173-340-7493)

The site was previously occupied by a fairly extensive automobile wrecking-yard operation, but is now largely vacant and undeveloped land covering approximately 15 acres in six separate tax parcels (Robinson Noble 2013). Therefore, this site does not meet one of the primary TEE exclusions that there be less than 1.5 acres of contiguous undeveloped land on the site. The site also does not meet the criteria for a simplified TEE, because the "site is located on or directly adjacent to an area where management or land use plans will maintain or restore native or semi-native vegetation."[1] Consequently, a site-specific TEE is required for the John's Auto Wrecking site.

2 Problem Formulation

The first step in the site-specific TEE is the problem formulation, which consists of the determination of the chemicals of ecological concern (COECs), complete exposure pathways, terrestrial ecological receptors of concern, and a toxicological assessment.

2.1 Chemicals of Ecological Concern – Pre-Remediation

Soil chemistry data have been collected at the site during various investigations beginning in 2008, at which time nine areas of concern (AOCs) were identified. The initial investigations of each AOC were completed in 2009, after which Ecology (2011) indicated that additional site characterization was needed. Additional characterization of soil chemistry was conducted in 2013, 2014, and 2016.

Much of the additional data were collected from wetland areas in the southern half of the site. A wetland delineation of this area conducted in 2014 identified three discrete wetlands in the southern half of the site (Normandeau 2014b).

Because of the presence of wetlands and the relatively large area of the site, it was divided into two halves for the purposes of determining the COECs for this TEE (Figure

[1] http://www.ecy.wa.gov/programs/tcp/policies/terrestrial/SimplifiedorSitespecific.htm

1). The northern half of the site is drier than the southern half and does not contain wetlands. Thirty soil sampling locations were included in the northern half of the site and 56 locations were included in the southern half of the site. All soil samples collected within the top six feet below ground surface (the assumed biologically active zone within MTCA) were compiled for this screening step.

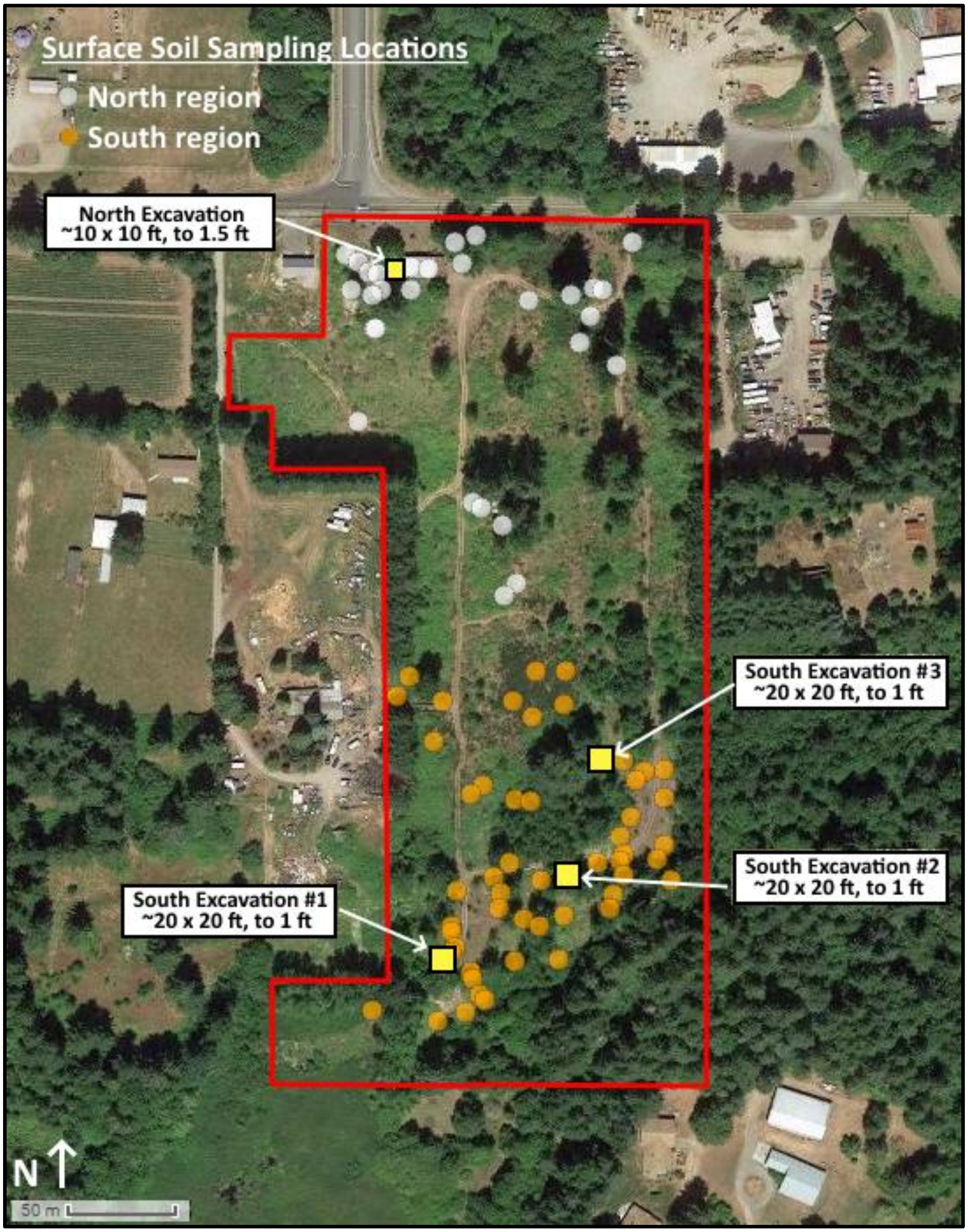


Figure 1. Soil sampling and excavation locations

Chemicals that were detected at least once are listed in Tables 1 (northern half of the site) and 2 (southern half of the site), along with summary statistics and the results of the screening. The soil results used in the screening and the output from the ProUCL software used to calculate the 95% upper confidence limit (UCL) on the mean are provided in Appendix B. Not all the detected chemicals have ecological screening values in MTCA, so these chemicals were discussed qualitatively.

Comparison statistics (either the 95% UCL or the maximum detected concentration) were compared to the lowest ecological screening values from MTCA Table 749-3. Nine detected chemicals had screening values (Tables 1 and 2), including trace elements (arsenic, chromium, copper, lead, nickel, zinc), hydrocarbons (benzo(a)pyrene, diesel range organics), and PCBs.

Based on the screening assessment, five chemicals (arsenic, chromium, copper, lead, and diesel range organics) were determined to be COECs in the northern half of the site (Table 1). The comparison statistic for lead (674 mg/kg) had the greatest exceedance factor compared to the screening value.

For the southern half of the site, lead, nickel, and diesel range organics were determined to be COECs (Table 2). None of the exceedance factors were greater than two for these chemicals.

Table 1. Identification of chemicals of ecological concern in the northern half of the site – pre-remediation dataset

Chemical	Units	Detection Frequency	Comparison Statistic[a]	Comparison Result	Lowest Ecological Screening Value from MTCA Table 749-3
Arsenic	mg/kg	29/44	95% UCL	**7.1**	7
Chromium	mg/kg	33/44	95% UCL	**42.3**	42
Copper	mg/kg	32/43	95% UCL	**398**	50
Diesel range organics	mg/kg	2/13	Maximum	**340**	200
Lead	mg/kg	13/46	95% UCL	**674**	50
Nickel	mg/kg	42/43	95% UCL	26.7	30
Paraffin oils	mg/kg	1/13	Maximum	1,020	n/a
PCB-Aroclor 1254	mg/kg	1/27	Maximum	0.46	0.65
Zinc	mg/kg	13/43	95% UCL	5.6	86

[a] 95% upper confidence limits (UCLs) on the mean or maximum concentrations were used for comparison statistic, as specified in WAC 173-340-7493(2)(a)(i). UCLs were determined using ProUCL (v. 5.0). The highest UCL of those recommended by the software is reported. When insufficient data were available to compute meaningful or reliable statistics, as indicated by ProUCL software, the maximum detected value was used as the comparison statistic.

n/a = not available

Table 2. Identification of chemicals of ecological concern in the southern half of the site – pre-remediation dataset

Chemical	Units	Detection Frequency	Comparison Statistic[a]	Comparison Result	Lowest Ecological Screening Value from MTCA Table 749-3
Arsenic	mg/kg	10/35	95% UCL	5.8	7
Benz[a]anthracene	mg/kg	2/8	Maximum	0.187	n/a
Benzo(a)pyrene	mg/kg	2/8	Maximum	0.202	12
Benzo(b)fluoranthene	mg/kg	3/8	95% UCL	0.194	n/a
Benzo(ghi)perylene	mg/kg	1/8	Maximum	0.115	n/a
Benzo(k)fluoranthene	mg/kg	1/8	Maximum	0.103	n/a
Chromium	mg/kg	14/35	95% UCL	7.8	42
Chrysene	mg/kg	2/12	Maximum	0.212	n/a
Copper	mg/kg	20/33	95% UCL	21	50
Diesel range organics	mg/kg	1/27	Maximum	**320**	200
Fluoranthene	mg/kg	2/8	Maximum	0.528	n/a
Indeno(1,2,3-cd)pyrene	mg/kg	1/8	Maximum	0.135	n/a
Lead	mg/kg	27/50	95% UCL	**64.7**	50
Nickel	mg/kg	30/33	95% UCL	**47.5**	30
Phenanthrene	mg/kg	2/8	Maximum	0.252	n/a
Pyrene	mg/kg	2/8	Maximum	0.416	n/a
Zinc	mg/kg	16/33	95% UCL	28.3	86

[a] 95% upper confidence limits (UCLs) or maximum values used for comparison statistic, as specified in WAC 173-340-7493(2)(a)(i). UCLs were determined using ProUCL (v. 5.0). The highest UCL of those recommended by the software is reported. When insufficient data were available to compute meaningful or reliable statistics, as indicated by ProUCL software, the maximum detected value was used as the comparison statistic.

n/a = not available

The chemicals listed in Tables 1 and 2 that do not have screening values include paraffin oils (also known as kerosene) in the northern area and several polycyclic aromatic hydrocarbons (PAHs) in the southern area.

The only detected result (1,020 mg/kg) for paraffin oils was from a single sample (TP22-1) collected in 2013 from the driveway near the road. This location is located outside any of the nine AOCs at the site. Metal concentrations in this sample were very low. Given the low habitat value at this location and the infrequent detection on a site-wide basis, this chemical is not likely to represent any appreciable ecological risk.

The PAHs without screening values were detected at similar concentration ranges (0.103 to 0.528 mg/kg) to benzo(a)pyrene, which does have a screening value of 12 mg/kg. Using the concept of toxic equivalence to benzo(a)pyrene, these other PAHs are unlikely to represent any appreciable ecological risk since the concentrations are well below the screening value for benzo(a)pyrene.

2.2 Chemicals of Ecological Concern – Post-remediation

The results from the soil samples collected in 2009, 2013, 2014, and 2016 indicated that there were isolated areas with high lead concentrations at the site, and one small area around station WS-8 with elevated PAH concentrations. These areas were addressed in the summer of 2019 by excavating and removing the impacted soils. The approximate locations of the excavations are shown on Figure 1.

Confirmation soil samples were collected from the excavation areas and analyzed for lead (north excavation area, and south excavation areas 1 and 2) and carcinogenic PAHs (south excavation areas 2 and 3). The results were non-detect for all samples and analytes.

Some of the sample results included in the screening step document in Section 2.1 and Tables 1 and 2 are no longer relevant for the TEE since the soil that those samples represented has been removed. Therefore, the screen for chemicals of ecological concern was repeated using a post-remediation dataset that excluded those sample results listed in Table 3. The results in Table 3 are limited to those chemicals preliminarily identified as COECs in Section 2.1.

Table 3. Soil results that were removed to create the post-remediation dataset

Sample Location	Soil Results (mg/kg)				
	Lead	Nickel	Arsenic	Chromium	Copper
North excavation					
TP14	5,552	24	8.0	116	3,113
South excavation 1					
WS-6	1,230	12.1	not COEC	not COEC	not COEC
WS-18	386	no data	not COEC	not COEC	not COEC
South excavation 2					
WS-8	525	18.1	not COEC	not COEC	not COEC
WS-11	67	no data	not COEC	not COEC	not COEC
South excavation 3					
PS1	34	10	not COEC	not COEC	not COEC

COEC – chemical of ecological concern

The results of the post-remediation screening are summarized in Table 4. The output from the ProUCL software is provided in Appendix B. None of the COECs originally identified in the northern half of the site remained COECs after considering the post-remediation dataset. For the southern half of the site, diesel range organics and lead were no longer considered COECs. The comparison result for nickel (50.9 mg/kg) still exceeded the lowest screening value of 30 mg/kg, so nickel preliminarily remained a COEC. Nickel is discussed in greater detail below.

Table 4. Screening results for chemicals of ecological concern – post-remediation dataset

Chemical	Comparison Statistic	Comparison Result	Lowest Ecological Screening Value from MTCA Table 749-3
Northern half of site			
Arsenic	95% UCL	7.0	7
Chromium	95% UCL	37.9	42
Copper	95% UCL	11.0	50
Diesel range organics	95% UCL[a]	179	200
Lead	95% UCL	11.1	50
Southern half of site			
Diesel range organics	95% UCL[a]	77.7	200
Lead	95% UCL[a]	34.3	50
Nickel	95% UCL[a]	**50.9**	30

[a] Diesel range organics were not detected frequently enough (two detections in north area, one detection in south area) to incorporate the non-detected values in a calculation of the 95% UCL statistic. As an alternative, a hypothetical 95% UCL was estimated assuming all results were detects, using the reporting limit for non-detect results. This likely overestimates the true 95% UCL.

The post-remediation dataset for nickel in the southern half of the site consists of 30 results. All but one of these results is less than the 30 mg/kg screening value (see Appendix B for data for all samples). A single result from 2013, from location HB9 near the southwestern corner of the site, was 209 mg/kg. This single result is responsible for elevating the 95% UCL above the screening value.

There are two lines of evidence to support the conclusion that nickel is not a COEC at this site. First, the 95% UCLs for both the pre-remediation (47.5 mg/kg) and post-remediation (50.9 mg/kg) datasets are very similar to the 90th percentile of natural background nickel concentrations in Puget Sound soil (Ecology 1994). MTCA (WAC 173-340-709) defines the appropriate statistic for background concentrations as the 90th percentile.

Second, field surveys conducted at the site indicate that nickel has not adversely affected the large wetland area where the elevated nickel concentration was detected. Location HB9, where the elevated nickel concentration was detected, is within a mature 50-acre forested and emergent wetland delineated in 2014 (Normandeau 2014b). The 30 mg/kg screening value for nickel is based on the protection of terrestrial plants. Other benchmarks presented in MTCA Table 749-3 are 200 and 980 mg/kg, for the protection of soil biota and wildlife, respectively. The 95% UCLs for nickel are well below these other benchmarks.

Although there are likely to be complete exposure pathways and terrestrial ecological receptors of concern at the site (Normandeau 2014a), no toxicological assessment or additional TEE analysis is warranted based on the lack of COECs at the site.

3 Conclusions

Because no COECs were identified during the problem formulation step, no additional TEE analysis is warranted. The site-specific TEE is considered to be complete for this site. The completed TEE form, documenting the decision flowchart and outcome of the site-specific TEE, is provided in Appendix A.

4 References

Ecology. 1994. Natural background soils metals concentrations in Washington State Toxics Cleanup Program. Publication #94-115. Olympia, WA: Washington Department of Ecology.

Ecology. 2011. Letter from Eugene Radcliff (Toxics Cleanup Program) dated August 23, 2011 to Alan J. Wertjes, regarding Ecology's conclusion that further action is needed at the John's Auto Wrecking site. Olympia, WA: Washington Department of Ecology, Southwest Regional Office.

Normandeau. 2014a. Memorandum dated October 14, 2014 from Patrick J. Togher (Normandeau) to Alan J. Wertjes, re: John's Wrecking Yard Final TEE Memorandum. Seattle, WA: Normandeau Associates, Inc.

Normandeau. 2014b. Wetland Delineation Report. John's Wrecking Yard, 411 93rd Avenue Southeast, Olympia, Washington. Prepared for Alan J. Wertjes. Normandeau Associates, Inc., Seattle, WA.

Robinson Noble. 2013. John's Auto Wrecking, 411 93rd Avenue Southeast, Olympia, Washington. Facility/Site No. 54665495, VCP Project No. SW1127. Remedial Investigation. Robinson Noble, Woodinville, WA.

Appendix A. Terrestrial Ecological Evaluation Form

Voluntary Cleanup Program

Washington State Department of Ecology
Toxics Cleanup Program

DEPARTMENT OF ECOLOGY
State of Washington

TERRESTRIAL ECOLOGICAL EVALUATION FORM

Under the Model Toxics Control Act (MTCA), a terrestrial ecological evaluation is necessary if hazardous substances are released into the soils at a Site. In the event of such a release, you must take one of the following three actions as part of your investigation and cleanup of the Site:

1. Document an exclusion from further evaluation using the criteria in WAC 173-340-7491.
2. Conduct a simplified evaluation as set forth in WAC 173-340-7492.
3. Conduct a site-specific evaluation as set forth in WAC 173-340-7493.

When requesting a written opinion under the Voluntary Cleanup Program (VCP), you must complete this form and submit it to the Department of Ecology (Ecology). The form documents the type and results of your evaluation.

Completion of this form is not sufficient to document your evaluation. You still need to document your analysis and the basis for your conclusion in your cleanup plan or report.

If you have questions about how to conduct a terrestrial ecological evaluation, please contact the Ecology site manager assigned to your Site. For additional guidance, please refer to www.ecy.wa.gov/programs/tcp/policies/terrestrial/TEEHome.htm.

Step 1: IDENTIFY HAZARDOUS WASTE SITE	
Please identify below the hazardous waste site for which you are documenting an evaluation.	
Facility/Site Name: John's Auto Wrecking	
Facility/Site Address: 411 93rd Ave SE	
Facility/Site No: 57665495	VCP Project No.: SW1613

Step 2: IDENTIFY EVALUATOR		
Please identify below the person who conducted the evaluation and their contact information.		
Name: Tad Deshler		Title: Owner
Organization: Coho Environmental LLC		
Mailing address: 533 NE 90th St.		
City: Seattle	State: WA	Zip code: 98115
Phone: 2067789274	Fax:	E-mail: tad.deshler@cohoenvironmental.com

ECY 090-300 (07/2015) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Toxic Cleanup Program 360-407-7170. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Step 3: DOCUMENT EVALUATION TYPE AND RESULTS

A. Exclusion from further evaluation.

1. Does the Site qualify for an exclusion from further evaluation?

- ☐ Yes — *If you answered **"YES,"** then answer **Question 2**.*
- ☒ No or Unknown — *If you answered **"NO" or "UKNOWN,"** then skip to **Step 3B** of this form.*

2. What is the basis for the exclusion? *Check all that apply. Then skip to **Step 4** of this form.*

Point of Compliance: WAC 173-340-7491(1)(a)

- ☐ All soil contamination is, or will be,* at least 15 feet below the surface.
- ☐ All soil contamination is, or will be,* at least 6 feet below the surface (or alternative depth if approved by Ecology), and institutional controls are used to manage remaining contamination.

Barriers to Exposure: WAC 173-340-7491(1)(b)

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

Undeveloped Land: WAC 173-340-7491(1)(c)

- ☐ There is less than 0.25 acres of contiguous# undeveloped± land on or within 500 feet of any area of the Site and any of the following chemicals is present: chlorinated dioxins or furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, heptachlor epoxide, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, or pentachlorobenzene.
- ☐ For sites not containing any of the chemicals mentioned above, there is less than 1.5 acres of contiguous# undeveloped± land on or within 500 feet of any area of the Site.

Background Concentrations: WAC 173-340-7491(1)(d)

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

* An exclusion based on future land use must have a completion date for future development that is acceptable to Ecology.

± "Undeveloped land" is land that is not covered by building, roads, paved areas, or other barriers that would prevent wildlife from feeding on plants, earthworms, insects, or other food in or on the soil.

\# "Contiguous" undeveloped land is an area of undeveloped land that is not divided into smaller areas of highways, extensive paving, or similar structures that are likely to reduce the potential use of the overall area by wildlife.

ECY 090-300 (07/2015) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Toxic Cleanup Program 360-407-7170. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

B. Simplified evaluation.

1. Does the Site qualify for a simplified evaluation?

☐ Yes — *If you answered* ***"YES,"*** *then answer* ***Question 2*** *below.*

☒ No or Unknown — *If you answered* ***"NO"*** *or* ***"UNKNOWN,"*** *then skip to* ***Step 3C*** *of this form.*

2. Did you conduct a simplified evaluation?

☐ Yes — *If you answered* ***"YES,"*** *then answer* ***Question 3*** *below.*

☐ No — *If you answered* ***"NO,"*** *then skip to* ***Step 3C*** *of this form.*

3. Was further evaluation necessary?

☐ Yes — *If you answered* ***"YES,"*** *then answer* ***Question 4*** *below.*

☐ No — *If you answered* ***"NO,"*** *then answer* ***Question 5*** *below.*

4. If further evaluation was necessary, what did you do?

☐ Used the concentrations listed in Table 749-2 as cleanup levels. *If so, then skip to* ***Step 4*** *of this form.*

☐ Conducted a site-specific evaluation. *If so, then skip to* ***Step 3C*** *of this form.*

5. If no further evaluation was necessary, what was the reason? *Check all that apply. Then skip to* ***Step 4*** *of this form.*

Exposure Analysis: WAC 173-340-7492(2)(a)

☐ Area of soil contamination at the Site is not more than 350 square feet.

☐ Current or planned land use makes wildlife exposure unlikely. Used Table 749-1.

Pathway Analysis: WAC 173-340-7492(2)(b)

☐ No potential exposure pathways from soil contamination to ecological receptors.

Contaminant Analysis: WAC 173-340-7492(2)(c)

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations that exceed the values listed in Table 749-2.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations that exceed the values listed in Table 749-2, and institutional controls are used to manage remaining contamination.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays, and institutional controls are used to manage remaining contamination.

ECY 090-300 (07/2015) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Toxic Cleanup Program 360-407-7170. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

C. Site-specific evaluation. A site-specific evaluation process consists of two parts: (1) formulating the problem, and (2) selecting the methods for addressing the identified problem. Both steps require consultation with and approval by Ecology. *See* WAC 173-340-7493(1)(c).

1. Was there a problem? *See* WAC 173-340-7493(2).

- ■ Yes — *If you answered **"YES,"** then answer **Question 2** below.*
- ☐ No — *If you answered **"NO,"** then identify the reason here and then skip to **Question 5** below:*
  - ☐ No issues were identified during the problem formulation step.
  - ☐ While issues were identified, those issues were addressed by the cleanup actions for protecting human health.

2. What did you do to resolve the problem? *See* WAC 173-340-7493(3).

- [X] Used the concentrations listed in Table 749-3 as cleanup levels. *If so, then skip to **Question 5** below.* For all chemicals except nickel
- [X] Used one or more of the methods listed in WAC 173-340-7493(3) to evaluate and address the identified problem. *If so, then answer **Questions 3 and 4** below.* Nickel

3. If you conducted further site-specific evaluations, what methods did you use? *Check all that apply. See* WAC 173-340-7493(3).

- ☐ Literature surveys.
- ☐ Soil bioassays.
- ☐ Wildlife exposure model.
- ☐ Biomarkers.
- [X] Site-specific field studies.
- [X] Weight of evidence.
- ☐ Other methods approved by Ecology. If so, please specify:

4. What was the result of those evaluations?

- [X] Confirmed there was no problem.
- ☐ Confirmed there was a problem and established site-specific cleanup levels.

5. Have you already obtained Ecology's approval of both your problem formulation and problem resolution steps?

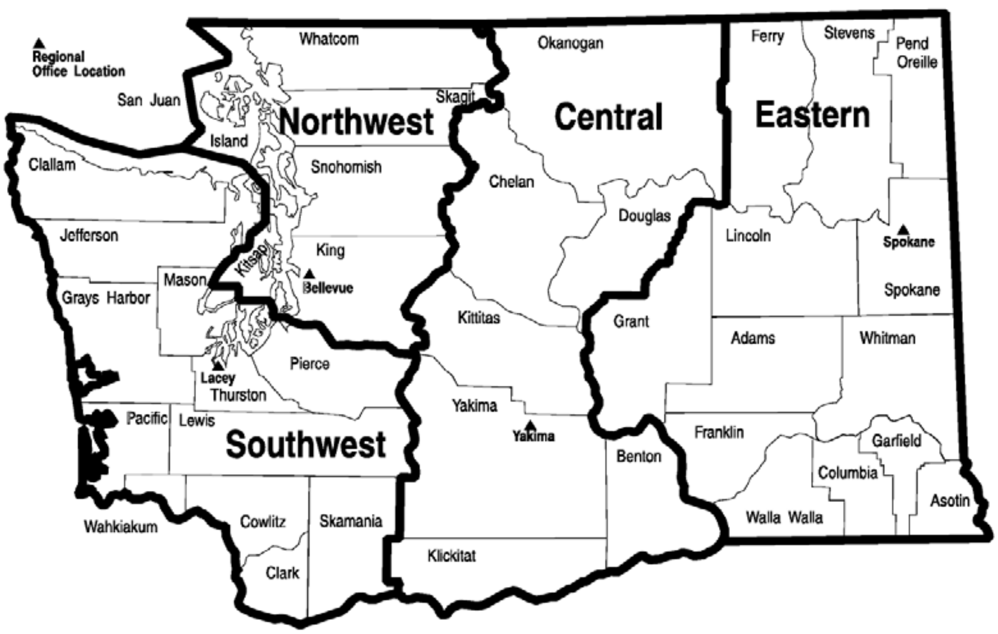
- ☐ Yes — If so, please identify the Ecology staff who approved those steps:
- ■ No

ECY 090-300 (07/2015) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Toxic Cleanup Program 360-407-7170. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Step 4: SUBMITTAL

Please mail your completed form to the Ecology site manager assigned to your Site. If a site manager has not yet been assigned, please mail your completed form to the Ecology regional office for the County in which your Site is located.

Northwest Region: Attn: VCP Coordinator 3190 160th Ave. SE Bellevue, WA 98008-5452	**Central Region:** Attn: VCP Coordinator 1250 West Alder St. Union Gap, WA 98903-0009
Southwest Region: Attn: VCP Coordinator P.O. Box 47775 Olympia, WA 98504-7775	**Eastern Region:** Attn: VCP Coordinator N. 4601 Monroe Spokane WA 99205-1295



ECY 090-300 (07/2015) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Toxic Cleanup Program 360-407-7170. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Appendix B. Soil Concentrations

North region

Sample_ID	Date	Arsenic (mg/kg)	Detected
TP1-1' B	2/20/2009	5	No
TP2-1' A	2/20/2009	5	No
TP2-1' B	2/20/2009	5	No
TP3-1A	2/20/2009	5	No
TP3-Surf B	2/20/2009	5	No
TP4-1'	2/20/2009	5	No
TP5-0.5'A	2/20/2009	5	No
TP5-Surf B	2/20/2009	5	No
CTP1B	8/18/2009	5	No
B15-3	2/25/2013	8.8	Yes
B16-3	2/25/2013	8.6	Yes
B17-3	2/25/2013	9.7	Yes
MW-4-3	2/25/2013	8.3	Yes
HB1-3	2/27/2013	8.9	Yes
HB2-3	2/27/2013	8.2	Yes
TP12-1	11/5/2014	7	Yes
TP12-3	11/5/2014	9	Yes
TP13-1	11/5/2014	7	Yes
TP13-3	11/5/2014	8	Yes
TP14-1.5	11/5/2014	8	Yes
TP14-3	11/5/2014	7	Yes
TP15-1	11/5/2014	7	Yes
TP15-3	11/5/2014	9	Yes
TP16-1	11/5/2014	7	Yes
TP16-3	11/5/2014	8	Yes
TP17-1	11/5/2014	8	Yes
TP17-3	11/5/2014	7	Yes
TP18-1	11/5/2014	7	Yes
TP18-3	11/5/2014	7	Yes
TP24-3	11/6/2014	5	No
TP26-2	11/6/2014	5	No
TP27-2	11/6/2014	5	No
TP28-2	11/6/2014	5	No
TP29-2	11/6/2014	5	No
TP30-2	11/6/2014	5	No
TP21-1	11/6/2014	8	Yes
TP21-3	11/6/2014	8	Yes
TP22-1	11/6/2014	5	Yes
TP22-3	11/6/2014	7	Yes
TP23-1	11/6/2014	5	Yes
TP23-4	11/6/2014	7	Yes
TP24-1	11/6/2014	5	Yes
TP25-1	11/6/2014	7	Yes
TP25-3	11/6/2014	7	Yes

North region

Sample_ID	Date	Chromium (mg/kg)	Detected
TP1-1' B	2/20/2009	27	Yes
TP2-1' A	2/20/2009	8	Yes
TP2-1' B	2/20/2009	13	Yes
TP3-1A	2/20/2009	116	Yes
TP3-Surf B	2/20/2009	23	Yes
TP4-1'	2/20/2009	9	Yes
TP5-0.5'A	2/20/2009	46	Yes
TP5-Surf B	2/20/2009	39	Yes
TP1-1' B	2/24/2009	59	Yes
TP2-1' A	2/24/2009	34	Yes
TP2-1' B	2/24/2009	37	Yes
TP3-1A	2/24/2009	23	Yes
TP3-Surf B	2/24/2009	19	Yes
TP5-0.5'A	2/24/2009	83	Yes
TP5-Surf B	2/24/2009	8	Yes
CTP1B	8/18/2009	5	No
CTP1B	8/18/2009	9	Yes
B12-3	2/25/2013	5	No
B14-3	2/25/2013	5	No
B15-3	2/25/2013	5	No
B16-3	2/25/2013	5	No
B17-3	2/25/2013	5	No
MW-4-3	2/25/2013	5	No
B13-3	2/25/2013	7.6	Yes
B15-3	2/25/2013	8	Yes
B16-3	2/25/2013	8.4	Yes
B17-3	2/25/2013	7.3	Yes
B15-3	2/25/2013	25	Yes
B16-3	2/25/2013	85	Yes
B17-3	2/25/2013	57	Yes
MW-4-3	2/25/2013	72	Yes
MW-4-3	2/25/2013	53	Yes
B12-3	2/25/2013	11	Yes
B13-3	2/25/2013	10	Yes
B14-3	2/25/2013	11	Yes
B15-3	2/25/2013	11	Yes
B18-3	2/26/2013	5	No
B18-6	2/26/2013	5	No
HB1-3	2/27/2013	5	No
HB2-3	2/27/2013	5	No
HB1-3	2/27/2013	34	Yes
HB2-3	2/27/2013	15	Yes
HB1-3	2/27/2013	11	Yes
HB2-3	2/27/2013	56	Yes

North region

Sample_ID	Date	Copper (mg/kg)	Detected
CTP1B	8/14/2008	6	Yes
TP5-Surf B	2/20/2009	5	No
TP1-1' B	2/20/2009	13	Yes
TP2-1' A	2/20/2009	15	Yes
TP2-1' B	2/20/2009	10	Yes
TP3-1A	2/20/2009	12	Yes
TP3-Surf B	2/20/2009	10	Yes
TP4-1'	2/20/2009	12	Yes
TP5-0.5'A	2/20/2009	12	Yes
TP5-Surf B	2/20/2009	10	Yes
TP1-1' B	2/24/2009	6	Yes
TP2-1' A	2/24/2009	7	Yes
TP2-1' B	2/24/2009	8	Yes
TP3-1A	2/24/2009	13	Yes
TP3-Surf B	2/24/2009	7	Yes
TP5-0.5'A	2/24/2009	5	No
TP5-Surf B	2/24/2009	5	No
TP1-1' B	2/25/2009	9	Yes
CTP1B	8/17/2009	5	No
CTP1B	8/18/2009	3113	Yes
B16-3	2/25/2013	13	Yes
B17-3	2/25/2013	14	Yes
MW-4-3	2/25/2013	11	Yes
B15-3	2/25/2013	5	No
B16-3	2/25/2013	5	No
B17-3	2/25/2013	20	Yes
MW-4-3	2/25/2013	10	Yes
B15-3	2/25/2013	11	Yes
B16-3	2/25/2013	20	Yes
B17-3	2/25/2013	11	Yes
MW-4-3	2/25/2013	5	No
B18-3	2/26/2013	12	Yes
B18-6	2/26/2013	12	Yes
B18-3	2/26/2013	5	No
B18-6	2/26/2013	5	No
B18-3	2/26/2013	5	No
B18-6	2/26/2013	5	No
HB1-3	2/27/2013	13	Yes
HB2-3	2/27/2013	12	Yes
HB1-3	2/27/2013	15	Yes
HB2-3	2/27/2013	12	Yes
HB1-3	2/27/2013	12	Yes
HB2-3	2/27/2013	5	Yes

North region

Sample_ID	Date	Diesel Range Organics (mg/kg)	Detected
TP12-1	11/5/2014	50	No
TP13-1	11/5/2014	50	No
TP13-3	11/5/2014	50	No
TP14-1.5	11/5/2014	50	No
TP14-3	11/5/2014	50	No
TP15-1	11/5/2014	50	No
TP15-3	11/5/2014	50	No
TP16-1	11/5/2014	50	No
TP17-1	11/5/2014	50	No
TP17-3	11/5/2014	50	No
TP18-1	11/5/2014	50	No
TP18-3	11/5/2014	140	Yes
TP19-1	11/6/2014	340	Yes

North region

Sample_ID	Date	Lead (mg/kg)	Detected
TP 3-Surface B	2/18/2009	5	No
TP 5-Surface B	2/18/2009	5	No
TP1-1' B	2/24/2009	13	Yes
TP2-1' A	2/24/2009	7	Yes
TP2-1' B	2/24/2009	5552	Yes
TP3-1A	2/24/2009	21	Yes
TP3-Surf B	2/24/2009	7	Yes
TP5-0.5'A	2/24/2009	5	No
TP5-Surf B	2/24/2009	17	Yes
CTP1B	8/18/2009	5	No
CTP1A	8/20/2009	5	No
CTP1B	8/20/2009	5	No
CTP1C	8/20/2009	5	No
CTP1A	8/25/2009	5	No
CTP1C	8/25/2009	5	No
B15-3	2/25/2013	5	No
B16-3	2/25/2013	230	Yes
B17-3	2/25/2013	5	No
MW-4-3	2/25/2013	13	Yes
HB1-3	2/27/2013	5	No
HB2-3	2/27/2013	27	Yes
TP12-1	11/5/2014	5	No
TP12-3	11/5/2014	5	No
TP13-1	11/5/2014	5	No
TP13-3	11/5/2014	5	No
TP14-1.5	11/5/2014	5	No
TP14-3	11/5/2014	5	No
TP15-1	11/5/2014	5	No
TP15-3	11/5/2014	5	Yes
TP16-1	11/5/2014	5	No
TP16-3	11/5/2014	5	No
TP17-1	11/5/2014	5	No
TP17-3	11/5/2014	5	No
TP18-1	11/5/2014	5	No
TP18-3	11/5/2014	16	Yes
TP19-3	11/6/2014	5	No
TP20-1	11/6/2014	5	No
TP20-3	11/6/2014	5	No
TP21-1	11/6/2014	26	Yes
TP21-3	11/6/2014	5	No
TP21-1	11/6/2014	5	No
TP21-3	11/6/2014	8	Yes
TP22-1	11/6/2014	5	No
TP22-3	11/6/2014	5	No
TP23-1	11/6/2014	5	No
TP23-4	11/6/2014	5	No

North region

Sample_ID	Date	Nickel (mg/kg)	Detected
TP12-1	11/5/2014	25	Yes
TP12-3	11/5/2014	20	Yes
TP13-1	11/5/2014	32	Yes
TP13-3	11/5/2014	27	Yes
TP14-1.5	11/5/2014	5	No
TP14-3	11/5/2014	24	Yes
TP15-1	11/5/2014	23	Yes
TP15-3	11/5/2014	24	Yes
TP16-1	11/5/2014	23	Yes
TP16-3	11/5/2014	26	Yes
TP17-1	11/5/2014	23	Yes
TP17-3	11/5/2014	16	Yes
TP18-1	11/5/2014	20	Yes
TP18-3	11/5/2014	21	Yes
TP12-1	11/5/2014	4	Yes
TP12-3	11/5/2014	9	Yes
TP13-1	11/5/2014	15	Yes
TP13-3	11/5/2014	8	Yes
TP14-1.5	11/5/2014	15	Yes
TP24-1	11/6/2014	20.8	Yes
TP24-3	11/6/2014	22.4	Yes
TP25-1	11/6/2014	20	Yes
TP25-3	11/6/2014	20	Yes
TP26-2	11/6/2014	18.6	Yes
TP27-2	11/6/2014	20.8	Yes
TP28-2	11/6/2014	115	Yes
TP29-2	11/6/2014	25	Yes
TP30-2	11/6/2014	21	Yes
TP21-1	11/6/2014	23	Yes
TP21-3	11/6/2014	20	Yes
TP22-1	11/6/2014	19	Yes
TP22-3	11/6/2014	20	Yes
TP23-1	11/6/2014	21	Yes
TP23-4	11/6/2014	19	Yes
TP24-1	11/6/2014	23	Yes
TP24-3	11/6/2014	18	Yes
TP25-1	11/6/2014	20	Yes
TP25-3	11/6/2014	16	Yes
TP26-2	11/6/2014	18	Yes
TP27-2	11/6/2014	16	Yes
TP28-2	11/6/2014	22	Yes
TP29-2	11/6/2014	24	Yes
TP30-2	11/6/2014	26	Yes

North region

Sample_ID	Date	Paraffin oils (mg/kg)	Detected
TP14-3	11/5/2014	100	No
TP15-1	11/5/2014	100	No
TP15-3	11/5/2014	100	No
TP16-1	11/5/2014	100	No
TP16-3	11/5/2014	100	No
TP17-1	11/5/2014	100	No
TP17-3	11/5/2014	100	No
TP18-1	11/5/2014	100	No
TP18-3	11/5/2014	100	No
TP21-1	11/6/2014	100	No
TP21-3	11/6/2014	100	No
TP22-1	11/6/2014	1020	Yes

North region

Sample_ID	Date	PCB-Aroclor 1254 (mg/kg)	Detected
TP12-1	11/5/2014	0.5	No
TP12-3	11/5/2014	0.5	No
TP13-1	11/5/2014	0.5	No
TP13-3	11/5/2014	0.5	No
TP14-1.5	11/5/2014	0.5	No
TP14-3	11/5/2014	0.05	No
TP15-1	11/5/2014	0.5	No
TP15-3	11/5/2014	0.5	No
TP16-1	11/5/2014	0.05	No
TP16-3	11/5/2014	0.5	No
TP17-1	11/5/2014	0.5	No
TP17-3	11/5/2014	0.5	No
TP18-1	11/5/2014	0.5	No
TP18-3	11/5/2014	0.185	No
TP22-3	11/6/2014	0.02	No
TP23-1	11/6/2014	0.02	No
TP23-4	11/6/2014	0.5	No
TP24-1	11/6/2014	0.5	No
TP24-3	11/6/2014	0.5	No
TP25-1	11/6/2014	0.46	Yes
TP25-3	11/6/2014	0.5	No
TP26-2	11/6/2014	0.5	No
TP27-2	11/6/2014	0.5	No
TP28-2	11/6/2014	0.5	No
TP29-2	11/6/2014	0.5	No
TP30-2	11/6/2014	0.5	No
TP21-1	11/6/2014	0.5	No

North region

Sample_ID	Date	Zinc (mg/kg)	Detected
TP12-1	11/5/2014	5	No
TP12-3	11/5/2014	9	Yes
TP13-1	11/5/2014	5	No
TP13-3	11/5/2014	7	Yes
TP14-1.5	11/5/2014	5	No
TP14-3	11/5/2014	5	No
TP15-1	11/5/2014	5	No
TP15-3	11/5/2014	5	No
TP16-1	11/5/2014	5	No
TP16-3	11/5/2014	5	No
TP17-1	11/5/2014	5	No
TP17-3	11/5/2014	5	No
TP18-1	11/5/2014	5	No
TP18-3	11/5/2014	6	Yes
TP21-3	11/6/2014	5	No
TP22-1	11/6/2014	5.3	Yes
TP22-3	11/6/2014	5	No
TP23-1	11/6/2014	25	Yes
TP23-4	11/6/2014	5	No
TP24-1	11/6/2014	5	No
TP24-3	11/6/2014	24.5	Yes
TP25-1	11/6/2014	23	Yes
TP25-3	11/6/2014	1	No
TP26-2	11/6/2014	1	No
TP27-2	11/6/2014	1	No
TP28-2	11/6/2014	19	Yes
TP29-2	11/6/2014	11	Yes
TP30-2	11/6/2014	9	Yes
TP21-1	11/6/2014	5	No
TP21-3	11/6/2014	5	No
TP22-1	11/6/2014	9	Yes
TP22-3	11/6/2014	5	No
TP23-1	11/6/2014	5	No
TP23-4	11/6/2014	7	Yes
TP24-1	11/6/2014	5	No
TP24-3	11/6/2014	5	No
TP25-1	11/6/2014	5	No
TP25-3	11/6/2014	5	No
TP26-2	11/6/2014	5	No
TP27-2	11/6/2014	5	No
TP28-2	11/6/2014	5	No
TP29-2	11/6/2014	5	No
TP30-2	11/6/2014	5	No

South region

Sample_ID	Date	Arsenic (mg/kg)	Detected
TP10-1'	2/20/2009	5	No
TP11-1'	2/20/2009	5	No
TP6-Surf B	2/20/2009	5	No
TP8-3'	2/20/2009	5	No
TP9-Surf A	2/20/2009	5	No
TP9-1'B	2/20/2009	5	No
TP9 Surf B	2/20/2009	5	No
B10-4.5'	3/1/2009	5	No
B8-2.5'	3/1/2009	5	No
CTP6C	8/18/2009	5	No
B21-2	2/26/2013	8.1	Yes
B22-6	2/26/2013	6.6	Yes
B20-6	2/26/2013	5	No
B23-2	2/26/2013	7.8	Yes
MW-5-3	2/26/2013	8.6	Yes
B21-5	2/26/2013	5	No
MW-5-6	2/26/2013	6.7	Yes
B24-1	2/27/2013	6.5	Yes
HB3-3	2/27/2013	6.1	Yes
HB7-2	2/27/2013	6.5	Yes
HB8-3	2/27/2013	6.3	Yes
B25-2	2/27/2013	5	No
HB4-3	2/27/2013	5	No
HB10-1	2/28/2013	5.6	Yes
HB5-1	2/28/2013	5	No
HB6-1	2/28/2013	5	No
HB9-1	2/28/2013	5	No
PS1	3/29/2013	5	No
SS2	3/29/2013	5	No
SS3	3/29/2013	5	No
SS4	3/29/2013	5	No
SS5	3/29/2013	5	No
WS6	3/29/2013	5	No
WS7	3/29/2013	5	No
WS8	3/29/2013	5	No

South region

Sample_ID	Date	Benz[a]anthracene (mg/kg)	Detected
PS1	3/29/2013	0.187	Yes
WS8	3/29/2013	0.0915	Yes
SS2	3/29/2013	0.0906	No
SS3	3/29/2013	0.107	No
SS4	3/29/2013	0.0815	No
SS5	3/29/2013	0.0723	No
WS6	3/29/2013	0.0815	No
WS7	3/29/2013	0.0768	No
PS1	3/29/2013	0.202	Yes
WS8	3/29/2013	0.085	Yes
SS2	3/29/2013	0.0906	No
SS3	3/29/2013	0.107	No
SS4	3/29/2013	0.0925	No
SS5	3/29/2013	0.0723	No
WS6	3/29/2013	0.0815	No
WS7	3/29/2013	0.0768	No

South region

Sample_ID	Date	Benzo(b)fluoranthene (mg/kg)	Detected
PS1	3/29/2013	0.349	Yes
WS6	3/29/2013	0.0925	Yes
WS8	3/29/2013	0.153	Yes
SS2	3/29/2013	0.0906	No
SS3	3/29/2013	0.107	No
SS4	3/29/2013	0.0815	No
SS5	3/29/2013	0.0723	No
WS7	3/29/2013	0.0768	No

South region

Sample_ID	Date	Benzo(ghi)perylene (mg/kg)	Detected
PS1	3/29/2013	0.115	Yes
SS2	3/29/2013	0.0906	No
SS3	3/29/2013	0.107	No
SS4	3/29/2013	0.0815	No
SS5	3/29/2013	0.0723	No
WS6	3/29/2013	0.0815	No
WS7	3/29/2013	0.0768	No
WS8	3/29/2013	0.0723	No

South region

Sample_ID	Date	Benzo(k)fluoranthene (mg/kg)	Detected
PS1	3/29/2013	0.103	Yes
SS2	3/29/2013	0.0906	No
SS3	3/29/2013	0.107	No
SS4	3/29/2013	0.0815	No
SS5	3/29/2013	0.0723	No
WS6	3/29/2013	0.0815	No
WS7	3/29/2013	0.0768	No
WS8	3/29/2013	0.0723	No

South region

Sample_ID	Date	Chromium (mg/kg)	Detected
TP10-1'	2/20/2009	5	No
TP11-1'	2/20/2009	5	No
TP6-Surf B	2/20/2009	5	No
TP8-3'	2/20/2009	5	No
TP9-Surf A	2/20/2009	5	No
TP9-1'B	2/20/2009	5	No
TP9 Surf B	2/20/2009	5	No
B10-4.5'	3/1/2009	5	No
B8-2.5'	3/1/2009	5	No
CTP6C	8/18/2009	5	No
B20-6	2/26/2013	5	No
B21-2	2/26/2013	8.7	Yes
B21-5	2/26/2013	13.2	Yes
B22-6	2/26/2013	7.2	Yes
B23-2	2/26/2013	6.6	Yes
MW-5-3	2/26/2013	13	Yes
MW-5-6	2/26/2013	17.4	Yes
B24-1	2/27/2013	9	Yes
B25-2	2/27/2013	7.9	Yes
HB3-3	2/27/2013	7.7	Yes
HB4-3	2/27/2013	7.6	Yes
HB7-2	2/27/2013	9.2	Yes
HB8-3	2/27/2013	7.9	Yes
HB10-1	2/28/2013	6.1	Yes
HB5-1	2/28/2013	5	No
HB6-1	2/28/2013	5	No
HB9-1	2/28/2013	5	No
WS6	3/29/2013	9.7	Yes
PS1	3/29/2013	5	No
SS2	3/29/2013	5	No
SS3	3/29/2013	5	No
SS4	3/29/2013	5	No
SS5	3/29/2013	5	No
WS7	3/29/2013	5	No
WS8	3/29/2013	5	No

South region

Sample_ID	Date	Chrysene (mg/kg)	Detected
PS1	3/29/2013	0.212	Yes
WS8	3/29/2013	0.0996	Yes
SS2	3/29/2013	0.0906	No
SS3	3/29/2013	0.107	No
SS4	3/29/2013	0.0815	No
SS5	3/29/2013	0.0915	No
WS6	3/29/2013	0.0815	No
WS7	3/29/2013	0.0768	No

South region

Sample_ID	Date	Copper (mg/kg)	Detected
TP9-Surf A	2/24/2009	5	Yes
TP11-1'	2/24/2009	5	No
TP8-3'	2/24/2009	5	No
TP9-1'B	2/24/2009	5	No
TP9 Surf B	2/24/2009	5	No
B10-4.5'	3/1/2009	5	No
B8-2.5'	3/1/2009	5	No
CTP6C	8/18/2009	11	Yes
B20-6	2/26/2013	5.9	Yes
B21-2	2/26/2013	6.1	Yes
B21-5	2/26/2013	6	Yes
B22-6	2/26/2013	6.9	Yes
B23-2	2/26/2013	9.6	Yes
MW-5-6	2/26/2013	34	Yes
MW-5-3	2/26/2013	23	Yes
B25-2	2/27/2013	5	No
B24-1	2/27/2013	6.3	Yes
HB3-3	2/27/2013	11	Yes
HB4-3	2/27/2013	5	Yes
HB7-2	2/27/2013	10	Yes
HB8-3	2/27/2013	13	Yes
HB10-1	2/28/2013	5.5	Yes
HB5-1	2/28/2013	5	No
HB6-1	2/28/2013	5	No
HB9-1	2/28/2013	5	No
PS1	3/2/2013	11	Yes
SS2	3/2/2013	8	Yes
WS6	3/2/2013	68	Yes
WS7	3/2/2013	12	Yes
WS8	3/2/2013	40	Yes
SS3	3/2/2013	5	No
SS4	3/2/2013	5	No
SS5	3/2/2013	5	No

South region

Sample_ID	Date	Diesel Range Organics (mg/kg)	Detected
TP9-Surf A	2/20/2009	320	Yes
B20-6	2/26/2013	50	No
B21-2	2/26/2013	50	No
B21-5	2/26/2013	50	No
B22-6	2/26/2013	50	No
B23-2	2/26/2013	50	No
B23-4	2/26/2013	50	No
MW-5-3	2/26/2013	50	No
MW-5-6	2/26/2013	50	No
B24-1	2/27/2013	50	No
B24-2	2/27/2013	50	No
B25-2	2/27/2013	50	No
HB3-3	2/27/2013	50	No
HB4-3	2/27/2013	50	No
HB7-2	2/27/2013	50	No
HB8-3	2/27/2013	50	No
HB10-1	2/28/2013	50	No
HB5-1	2/28/2013	50	No
HB6-1	2/28/2013	50	No
HB9-1	2/28/2013	50	No
PS1	4/1/2013	50	No
SS2	4/1/2013	50	No
SS3	4/1/2013	50	No
SS4	4/1/2013	50	No
SS5	4/1/2013	50	No
WS6	4/1/2013	50	No
WS7	4/1/2013	50	No
WS8	4/1/2013	50	No

South region

Sample_ID	Date	Fluoranthene (mg/kg)	Detected
PS1	3/29/2013	0.528	Yes
WS8	3/29/2013	0.216	Yes
SS2	3/29/2013	0.0906	No
SS3	3/29/2013	0.378	No
SS4	3/29/2013	0.0815	No
SS5	3/29/2013	0.153	No
WS6	3/29/2013	0.0815	No
WS7	3/29/2013	0.0768	No

South region

Sample_ID	Date	Indeno(1,2,3-cd)pyrene (mg/kg)	Detected
PS1	3/29/2013	0.135	Yes
SS2	3/29/2013	0.0906	No
SS3	3/29/2013	0.378	No
SS4	3/29/2013	0.0815	No
SS5	3/29/2013	0.0723	No
WS6	3/29/2013	0.0815	No
WS7	3/29/2013	0.0768	No
WS8	3/29/2013	0.0723	No

South region

Sample_ID	Date	Lead (mg/kg)	Detected
TP9-Surf A	2/20/2009	25	Yes
TP9-1'B	2/20/2009	6	Yes
TP10-1'	2/20/2009	5	No
TP11-1'	2/20/2009	5	No
TP6-Surf B	2/20/2009	5	No
TP8-3'	2/20/2009	5	No
TP9 Surf B	2/20/2009	5	No
B10-4.5'	3/1/2009	5	No
B8-2.5'	3/1/2009	5	No
CTP6C	8/18/2009	5	No
B20-6	2/26/2013	5	No
B21-5	2/26/2013	5	No
B22-6	2/26/2013	5	No
B23-2	2/26/2013	5	No
B21-2	2/26/2013	5.5	Yes
MW-5-3	2/26/2013	5	No
MW-5-6	2/26/2013	5	No
B24-1	2/27/2013	5	No
B25-2	2/27/2013	5	No
HB3-3	2/27/2013	5	No
HB4-3	2/27/2013	5	No
HB7-2	2/27/2013	5	No
HB8-3	2/27/2013	5	No
HB5-1	2/28/2013	5	No
HB6-1	2/28/2013	5	No
HB9-1	2/28/2013	5	No
HB10-1	2/28/2013	43	Yes
PS1	3/29/2013	34	Yes
SS2	3/29/2013	40	Yes
SS3	3/29/2013	25	Yes
SS4	3/29/2013	6	Yes
SS5	3/29/2013	22	Yes
WS6	3/29/2013	1230	Yes
WS7	3/29/2013	53	Yes
WS8	3/29/2013	525	Yes
WS 10	8/1/2016	165	Yes
WS 11	8/1/2016	67	Yes
WS 12	8/1/2016	21	Yes
WS 13	8/1/2016	47	Yes
WS 14	8/1/2016	17	Yes
WS 15	8/1/2016	9	Yes
WS 16	8/1/2016	8	Yes
WS 17	8/1/2016	8	Yes
WS 18	8/1/2016	386	Yes
WS 19	8/1/2016	11	Yes
WS 20	8/1/2016	41	Yes

WS 21	8/1/2016	123	Yes
WS 22	8/1/2016	15	Yes
WS 23	8/1/2016	13	Yes
WS 24	8/1/2016	85	Yes

South region

Sample_ID	Date	Nickel (mg/kg)	Detected
CTP6C	8/14/2008	21	Yes
TP11-1'	2/24/2009	23	Yes
TP8-3'	2/24/2009	13	Yes
TP9-Surf A	2/24/2009	30	Yes
TP9 Surf B	2/24/2009	40	Yes
TP9-1'B	2/24/2009	35	Yes
B10-4.5'	3/1/2009	20	Yes
B8-2.5'	3/1/2009	12	Yes
B20-6	2/26/2013	16	Yes
B21-2	2/26/2013	20.1	Yes
B21-5	2/26/2013	8.3	Yes
B22-6	2/26/2013	11.7	Yes
B23-2	2/26/2013	7.1	Yes
MW-5-3	2/26/2013	21.7	Yes
MW-5-6	2/26/2013	21.4	Yes
B25-2	2/27/2013	1.5	No
B24-1	2/27/2013	15.4	Yes
HB3-3	2/27/2013	19.9	Yes
HB4-3	2/27/2013	9.5	Yes
HB7-2	2/27/2013	15	Yes
HB8-3	2/27/2013	22.2	Yes
HB10-1	2/28/2013	1.5	No
HB6-1	2/28/2013	1.5	No
HB5-1	2/28/2013	15.7	Yes
HB9-1	2/28/2013	209	Yes
PS1	3/29/2013	10	Yes
SS2	3/29/2013	12	Yes
SS3	3/29/2013	8	Yes
SS4	3/29/2013	5	Yes
SS5	3/29/2013	3	Yes
WS6	3/29/2013	12.1	Yes
WS7	3/29/2013	12.5	Yes
WS8	3/29/2013	18.1	Yes

South region

Sample_ID	Date	Phenanthrene (mg/kg)	Detected
SS2	3/29/2013	0.0906	No
SS3	3/29/2013	0.378	No
SS4	3/29/2013	0.0815	No
SS5	3/29/2013	0.0723	No
PS1	3/29/2013	0.252	Yes
WS8	3/29/2013	0.104	Yes
WS6	3/29/2013	0.0815	No
WS7	3/29/2013	0.0768	No

South region

Sample_ID	Date	Pyrene (mg/kg)	Detected
SS2	3/29/2013	0.0906	No
SS3	3/29/2013	0.378	No
SS4	3/29/2013	0.0768	No
SS5	3/29/2013	0.216	No
PS1	3/29/2013	0.416	Yes
WS8	3/29/2013	0.185	Yes
WS6	3/29/2013	0.0815	No
WS7	3/29/2013	0.0768	No

South region

Sample_ID	Date	Zinc (mg/kg)	Detected
TP11-1'	2/24/2009	1	No
TP8-3'	2/24/2009	1	No
TP9-1'B	2/24/2009	1	No
TP9-Surf A	2/24/2009	17	Yes
TP9 Surf B	2/24/2009	13	Yes
B10-4.5'	3/1/2009	3.4	Yes
B8-2.5'	3/1/2009	3.1	Yes
CTP6C	8/18/2009	29.4	Yes
B20-6	2/26/2013	5	No
B22-6	2/26/2013	5	No
B23-2	2/26/2013	5	No
B21-5	2/26/2013	12	Yes
B21-2	2/26/2013	5.8	Yes
MW-5-3	2/26/2013	20	Yes
MW-5-6	2/26/2013	20	Yes
HB3-3	2/27/2013	5	No
HB4-3	2/27/2013	5	No
HB7-2	2/27/2013	5	No
HB8-3	2/27/2013	5	No
B24-1	2/27/2013	6.3	Yes
B25-2	2/27/2013	6.1	Yes
HB10-1	2/28/2013	5	No
HB5-1	2/28/2013	5	No
HB6-1	2/28/2013	5	No
HB9-1	2/28/2013	5	No
SS3	3/2/2013	5	No
SS4	3/2/2013	5	No
WS7	3/2/2013	5	No
PS1	3/2/2013	40	Yes
SS2	3/2/2013	47	Yes
SS5	3/2/2013	6	Yes
WS6	3/2/2013	7.6	Yes
WS8	3/2/2013	156	Yes

Appendix C. Upper Confidence Limits Output from ProUCL

Arsenic - North region

General Statistics

Total Number of Observations	44	Number of Distinct Observations	10
Number of Detects	29	Number of Non-Detects	15
Number of Distinct Detects	10	Number of Distinct Non-Detects	1
Minimum Detect	5	Minimum Non-Detect	5
Maximum Detect	9.7	Maximum Non-Detect	5
Variance Detects	1.378	Percent Non-Detects	34.09%
Mean Detects	7.5	SD Detects	1.174
Median Detects	7	CV Detects	0.157
Skewness Detects	-0.548	Kurtosis Detects	0.396
Mean of Logged Detects	2.002	SD of Logged Detects	0.168

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.894	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.926	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.232	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.161	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.648	KM Standard Error of Mean	0.232
KM SD	1.51	95% KM (BCA) UCL	7.057
95% KM (t) UCL	7.037	95% KM (Percentile Bootstrap) UCL	7.03
95% KM (z) UCL	7.029	95% KM Bootstrap t UCL	7.041
90% KM Chebyshev UCL	7.343	95% KM Chebyshev UCL	7.658
97.5% KM Chebyshev UCL	8.095	99% KM Chebyshev UCL	8.953

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.519	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.744	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.252	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.162	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	38.65	k star (bias corrected MLE)	34.68
Theta hat (MLE)	0.194	Theta star (bias corrected MLE)	0.216
nu hat (MLE)	2242	nu star (bias corrected)	2011
Mean (detects)	7.5		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	3.765	Mean	6.673
Maximum	9.7	Median	7
SD	1.542	CV	0.231

k hat (MLE)	18.32	k star (bias corrected MLE)	17.09
Theta hat (MLE)	0.364	Theta star (bias corrected MLE)	0.391
nu hat (MLE)	1612	nu star (bias corrected)	1503
Adjusted Level of Significance (β)	0.0445		
Approximate Chi Square Value (N/A, α)	1414	Adjusted Chi Square Value (N/A, β)	1412
95% Gamma Approximate UCL (use when n>=50)	7.093	95% Gamma Adjusted UCL (use when n<50)	7.108

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.648	SD (KM)	1.51
Variance (KM)	2.281	SE of Mean (KM)	0.232
k hat (KM)	19.37	k star (KM)	18.07
nu hat (KM)	1705	nu star (KM)	1590
theta hat (KM)	0.343	theta star (KM)	0.368
80% gamma percentile (KM)	7.916	90% gamma percentile (KM)	8.714
95% gamma percentile (KM)	9.412	99% gamma percentile (KM)	10.82

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	1498	Adjusted Chi Square Value (N/A, β)	1495
95% Gamma Approximate KM-UCL (use when n>=50)	7.054	95% Gamma Adjusted KM-UCL (use when n<50)	7.068

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.85	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.926	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.266	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.161	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	6.699	Mean in Log Scale	1.876
SD in Original Scale	1.503	SD in Log Scale	0.231
95% t UCL (assumes normality of ROS data)	7.08	95% Percentile Bootstrap UCL	7.07
95% BCA Bootstrap UCL	7.094	95% Bootstrap t UCL	7.062
95% H-UCL (Log ROS)	7.125		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.868	KM Geo Mean	6.476
KM SD (logged)	0.23	95% Critical H Value (KM-Log)	1.716
KM Standard Error of Mean (logged)	0.0352	95% H-UCL (KM -Log)	7.06
KM SD (logged)	0.23	95% Critical H Value (KM-Log)	1.716
KM Standard Error of Mean (logged)	0.0352		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	5.795	Mean in Log Scale	1.632
SD in Original Scale	2.578	SD in Log Scale	0.538
95% t UCL (Assumes normality)	6.449	95% H-Stat UCL	6.924

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	7.037	KM H-UCL	7.06
95% KM (BCA) UCL	7.057		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chromium - North region

General Statistics

Total Number of Observations	44	Number of Distinct Observations	26
Number of Detects	33	Number of Non-Detects	11
Number of Distinct Detects	25	Number of Distinct Non-Detects	1
Minimum Detect	7.3	Minimum Non-Detect	5
Maximum Detect	116	Maximum Non-Detect	5
Variance Detects	767.3	Percent Non-Detects	25%
Mean Detects	31.37	SD Detects	27.7
Median Detects	23	CV Detects	0.883
Skewness Detects	1.368	Kurtosis Detects	1.467
Mean of Logged Detects	3.086	SD of Logged Detects	0.862

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.823	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.192	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.152	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	24.78	KM Standard Error of Mean	4.017
KM SD	26.24	95% KM (BCA) UCL	31.81
95% KM (t) UCL	31.53	95% KM (Percentile Bootstrap) UCL	31.1
95% KM (z) UCL	31.39	95% KM Bootstrap t UCL	33.24
90% KM Chebyshev UCL	36.83	95% KM Chebyshev UCL	42.29
97.5% KM Chebyshev UCL	49.86	99% KM Chebyshev UCL	64.75

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.137	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.765	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.187	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.156	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.535	k star (bias corrected MLE)	1.415
Theta hat (MLE)	20.44	Theta star (bias corrected MLE)	22.17
nu hat (MLE)	101.3	nu star (bias corrected)	93.41
Mean (detects)	31.37		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	23.53
Maximum	116	Median	11
SD	27.56	CV	1.171

k hat (MLE)	0.339	k star (bias corrected MLE)	0.331
Theta hat (MLE)	69.45	Theta star (bias corrected MLE)	71.12
nu hat (MLE)	29.82	nu star (bias corrected)	29.12
Adjusted Level of Significance (β)	0.0445		
Approximate Chi Square Value (29.12, α)	17.8	Adjusted Chi Square Value (29.12, β)	17.5
95% Gamma Approximate UCL (use when n>=50)	38.49	95% Gamma Adjusted UCL (use when n<50)	39.16

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	24.78	SD (KM)	26.24
Variance (KM)	688.4	SE of Mean (KM)	4.017
k hat (KM)	0.892	k star (KM)	0.846
nu hat (KM)	78.49	nu star (KM)	74.47
theta hat (KM)	27.78	theta star (KM)	29.28
80% gamma percentile (KM)	40.36	90% gamma percentile (KM)	59.44
95% gamma percentile (KM)	78.78	99% gamma percentile (KM)	124.3

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (74.47, α)	55.6	Adjusted Chi Square Value (74.47, β)	55.04
95% Gamma Approximate KM-UCL (use when n>=50)	33.19	95% Gamma Adjusted KM-UCL (use when n<50)	33.53

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.181	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.152	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	24.33	Mean in Log Scale	2.579
SD in Original Scale	26.9	SD in Log Scale	1.184
95% t UCL (assumes normality of ROS data)	31.15	95% Percentile Bootstrap UCL	31.29
95% BCA Bootstrap UCL	32.09	95% Bootstrap t UCL	32.88
95% H-UCL (Log ROS)	42.34		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.717	KM Geo Mean	15.13
KM SD (logged)	0.975	95% Critical H Value (KM-Log)	2.339
KM Standard Error of Mean (logged)	0.149	95% H-UCL (KM -Log)	34.44
KM SD (logged)	0.975	95% Critical H Value (KM-Log)	2.339
KM Standard Error of Mean (logged)	0.149		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	24.15	Mean in Log Scale	2.544
SD in Original Scale	27.04	SD in Log Scale	1.207
95% t UCL (Assumes normality)	31.01	95% H-Stat UCL	42.6

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	42.29

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Copper - North region

General Statistics

Total Number of Observations	43	Number of Distinct Observations	13
Number of Detects	32	Number of Non-Detects	11
Number of Distinct Detects	13	Number of Distinct Non-Detects	1
Minimum Detect	5	Minimum Non-Detect	5
Maximum Detect	3113	Maximum Non-Detect	5
Variance Detects	300637	Percent Non-Detects	25.58%
Mean Detects	108.3	SD Detects	548.3
Median Detects	12	CV Detects	5.062
Skewness Detects	5.657	Kurtosis Detects	32
Mean of Logged Detects	2.562	SD of Logged Detects	1.049

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.186	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.533	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.154	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	81.88	KM Standard Error of Mean	72.47
KM SD	467.7	95% KM (BCA) UCL	226.3
95% KM (t) UCL	203.8	95% KM (Percentile Bootstrap) UCL	226.2
95% KM (z) UCL	201.1	95% KM Bootstrap t UCL	9742
90% KM Chebyshev UCL	299.3	95% KM Chebyshev UCL	397.8
97.5% KM Chebyshev UCL	534.5	99% KM Chebyshev UCL	802.9

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	10.7	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.85	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.524	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.168	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.321	k star (bias corrected MLE)	0.312
Theta hat (MLE)	337.2	Theta star (bias corrected MLE)	347.2
nu hat (MLE)	20.56	nu star (bias corrected)	19.97
Mean (detects)	108.3		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	80.61
Maximum	3113	Median	10
SD	473.5	CV	5.874

k hat (MLE)	0.201	k star (bias corrected MLE)	0.202
Theta hat (MLE)	401.3	Theta star (bias corrected MLE)	398.3
nu hat (MLE)	17.28	nu star (bias corrected)	17.4
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (17.40, α)	8.962	Adjusted Chi Square Value (17.40, β)	8.751
95% Gamma Approximate UCL (use when n>=50)	156.5	95% Gamma Adjusted UCL (use when n<50)	160.3

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	81.88	SD (KM)	467.7
Variance (KM)	218770	SE of Mean (KM)	72.47
k hat (KM)	0.0306	k star (KM)	0.044
nu hat (KM)	2.636	nu star (KM)	3.785
theta hat (KM)	2672	theta star (KM)	1860
80% gamma percentile (KM)	6.824	90% gamma percentile (KM)	104.2
95% gamma percentile (KM)	413	99% gamma percentile (KM)	1870

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (3.79, α)	0.639	Adjusted Chi Square Value (3.79, β)	0.598
95% Gamma Approximate KM-UCL (use when n>=50)	485.3	95% Gamma Adjusted KM-UCL (use when n<50)	518.5

95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.447	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.351	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.154	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	81.28	Mean in Log Scale	2.138
SD in Original Scale	473.4	SD in Log Scale	1.178
95% t UCL (assumes normality of ROS data)	202.7	95% Percentile Bootstrap UCL	225.8
95% BCA Bootstrap UCL	298.6	95% Bootstrap t UCL	7948
95% H-UCL (Log ROS)	27.08		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.319	KM Geo Mean	10.16
KM SD (logged)	0.983	95% Critical H Value (KM-Log)	2.343
KM Standard Error of Mean (logged)	0.152	95% H-UCL (KM -Log)	23.49
KM SD (logged)	0.983	95% Critical H Value (KM-Log)	2.343
KM Standard Error of Mean (logged)	0.152		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	81.24	Mean in Log Scale	2.141
SD in Original Scale	473.4	SD in Log Scale	1.157
95% t UCL (Assumes normality)	202.7	95% H-Stat UCL	26.18

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	397.8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Diesel Range Organics - North region

General Statistics

Total Number of Observations	13	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	11
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	140	Minimum Non-Detect	50
Maximum Detect	340	Maximum Non-Detect	50
Variance Detects	20000	Percent Non-Detects	84.62%
Mean Detects	240	SD Detects	141.4
Median Detects	240	CV Detects	0.589
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	5.385	SD of Logged Detects	0.627

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	79.23	KM Standard Error of Mean	30.98
KM SD	78.98	95% KM (BCA) UCL	N/A
95% KM (t) UCL	134.4	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	130.2	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	172.2	95% KM Chebyshev UCL	214.3
97.5% KM Chebyshev UCL	272.7	99% KM Chebyshev UCL	387.5

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	5.405	k star (bias corrected MLE)	N/A
Theta hat (MLE)	44.4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	21.62	nu star (bias corrected)	N/A
Mean (detects)	240		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	79.23	SD (KM)	78.98
Variance (KM)	6238	SE of Mean (KM)	30.98
k hat (KM)	1.006	k star (KM)	0.825
nu hat (KM)	26.17	nu star (KM)	21.46
theta hat (KM)	78.73	theta star (KM)	95.99
80% gamma percentile (KM)	129.3	90% gamma percentile (KM)	191.2
95% gamma percentile (KM)	254.2	99% gamma percentile (KM)	402.4

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0301
Approximate Chi Square Value (21.46, α)	11.93	Adjusted Chi Square Value (21.46, β)	10.93
95% Gamma Approximate KM-UCL (use when n>=50)	142.5	95% Gamma Adjusted KM-UCL (use when n<50)	155.5

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	45	Mean in Log Scale	1.9
SD in Original Scale	96.38	SD in Log Scale	2.189
95% t UCL (assumes normality of ROS data)	92.64	95% Percentile Bootstrap UCL	93.72
95% BCA Bootstrap UCL	125.6	95% Bootstrap t UCL	346
95% H-UCL (Log ROS)	1990		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	4.139	KM Geo Mean	62.72
KM SD (logged)	0.559	95% Critical H Value (KM-Log)	2.183
KM Standard Error of Mean (logged)	0.219	95% H-UCL (KM -Log)	104.3
KM SD (logged)	0.559	95% Critical H Value (KM-Log)	2.183
KM Standard Error of Mean (logged)	0.219		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	58.08	Mean in Log Scale	3.552
SD in Original Scale	90.47	SD in Log Scale	0.833
95% t UCL (Assumes normality)	102.8	95% H-Stat UCL	91.69

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	214.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Lead - North region

General Statistics

Total Number of Observations	46	Number of Distinct Observations	11
Number of Detects	13	Number of Non-Detects	33
Number of Distinct Detects	11	Number of Distinct Non-Detects	1
Minimum Detect	5	Minimum Non-Detect	5
Maximum Detect	5552	Maximum Non-Detect	5
Variance Detects	2347047	Percent Non-Detects	71.74%
Mean Detects	457.1	SD Detects	1532
Median Detects	16	CV Detects	3.352
Skewness Detects	3.596	Kurtosis Detects	12.95
Mean of Logged Detects	3.229	SD of Logged Detects	1.882

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.332	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.482	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	132.8	KM Standard Error of Mean	124.1
KM SD	808.5	95% KM (BCA) UCL	373.9
95% KM (t) UCL	341.1	95% KM (Percentile Bootstrap) UCL	374.1
95% KM (z) UCL	336.9	95% KM Bootstrap t UCL	20589
90% KM Chebyshev UCL	505	95% KM Chebyshev UCL	673.6
97.5% KM Chebyshev UCL	907.6	99% KM Chebyshev UCL	1367

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.949	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.853	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.458	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.259	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.246	k star (bias corrected MLE)	0.24
Theta hat (MLE)	1859	Theta star (bias corrected MLE)	1901
nu hat (MLE)	6.394	nu star (bias corrected)	6.252
Mean (detects)	457.1		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	129.2
Maximum	5552	Median	0.01
SD	818	CV	6.332

k hat (MLE)	0.111	k star (bias corrected MLE)	0.118
Theta hat (MLE)	1169	Theta star (bias corrected MLE)	1096
nu hat (MLE)	10.17	nu star (bias corrected)	10.84
Adjusted Level of Significance (β)	0.0448		
Approximate Chi Square Value (10.84, α)	4.474	Adjusted Chi Square Value (10.84, β)	4.341
95% Gamma Approximate UCL (use when n>=50)	313	95% Gamma Adjusted UCL (use when n<50)	322.6

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	132.8	SD (KM)	808.5
Variance (KM)	653708	SE of Mean (KM)	124.1
k hat (KM)	0.027	k star (KM)	0.0397
nu hat (KM)	2.481	nu star (KM)	3.652
theta hat (KM)	4924	theta star (KM)	3344
80% gamma percentile (KM)	7.033	90% gamma percentile (KM)	142
95% gamma percentile (KM)	634.1	99% gamma percentile (KM)	3146

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (3.65, α)	0.589	Adjusted Chi Square Value (3.65, β)	0.553
95% Gamma Approximate KM-UCL (use when n>=50)	822.8	95% Gamma Adjusted KM-UCL (use when n<50)	876.3

95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.715	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.332	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	129.4	Mean in Log Scale	-1.359
SD in Original Scale	818	SD in Log Scale	3.789
95% t UCL (assumes normality of ROS data)	331.9	95% Percentile Bootstrap UCL	367.8
95% BCA Bootstrap UCL	497.5	95% Bootstrap t UCL	15071
95% H-UCL (Log ROS)	11229		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.067	KM Geo Mean	7.902
KM SD (logged)	1.206	95% Critical H Value (KM-Log)	2.556
KM Standard Error of Mean (logged)	0.185	95% H-UCL (KM -Log)	25.9
KM SD (logged)	1.206	95% Critical H Value (KM-Log)	2.556
KM Standard Error of Mean (logged)	0.185		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	131	Mean in Log Scale	1.57
SD in Original Scale	817.7	SD in Log Scale	1.433
95% t UCL (Assumes normality)	333.5	95% H-Stat UCL	24.54

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	673.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Nickel - North region

General Statistics

Total Number of Observations	43	Number of Distinct Observations	21
Number of Detects	42	Number of Non-Detects	1
Number of Distinct Detects	20	Number of Distinct Non-Detects	1
Minimum Detect	4	Minimum Non-Detect	5
Maximum Detect	115	Maximum Non-Detect	5
Variance Detects	239.6	Percent Non-Detects	2.326%
Mean Detects	22.47	SD Detects	15.48
Median Detects	20.8	CV Detects	0.689
Skewness Detects	5.384	Kurtosis Detects	32.94
Mean of Logged Detects	3.001	SD of Logged Detects	0.449

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.434	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.338	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.135	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	22.04	KM Standard Error of Mean	2.372
KM SD	15.37	95% KM (BCA) UCL	26.69
95% KM (t) UCL	26.03	95% KM (Percentile Bootstrap) UCL	26.25
95% KM (z) UCL	25.94	95% KM Bootstrap t UCL	30.49
90% KM Chebyshev UCL	29.15	95% KM Chebyshev UCL	32.38
97.5% KM Chebyshev UCL	36.85	99% KM Chebyshev UCL	45.64

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	4.053	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.752	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.245	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.137	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.657	k star (bias corrected MLE)	4.34
Theta hat (MLE)	4.824	Theta star (bias corrected MLE)	5.176
nu hat (MLE)	391.2	nu star (bias corrected)	364.6
Mean (detects)	22.47		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	4	Mean	22.07
Maximum	115	Median	20.8
SD	15.52	CV	0.703

k hat (MLE)	4.176	k star (bias corrected MLE)	3.9
Theta hat (MLE)	5.284	Theta star (bias corrected MLE)	5.658
nu hat (MLE)	359.1	nu star (bias corrected)	335.4
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (335.38, α)	294	Adjusted Chi Square Value (335.38, β)	292.6
95% Gamma Approximate UCL (use when n>=50)	25.18	95% Gamma Adjusted UCL (use when n<50)	25.29

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	22.04	SD (KM)	15.37
Variance (KM)	236.2	SE of Mean (KM)	2.372
k hat (KM)	2.056	k star (KM)	1.928
nu hat (KM)	176.8	nu star (KM)	165.8
theta hat (KM)	10.72	theta star (KM)	11.43
80% gamma percentile (KM)	33.14	90% gamma percentile (KM)	43.23
95% gamma percentile (KM)	52.88	99% gamma percentile (KM)	74.33

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (165.83, α)	137.1	Adjusted Chi Square Value (165.83, β)	136.2
95% Gamma Approximate KM-UCL (use when n>=50)	26.66	95% Gamma Adjusted KM-UCL (use when n<50)	26.84

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.755	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.212	Lilliefors GOF Test
5% Lilliefors Critical Value	0.135	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	22.15	Mean in Log Scale	2.981
SD in Original Scale	15.44	SD in Log Scale	0.461
95% t UCL (assumes normality of ROS data)	26.11	95% Percentile Bootstrap UCL	26.73
95% BCA Bootstrap UCL	29.34	95% Bootstrap t UCL	30.93
95% H-UCL (Log ROS)	25.06		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.963	KM Geo Mean	19.36
KM SD (logged)	0.501	95% Critical H Value (KM-Log)	1.902
KM Standard Error of Mean (logged)	0.0773	95% H-UCL (KM -Log)	25.43
KM SD (logged)	0.501	95% Critical H Value (KM-Log)	1.902
KM Standard Error of Mean (logged)	0.0773		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	22	Mean in Log Scale	2.952
SD in Original Scale	15.59	SD in Log Scale	0.545
95% t UCL (Assumes normality)	26	95% H-Stat UCL	26.15

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	26.03	KM H-UCL	25.43
95% KM (BCA) UCL	26.69		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Zinc - North region

General Statistics

Total Number of Observations	43	Number of Distinct Observations	11
Number of Detects	12	Number of Non-Detects	31
Number of Distinct Detects	9	Number of Distinct Non-Detects	2
Minimum Detect	5.3	Minimum Non-Detect	1
Maximum Detect	25	Maximum Non-Detect	5
Variance Detects	58.58	Percent Non-Detects	72.09%
Mean Detects	12.9	SD Detects	7.654
Median Detects	9	CV Detects	0.593
Skewness Detects	0.785	Kurtosis Detects	-1.275
Mean of Logged Detects	2.403	SD of Logged Detects	0.571

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.805	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.278	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.243	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	4.321	KM Standard Error of Mean	1.05
KM SD	6.594	95% KM (BCA) UCL	6.891
95% KM (t) UCL	6.087	95% KM (Percentile Bootstrap) UCL	6.767
95% KM (z) UCL	6.048	95% KM Bootstrap t UCL	6.739
90% KM Chebyshev UCL	7.472	95% KM Chebyshev UCL	8.899
97.5% KM Chebyshev UCL	10.88	99% KM Chebyshev UCL	14.77

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.822	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.738	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.253	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.247	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.404	k star (bias corrected MLE)	2.608
Theta hat (MLE)	3.79	Theta star (bias corrected MLE)	4.946
nu hat (MLE)	81.69	nu star (bias corrected)	62.6
Mean (detects)	12.9		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	3.739
Maximum	25	Median	0.01
SD	6.99	CV	1.87

k hat (MLE)	0.206	k star (bias corrected MLE)	0.207
Theta hat (MLE)	18.12	Theta star (bias corrected MLE)	18.03
nu hat (MLE)	17.74	nu star (bias corrected)	17.84
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (17.84, α)	9.273	Adjusted Chi Square Value (17.84, β)	9.058
95% Gamma Approximate UCL (use when n>=50)	7.191	95% Gamma Adjusted UCL (use when n<50)	7.362

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.321	SD (KM)	6.594
Variance (KM)	43.48	SE of Mean (KM)	1.05
k hat (KM)	0.429	k star (KM)	0.415
nu hat (KM)	36.93	nu star (KM)	35.69
theta hat (KM)	10.06	theta star (KM)	10.41
80% gamma percentile (KM)	7.002	90% gamma percentile (KM)	12.12
95% gamma percentile (KM)	17.73	99% gamma percentile (KM)	31.76

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (35.69, α)	23.02	Adjusted Chi Square Value (35.69, β)	22.66
95% Gamma Approximate KM-UCL (use when n>=50)	6.699	95% Gamma Adjusted KM-UCL (use when n<50)	6.804

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.876	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.224	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.243	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.927	Mean in Log Scale	0.908
SD in Original Scale	6.456	SD in Log Scale	1.208
95% t UCL (assumes normality of ROS data)	6.583	95% Percentile Bootstrap UCL	6.664
95% BCA Bootstrap UCL	6.912	95% Bootstrap t UCL	7.066
95% H-UCL (Log ROS)	8.363		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.671	KM Geo Mean	1.956
KM SD (logged)	1.116	95% Critical H Value (KM-Log)	2.493
KM Standard Error of Mean (logged)	0.178	95% H-UCL (KM -Log)	5.6
KM SD (logged)	1.116	95% Critical H Value (KM-Log)	2.493
KM Standard Error of Mean (logged)	0.178		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	5.263	Mean in Log Scale	1.219
SD in Original Scale	6.222	SD in Log Scale	0.899
95% t UCL (Assumes normality)	6.859	95% H-Stat UCL	6.93

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	5.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Arsenic - South region

General Statistics

Total Number of Observations	35	Number of Distinct Observations	10
Number of Detects	10	Number of Non-Detects	25
Number of Distinct Detects	9	Number of Distinct Non-Detects	1
Minimum Detect	5.6	Minimum Non-Detect	5
Maximum Detect	8.6	Maximum Non-Detect	5
Variance Detects	0.92	Percent Non-Detects	71.43%
Mean Detects	6.88	SD Detects	0.959
Median Detects	6.55	CV Detects	0.139
Skewness Detects	0.753	Kurtosis Detects	-0.493
Mean of Logged Detects	1.92	SD of Logged Detects	0.135

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.9	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.274	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.262	Detected Data Not Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	5.537	KM Standard Error of Mean	0.174
KM SD	0.979	95% KM (BCA) UCL	5.843
95% KM (t) UCL	5.832	95% KM (Percentile Bootstrap) UCL	5.826
95% KM (z) UCL	5.824	95% KM Bootstrap t UCL	5.894
90% KM Chebyshev UCL	6.06	95% KM Chebyshev UCL	6.297
97.5% KM Chebyshev UCL	6.626	99% KM Chebyshev UCL	7.272

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.538	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.264	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.266	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	59.65	k star (bias corrected MLE)	41.82
Theta hat (MLE)	0.115	Theta star (bias corrected MLE)	0.164
nu hat (MLE)	1193	nu star (bias corrected)	836.5
Mean (detects)	6.88		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.907	Mean	4.529
Maximum	8.6	Median	4.418
SD	1.901	CV	0.42
k hat (MLE)	4.953	k star (bias corrected MLE)	4.547
Theta hat (MLE)	0.914	Theta star (bias corrected MLE)	0.996
nu hat (MLE)	346.7	nu star (bias corrected)	318.3

Adjusted Level of Significance (β)	0.0425		
Approximate Chi Square Value (318.29, α)	278	Adjusted Chi Square Value (318.29, β)	276.2
95% Gamma Approximate UCL (use when n>=50)	5.186	95% Gamma Adjusted UCL (use when n<50)	5.219

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	5.537	SD (KM)	0.979
Variance (KM)	0.958	SE of Mean (KM)	0.174
k hat (KM)	32.01	k star (KM)	29.29
nu hat (KM)	2241	nu star (KM)	2050
theta hat (KM)	0.173	theta star (KM)	0.189
80% gamma percentile (KM)	6.375	90% gamma percentile (KM)	6.882
95% gamma percentile (KM)	7.321	99% gamma percentile (KM)	8.191

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	1946	Adjusted Chi Square Value (N/A, β)	1941
95% Gamma Approximate KM-UCL (use when n>=50)	5.834	95% Gamma Adjusted KM-UCL (use when n<50)	5.848

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.253	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.262	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.969	Mean in Log Scale	1.56
SD in Original Scale	1.491	SD in Log Scale	0.297
95% t UCL (assumes normality of ROS data)	5.395	95% Percentile Bootstrap UCL	5.384
95% BCA Bootstrap UCL	5.417	95% Bootstrap t UCL	5.436
95% H-UCL (Log ROS)	5.452		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.698	KM Geo Mean	5.464
KM SD (logged)	0.156	95% Critical H Value (KM-Log)	1.729
KM Standard Error of Mean (logged)	0.0278	95% H-UCL (KM -Log)	5.794
KM SD (logged)	0.156	95% Critical H Value (KM-Log)	1.729
KM Standard Error of Mean (logged)	0.0278		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.751	Mean in Log Scale	1.203
SD in Original Scale	2.067	SD in Log Scale	0.465
95% t UCL (Assumes normality)	4.342	95% H-Stat UCL	4.325

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	5.832

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Benzo(b)fluoranthene - South region

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	5
Minimum Detect	0.0925	Minimum Non-Detect	0.0723
Maximum Detect	0.349	Maximum Non-Detect	0.107
Variance Detects	0.018	Percent Non-Detects	62.5%
Mean Detects	0.198	SD Detects	0.134
Median Detects	0.153	CV Detects	0.677
Skewness Detects	1.344	Kurtosis Detects	N/A
Mean of Logged Detects	-1.77	SD of Logged Detects	0.67

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.915	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.299	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.12	KM Standard Error of Mean	0.0392
KM SD	0.0904	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.194	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.184	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.237	95% KM Chebyshev UCL	0.291
97.5% KM Chebyshev UCL	0.365	99% KM Chebyshev UCL	0.51

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.457	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0573	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	20.74	nu star (bias corrected)	N/A
Mean (detects)	0.198		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0806

Maximum	0.349	Median	0.01
SD	0.121	CV	1.501
k hat (MLE)	0.603	k star (bias corrected MLE)	0.46
Theta hat (MLE)	0.134	Theta star (bias corrected MLE)	0.175
nu hat (MLE)	9.653	nu star (bias corrected)	7.366
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (7.37, α)	2.374	Adjusted Chi Square Value (7.37, β)	1.722
95% Gamma Approximate UCL (use when n>=50)	0.25	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.12	SD (KM)	0.0904
Variance (KM)	0.00817	SE of Mean (KM)	0.0392
k hat (KM)	1.763	k star (KM)	1.185
nu hat (KM)	28.2	nu star (KM)	18.96
theta hat (KM)	0.0681	theta star (KM)	0.101
80% gamma percentile (KM)	0.19	90% gamma percentile (KM)	0.265
95% gamma percentile (KM)	0.339	99% gamma percentile (KM)	0.508

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (18.96, α)	10.09	Adjusted Chi Square Value (18.96, β)	8.501
95% Gamma Approximate KM-UCL (use when n>=50)	0.226	95% Gamma Adjusted KM-UCL (use when n<50)	0.268

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.981	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.23	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0888	Mean in Log Scale	-3.021
SD in Original Scale	0.116	SD in Log Scale	1.101
95% t UCL (assumes normality of ROS data)	0.166	95% Percentile Bootstrap UCL	0.161
95% BCA Bootstrap UCL	0.179	95% Bootstrap t UCL	0.354
95% H-UCL (Log ROS)	0.412		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.299	KM Geo Mean	0.1
KM SD (logged)	0.531	95% Critical H Value (KM-Log)	2.407
KM Standard Error of Mean (logged)	0.231	95% H-UCL (KM -Log)	0.187
KM SD (logged)	0.531	95% Critical H Value (KM-Log)	2.407
KM Standard Error of Mean (logged)	0.231		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.101	Mean in Log Scale	-2.639
SD in Original Scale	0.108	SD in Log Scale	0.812
95% t UCL (Assumes normality)	0.173	95% H-Stat UCL	0.248

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.194

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chromium - South region

General Statistics

Total Number of Observations	35	Number of Distinct Observations	14
Number of Detects	14	Number of Non-Detects	21
Number of Distinct Detects	13	Number of Distinct Non-Detects	1
Minimum Detect	6.1	Minimum Non-Detect	5
Maximum Detect	17.4	Maximum Non-Detect	5
Variance Detects	9.721	Percent Non-Detects	60%
Mean Detects	9.371	SD Detects	3.118
Median Detects	8.3	CV Detects	0.333
Skewness Detects	1.593	Kurtosis Detects	2.332
Mean of Logged Detects	2.195	SD of Logged Detects	0.292

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.826	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.244	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.226	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.749	KM Standard Error of Mean	0.502
KM SD	2.863	95% KM (BCA) UCL	7.594
95% KM (t) UCL	7.598	95% KM (Percentile Bootstrap) UCL	7.574
95% KM (z) UCL	7.575	95% KM Bootstrap t UCL	7.919
90% KM Chebyshev UCL	8.255	95% KM Chebyshev UCL	8.938
97.5% KM Chebyshev UCL	9.885	99% KM Chebyshev UCL	11.75

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.722	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.201	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.229	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	11.81	k star (bias corrected MLE)	9.324
Theta hat (MLE)	0.794	Theta star (bias corrected MLE)	1.005
nu hat (MLE)	330.6	nu star (bias corrected)	261.1
Mean (detects)	9.371		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	4.835
Maximum	17.4	Median	3.93
SD	4.435	CV	0.917
k hat (MLE)	0.489	k star (bias corrected MLE)	0.466
Theta hat (MLE)	9.88	Theta star (bias corrected MLE)	10.36
nu hat (MLE)	34.26	nu star (bias corrected)	32.65

Adjusted Level of Significance (β)	0.0425		
Approximate Chi Square Value (32.65, α)	20.59	Adjusted Chi Square Value (32.65, β)	20.14
95% Gamma Approximate UCL (use when n>=50)	7.667	95% Gamma Adjusted UCL (use when n<50)	7.841

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.749	SD (KM)	2.863
Variance (KM)	8.197	SE of Mean (KM)	0.502
k hat (KM)	5.556	k star (KM)	5.099
nu hat (KM)	388.9	nu star (KM)	356.9
theta hat (KM)	1.215	theta star (KM)	1.324
80% gamma percentile (KM)	9.052	90% gamma percentile (KM)	10.75
95% gamma percentile (KM)	12.29	99% gamma percentile (KM)	15.56

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (356.93, α)	314.2	Adjusted Chi Square Value (356.93, β)	312.3
95% Gamma Approximate KM-UCL (use when n>=50)	7.668	95% Gamma Adjusted KM-UCL (use when n<50)	7.714

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.181	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.226	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	6.013	Mean in Log Scale	1.642
SD in Original Scale	3.507	SD in Log Scale	0.56
95% t UCL (assumes normality of ROS data)	7.015	95% Percentile Bootstrap UCL	7.004
95% BCA Bootstrap UCL	7.027	95% Bootstrap t UCL	7.187
95% H-UCL (Log ROS)	7.32		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.844	KM Geo Mean	6.319
KM SD (logged)	0.337	95% Critical H Value (KM-Log)	1.824
KM Standard Error of Mean (logged)	0.0592	95% H-UCL (KM -Log)	7.434
KM SD (logged)	0.337	95% Critical H Value (KM-Log)	1.824
KM Standard Error of Mean (logged)	0.0592		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	5.249	Mean in Log Scale	1.428
SD in Original Scale	3.922	SD in Log Scale	0.661
95% t UCL (Assumes normality)	6.37	95% H-Stat UCL	6.567

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	7.714	95% GROS Adjusted Gamma UCL	7.841

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

Copper - South region

General Statistics

Total Number of Observations	33	Number of Distinct Observations	17
Number of Detects	20	Number of Non-Detects	13
Number of Distinct Detects	17	Number of Distinct Non-Detects	1
Minimum Detect	5	Minimum Non-Detect	5
Maximum Detect	68	Maximum Non-Detect	5
Variance Detects	247.2	Percent Non-Detects	39.39%
Mean Detects	14.87	SD Detects	15.72
Median Detects	9.8	CV Detects	1.058
Skewness Detects	2.508	Kurtosis Detects	6.587
Mean of Logged Detects	2.376	SD of Logged Detects	0.737

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.639	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.347	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.192	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	10.98	KM Standard Error of Mean	2.298
KM SD	12.87	95% KM (BCA) UCL	15.18
95% KM (t) UCL	14.87	95% KM (Percentile Bootstrap) UCL	14.67
95% KM (z) UCL	14.76	95% KM Bootstrap t UCL	18.74
90% KM Chebyshev UCL	17.87	95% KM Chebyshev UCL	21
97.5% KM Chebyshev UCL	25.33	99% KM Chebyshev UCL	33.85

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.618	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.756	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.264	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.197	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.697	k star (bias corrected MLE)	1.476
Theta hat (MLE)	8.757	Theta star (bias corrected MLE)	10.07
nu hat (MLE)	67.9	nu star (bias corrected)	59.05
Mean (detects)	14.87		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	9.013
Maximum	68	Median	5.9
SD	14.18	CV	1.573
k hat (MLE)	0.272	k star (bias corrected MLE)	0.268
Theta hat (MLE)	33.1	Theta star (bias corrected MLE)	33.66
nu hat (MLE)	17.97	nu star (bias corrected)	17.67

Adjusted Level of Significance (β)	0.0419		
Approximate Chi Square Value (17.67, α)	9.154	Adjusted Chi Square Value (17.67, β)	8.838
95% Gamma Approximate UCL (use when n>=50)	17.4	95% Gamma Adjusted UCL (use when n<50)	18.02

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	10.98	SD (KM)	12.87
Variance (KM)	165.6	SE of Mean (KM)	2.298
k hat (KM)	0.728	k star (KM)	0.682
nu hat (KM)	48.04	nu star (KM)	45.01
theta hat (KM)	15.08	theta star (KM)	16.1
80% gamma percentile (KM)	18.06	90% gamma percentile (KM)	27.73
95% gamma percentile (KM)	37.72	99% gamma percentile (KM)	61.63

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (45.01, α)	30.62	Adjusted Chi Square Value (45.01, β)	30.01
95% Gamma Approximate KM-UCL (use when n>=50)	16.14	95% Gamma Adjusted KM-UCL (use when n<50)	16.47

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.199	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.192	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	9.747	Mean in Log Scale	1.634
SD in Original Scale	13.74	SD in Log Scale	1.15
95% t UCL (assumes normality of ROS data)	13.8	95% Percentile Bootstrap UCL	14
95% BCA Bootstrap UCL	15.83	95% Bootstrap t UCL	16.89
95% H-UCL (Log ROS)	16.92		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.074	KM Geo Mean	7.959
KM SD (logged)	0.673	95% Critical H Value (KM-Log)	2.086
KM Standard Error of Mean (logged)	0.12	95% H-UCL (KM -Log)	12.79
KM SD (logged)	0.673	95% Critical H Value (KM-Log)	2.086
KM Standard Error of Mean (logged)	0.12		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.994	Mean in Log Scale	1.801
SD in Original Scale	13.58	SD in Log Scale	0.92
95% t UCL (Assumes normality)	14	95% H-Stat UCL	13.56

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	21

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

Lead - South region

General Statistics

Total Number of Observations	50	Number of Distinct Observations	25
Number of Detects	27	Number of Non-Detects	23
Number of Distinct Detects	24	Number of Distinct Non-Detects	1
Minimum Detect	5.5	Minimum Non-Detect	5
Maximum Detect	1230	Maximum Non-Detect	5
Variance Detects	64078	Percent Non-Detects	46%
Mean Detects	112.2	SD Detects	253.1
Median Detects	25	CV Detects	2.255
Skewness Detects	3.769	Kurtosis Detects	15.47
Mean of Logged Detects	3.523	SD of Logged Detects	1.406

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.457	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.358	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.167	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	62.91	KM Standard Error of Mean	27.41
KM SD	190.2	95% KM (BCA) UCL	114.6
95% KM (t) UCL	108.9	95% KM (Percentile Bootstrap) UCL	113.7
95% KM (z) UCL	108	95% KM Bootstrap t UCL	184.9
90% KM Chebyshev UCL	145.1	95% KM Chebyshev UCL	182.4
97.5% KM Chebyshev UCL	234.1	99% KM Chebyshev UCL	335.6

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.133	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.805	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.242	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.178	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.526	k star (bias corrected MLE)	0.493
Theta hat (MLE)	213.2	Theta star (bias corrected MLE)	227.9
nu hat (MLE)	28.42	nu star (bias corrected)	26.6
Mean (detects)	112.2		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	60.61
Maximum	1230	Median	6
SD	192.9	CV	3.182
k hat (MLE)	0.174	k star (bias corrected MLE)	0.177
Theta hat (MLE)	348.3	Theta star (bias corrected MLE)	342.6
nu hat (MLE)	17.4	nu star (bias corrected)	17.69

Adjusted Level of Significance (β)	0.0452		
Approximate Chi Square Value (17.69, α)	9.168	Adjusted Chi Square Value (17.69, β)	8.985
95% Gamma Approximate UCL (use when n>=50)	117	95% Gamma Adjusted UCL (use when n<50)	119.3

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	62.91	SD (KM)	190.2
Variance (KM)	36177	SE of Mean (KM)	27.41
k hat (KM)	0.109	k star (KM)	0.116
nu hat (KM)	10.94	nu star (KM)	11.62
theta hat (KM)	575.1	theta star (KM)	541.6
80% gamma percentile (KM)	53.14	90% gamma percentile (KM)	176.6
95% gamma percentile (KM)	360.4	99% gamma percentile (KM)	926.1

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (11.62, α)	4.976	Adjusted Chi Square Value (11.62, β)	4.846
95% Gamma Approximate KM-UCL (use when n>=50)	146.9	95% Gamma Adjusted KM-UCL (use when n<50)	150.8

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.93	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.923	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.116	Lilliefors GOF Test
5% Lilliefors Critical Value	0.167	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	61.23	Mean in Log Scale	1.772
SD in Original Scale	192.7	SD in Log Scale	2.34
95% t UCL (assumes normality of ROS data)	106.9	95% Percentile Bootstrap UCL	112.1
95% BCA Bootstrap UCL	138.4	95% Bootstrap t UCL	231.1
95% H-UCL (Log ROS)	358.5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.643	KM Geo Mean	14.05
KM SD (logged)	1.392	95% Critical H Value (KM-Log)	2.803
KM Standard Error of Mean (logged)	0.201	95% H-UCL (KM -Log)	64.67
KM SD (logged)	1.392	95% Critical H Value (KM-Log)	2.803
KM Standard Error of Mean (logged)	0.201		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	61.76	Mean in Log Scale	2.324
SD in Original Scale	192.5	SD in Log Scale	1.665
95% t UCL (Assumes normality)	107.4	95% H-Stat UCL	86.58

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	64.67

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

Nickel - South region

General Statistics

Total Number of Observations	33	Number of Distinct Observations	30
Number of Detects	30	Number of Non-Detects	3
Number of Distinct Detects	29	Number of Distinct Non-Detects	1
Minimum Detect	3	Minimum Non-Detect	1.5
Maximum Detect	209	Maximum Non-Detect	1.5
Variance Detects	1304	Percent Non-Detects	9.091%
Mean Detects	22.92	SD Detects	36.12
Median Detects	15.55	CV Detects	1.576
Skewness Detects	5.028	Kurtosis Detects	26.57
Mean of Logged Detects	2.756	SD of Logged Detects	0.737

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.381	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.366	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.159	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	20.98	KM Standard Error of Mean	6.093
KM SD	34.41	95% KM (BCA) UCL	32.82
95% KM (t) UCL	31.3	95% KM (Percentile Bootstrap) UCL	32.33
95% KM (z) UCL	31	95% KM Bootstrap t UCL	53.96
90% KM Chebyshev UCL	39.25	95% KM Chebyshev UCL	47.53
97.5% KM Chebyshev UCL	59.03	99% KM Chebyshev UCL	81.6

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.169	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.764	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.256	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.163	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.475	k star (bias corrected MLE)	1.35
Theta hat (MLE)	15.54	Theta star (bias corrected MLE)	16.98
nu hat (MLE)	88.5	nu star (bias corrected)	80.99
Mean (detects)	22.92		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	20.84
Maximum	209	Median	15
SD	35.03	CV	1.681
k hat (MLE)	0.644	k star (bias corrected MLE)	0.606
Theta hat (MLE)	32.37	Theta star (bias corrected MLE)	34.41
nu hat (MLE)	42.5	nu star (bias corrected)	39.97

Adjusted Level of Significance (β)	0.0419		
Approximate Chi Square Value (39.97, α)	26.48	Adjusted Chi Square Value (39.97, β)	25.92
95% Gamma Approximate UCL (use when n>=50)	31.45	95% Gamma Adjusted UCL (use when n<50)	32.14

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	20.98	SD (KM)	34.41
Variance (KM)	1184	SE of Mean (KM)	6.093
k hat (KM)	0.372	k star (KM)	0.358
nu hat (KM)	24.52	nu star (KM)	23.62
theta hat (KM)	56.46	theta star (KM)	58.6
80% gamma percentile (KM)	33.34	90% gamma percentile (KM)	60.36
95% gamma percentile (KM)	90.53	99% gamma percentile (KM)	167.3

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (23.62, α)	13.56	Adjusted Chi Square Value (23.62, β)	13.17
95% Gamma Approximate KM-UCL (use when n>=50)	36.54	95% Gamma Adjusted KM-UCL (use when n<50)	37.63

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.159	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	21.13	Mean in Log Scale	2.609
SD in Original Scale	34.86	SD in Log Scale	0.848
95% t UCL (assumes normality of ROS data)	31.41	95% Percentile Bootstrap UCL	31.99
95% BCA Bootstrap UCL	40.1	95% Bootstrap t UCL	55.27
95% H-UCL (Log ROS)	27.34		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.543	KM Geo Mean	12.71
KM SD (logged)	0.967	95% Critical H Value (KM-Log)	2.401
KM Standard Error of Mean (logged)	0.171	95% H-UCL (KM -Log)	30.58
KM SD (logged)	0.967	95% Critical H Value (KM-Log)	2.401
KM Standard Error of Mean (logged)	0.171		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	20.91	Mean in Log Scale	2.48
SD in Original Scale	34.99	SD in Log Scale	1.132
95% t UCL (Assumes normality)	31.22	95% H-Stat UCL	38.16

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	47.53

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

Zinc - South region

General Statistics

Total Number of Observations	33	Number of Distinct Observations	17
Number of Detects	16	Number of Non-Detects	17
Number of Distinct Detects	15	Number of Distinct Non-Detects	2
Minimum Detect	3.1	Minimum Non-Detect	1
Maximum Detect	156	Maximum Non-Detect	5
Variance Detects	1400	Percent Non-Detects	51.52%
Mean Detects	24.54	SD Detects	37.42
Median Detects	12.5	CV Detects	1.524
Skewness Detects	3.248	Kurtosis Detects	11.54
Mean of Logged Detects	2.589	SD of Logged Detects	1.055

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.563	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.298	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.213	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	12.8	KM Standard Error of Mean	4.985
KM SD	27.69	95% KM (BCA) UCL	22.09
95% KM (t) UCL	21.24	95% KM (Percentile Bootstrap) UCL	22.07
95% KM (z) UCL	21	95% KM Bootstrap t UCL	35.56
90% KM Chebyshev UCL	27.75	95% KM Chebyshev UCL	34.53
97.5% KM Chebyshev UCL	43.93	99% KM Chebyshev UCL	62.4

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.789	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.766	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.187	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.222	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.95	k star (bias corrected MLE)	0.814
Theta hat (MLE)	25.84	Theta star (bias corrected MLE)	30.17
nu hat (MLE)	30.4	nu star (bias corrected)	26.03
Mean (detects)	24.54		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	11.91
Maximum	156	Median	0.01
SD	28.48	CV	2.392
k hat (MLE)	0.204	k star (bias corrected MLE)	0.206
Theta hat (MLE)	58.33	Theta star (bias corrected MLE)	57.86
nu hat (MLE)	13.47	nu star (bias corrected)	13.58

Adjusted Level of Significance (β)	0.0419		
Approximate Chi Square Value (13.58, α)	6.285	Adjusted Chi Square Value (13.58, β)	6.03
95% Gamma Approximate UCL (use when n>=50)	25.72	95% Gamma Adjusted UCL (use when n<50)	26.81

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	12.8	SD (KM)	27.69
Variance (KM)	766.8	SE of Mean (KM)	4.985
k hat (KM)	0.214	k star (KM)	0.214
nu hat (KM)	14.1	nu star (KM)	14.15
theta hat (KM)	59.92	theta star (KM)	59.7
80% gamma percentile (KM)	17.45	90% gamma percentile (KM)	38.69
95% gamma percentile (KM)	64.73	99% gamma percentile (KM)	135.6

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (14.15, α)	6.673	Adjusted Chi Square Value (14.15, β)	6.409
95% Gamma Approximate KM-UCL (use when n>=50)	27.13	95% Gamma Adjusted KM-UCL (use when n<50)	28.25

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.14	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.213	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	12.59	Mean in Log Scale	1.206
SD in Original Scale	28.2	SD in Log Scale	1.69
95% t UCL (assumes normality of ROS data)	20.91	95% Percentile Bootstrap UCL	21.59
95% BCA Bootstrap UCL	25.86	95% Bootstrap t UCL	34.9
95% H-UCL (Log ROS)	38.21		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.455	KM Geo Mean	4.285
KM SD (logged)	1.369	95% Critical H Value (KM-Log)	2.92
KM Standard Error of Mean (logged)	0.279	95% H-UCL (KM -Log)	22.17
KM SD (logged)	1.369	95% Critical H Value (KM-Log)	2.92
KM Standard Error of Mean (logged)	0.279		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	13.01	Mean in Log Scale	1.581
SD in Original Scale	28.03	SD in Log Scale	1.307
95% t UCL (Assumes normality)	21.27	95% H-Stat UCL	21.97

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

a Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	28.25

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Arsenic - North region post-remediation

General Statistics

Total Number of Observations	43	Number of Distinct Observations	10
Number of Detects	28	Number of Non-Detects	15
Number of Distinct Detects	10	Number of Distinct Non-Detects	1
Minimum Detect	5	Minimum Non-Detect	5
Maximum Detect	9.7	Maximum Non-Detect	5
Variance Detects	1.419	Percent Non-Detects	34.88%
Mean Detects	7.482	SD Detects	1.191
Median Detects	7	CV Detects	0.159
Skewness Detects	-0.499	Kurtosis Detects	0.288
Mean of Logged Detects	1.999	SD of Logged Detects	0.171

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.894	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.924	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.236	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.164	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.616	KM Standard Error of Mean	0.235
KM SD	1.513	95% KM (BCA) UCL	7.028
95% KM (t) UCL	7.012	95% KM (Percentile Bootstrap) UCL	6.974
95% KM (z) UCL	7.003	95% KM Bootstrap t UCL	7.036
90% KM Chebyshev UCL	7.321	95% KM Chebyshev UCL	7.641
97.5% KM Chebyshev UCL	8.084	99% KM Chebyshev UCL	8.955

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.482	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.744	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.256	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.165	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	37.54	k star (bias corrected MLE)	33.54
Theta hat (MLE)	0.199	Theta star (bias corrected MLE)	0.223
nu hat (MLE)	2102	nu star (bias corrected)	1878
Mean (detects)	7.482		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	3.655	Mean	6.617
Maximum	9.7	Median	7
SD	1.576	CV	0.238
k hat (MLE)	17.27	k star (bias corrected MLE)	16.08
Theta hat (MLE)	0.383	Theta star (bias corrected MLE)	0.411
nu hat (MLE)	1486	nu star (bias corrected)	1383

Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (N/A, α)	1298	Adjusted Chi Square Value (N/A, β)	1295
95% Gamma Approximate UCL (use when n>=50)	7.053	95% Gamma Adjusted UCL (use when n<50)	7.068

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.616	SD (KM)	1.513
Variance (KM)	2.291	SE of Mean (KM)	0.235
k hat (KM)	19.11	k star (KM)	17.79
nu hat (KM)	1643	nu star (KM)	1530
theta hat (KM)	0.346	theta star (KM)	0.372
80% gamma percentile (KM)	7.887	90% gamma percentile (KM)	8.689
95% gamma percentile (KM)	9.39	99% gamma percentile (KM)	10.8

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	1440	Adjusted Chi Square Value (N/A, β)	1437
95% Gamma Approximate KM-UCL (use when n>=50)	7.029	95% Gamma Adjusted KM-UCL (use when n<50)	7.044

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.851	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.924	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.271	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.164	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	6.649	Mean in Log Scale	1.868
SD in Original Scale	1.529	SD in Log Scale	0.236
95% t UCL (assumes normality of ROS data)	7.041	95% Percentile Bootstrap UCL	7.034
95% BCA Bootstrap UCL	7.03	95% Bootstrap t UCL	7.027
95% H-UCL (Log ROS)	7.09		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.863	KM Geo Mean	6.444
KM SD (logged)	0.23	95% Critical H Value (KM-Log)	1.724
KM Standard Error of Mean (logged)	0.0357	95% H-UCL (KM -Log)	7.034
KM SD (logged)	0.23	95% Critical H Value (KM-Log)	1.724
KM Standard Error of Mean (logged)	0.0357		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	5.744	Mean in Log Scale	1.621
SD in Original Scale	2.586	SD in Log Scale	0.54
95% t UCL (Assumes normality)	6.407	95% H-Stat UCL	6.875

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	7.012	KM H-UCL	7.034
95% KM (BCA) UCL	7.028		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

Chromium - North region post-remediation

General Statistics

Total Number of Observations	43	Number of Distinct Observations	25
Number of Detects	32	Number of Non-Detects	11
Number of Distinct Detects	24	Number of Distinct Non-Detects	1
Minimum Detect	7.3	Minimum Non-Detect	5
Maximum Detect	85	Maximum Non-Detect	5
Variance Detects	553.8	Percent Non-Detects	25.58%
Mean Detects	28.73	SD Detects	23.53
Median Detects	21	CV Detects	0.819
Skewness Detects	1.068	Kurtosis Detects	0.102
Mean of Logged Detects	3.034	SD of Logged Detects	0.822

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.83	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.189	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.154	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	22.66	KM Standard Error of Mean	3.487
KM SD	22.5	95% KM (BCA) UCL	29.11
95% KM (t) UCL	28.52	95% KM (Percentile Bootstrap) UCL	28.48
95% KM (z) UCL	28.39	95% KM Bootstrap t UCL	29.67
90% KM Chebyshev UCL	33.12	95% KM Chebyshev UCL	37.86
97.5% KM Chebyshev UCL	44.43	99% KM Chebyshev UCL	57.35

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.2	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.762	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.195	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.158	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.691	k star (bias corrected MLE)	1.553
Theta hat (MLE)	16.99	Theta star (bias corrected MLE)	18.5
nu hat (MLE)	108.2	nu star (bias corrected)	99.4
Mean (detects)	28.73		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	21.38
Maximum	85	Median	11
SD	23.86	CV	1.116
k hat (MLE)	0.341	k star (bias corrected MLE)	0.332
Theta hat (MLE)	62.77	Theta star (bias corrected MLE)	64.33
nu hat (MLE)	29.29	nu star (bias corrected)	28.58

Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (28.58, α)	17.38	Adjusted Chi Square Value (28.58, β)	17.08
95% Gamma Approximate UCL (use when n>=50)	35.16	95% Gamma Adjusted UCL (use when n<50)	35.78

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	22.66	SD (KM)	22.5
Variance (KM)	506.4	SE of Mean (KM)	3.487
k hat (KM)	1.014	k star (KM)	0.959
nu hat (KM)	87.18	nu star (KM)	82.43
theta hat (KM)	22.35	theta star (KM)	23.64
80% gamma percentile (KM)	36.59	90% gamma percentile (KM)	52.72
95% gamma percentile (KM)	68.9	99% gamma percentile (KM)	106.6

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (82.43, α)	62.51	Adjusted Chi Square Value (82.43, β)	61.91
95% Gamma Approximate KM-UCL (use when n>=50)	29.88	95% Gamma Adjusted KM-UCL (use when n<50)	30.17

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.896	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.154	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	22.23	Mean in Log Scale	2.54
SD in Original Scale	23.13	SD in Log Scale	1.131
95% t UCL (assumes normality of ROS data)	28.16	95% Percentile Bootstrap UCL	28.25
95% BCA Bootstrap UCL	28.76	95% Bootstrap t UCL	29.03
95% H-UCL (Log ROS)	37.29		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.669	KM Geo Mean	14.43
KM SD (logged)	0.934	95% Critical H Value (KM-Log)	2.291
KM Standard Error of Mean (logged)	0.145	95% H-UCL (KM -Log)	31.07
KM SD (logged)	0.934	95% Critical H Value (KM-Log)	2.291
KM Standard Error of Mean (logged)	0.145		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	22.02	Mean in Log Scale	2.492
SD in Original Scale	23.3	SD in Log Scale	1.171
95% t UCL (Assumes normality)	27.99	95% H-Stat UCL	38.13

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	37.86

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

Copper - North region post-remediation

General Statistics

Total Number of Observations	42	Number of Distinct Observations	12
Number of Detects	31	Number of Non-Detects	11
Number of Distinct Detects	12	Number of Distinct Non-Detects	1
Minimum Detect	5	Minimum Non-Detect	5
Maximum Detect	20	Maximum Non-Detect	5
Variance Detects	11.91	Percent Non-Detects	26.19%
Mean Detects	11.39	SD Detects	3.451
Median Detects	12	CV Detects	0.303
Skewness Detects	0.523	Kurtosis Detects	1.178
Mean of Logged Detects	2.386	SD of Logged Detects	0.32

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.929	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.159	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.156	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	9.714	KM Standard Error of Mean	0.635
KM SD	4.049	95% KM (BCA) UCL	10.71
95% KM (t) UCL	10.78	95% KM (Percentile Bootstrap) UCL	10.76
95% KM (z) UCL	10.76	95% KM Bootstrap t UCL	10.82
90% KM Chebyshev UCL	11.62	95% KM Chebyshev UCL	12.48
97.5% KM Chebyshev UCL	13.68	99% KM Chebyshev UCL	16.03

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.861	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.746	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.157	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.158	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	10.81	k star (bias corrected MLE)	9.787
Theta hat (MLE)	1.053	Theta star (bias corrected MLE)	1.164
nu hat (MLE)	670.3	nu star (bias corrected)	606.8
Mean (detects)	11.39		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	2.323	Mean	9.661
Maximum	20	Median	10
SD	4.211	CV	0.436
k hat (MLE)	4.817	k star (bias corrected MLE)	4.489
Theta hat (MLE)	2.006	Theta star (bias corrected MLE)	2.152
nu hat (MLE)	404.6	nu star (bias corrected)	377

Adjusted Level of Significance (β)	0.0443		
Approximate Chi Square Value (377.05, α)	333	Adjusted Chi Square Value (377.05, β)	331.6
95% Gamma Approximate UCL (use when n>=50)	10.94	95% Gamma Adjusted UCL (use when n<50)	10.99

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	9.714	SD (KM)	4.049
Variance (KM)	16.39	SE of Mean (KM)	0.635
k hat (KM)	5.756	k star (KM)	5.361
nu hat (KM)	483.5	nu star (KM)	450.3
theta hat (KM)	1.688	theta star (KM)	1.812
80% gamma percentile (KM)	12.96	90% gamma percentile (KM)	15.33
95% gamma percentile (KM)	17.48	99% gamma percentile (KM)	22.02

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (450.30, α)	402.1	Adjusted Chi Square Value (450.30, β)	400.5
95% Gamma Approximate KM-UCL (use when n>=50)	10.88	95% Gamma Adjusted KM-UCL (use when n<50)	10.92

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.929	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.172	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.156	Detected Data Not Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	9.825	Mean in Log Scale	2.2
SD in Original Scale	3.996	SD in Log Scale	0.427
95% t UCL (assumes normality of ROS data)	10.86	95% Percentile Bootstrap UCL	10.82
95% BCA Bootstrap UCL	10.92	95% Bootstrap t UCL	10.95
95% H-UCL (Log ROS)	11.18		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.182	KM Geo Mean	8.866
KM SD (logged)	0.436	95% Critical H Value (KM-Log)	1.854
KM Standard Error of Mean (logged)	0.0683	95% H-UCL (KM -Log)	11.06
KM SD (logged)	0.436	95% Critical H Value (KM-Log)	1.854
KM Standard Error of Mean (logged)	0.0683		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.06	Mean in Log Scale	2.001
SD in Original Scale	4.935	SD in Log Scale	0.709
95% t UCL (Assumes normality)	10.34	95% H-Stat UCL	11.95

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	10.92	95% GROS Adjusted Gamma UCL	10.99

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Lead - North region post-remediation

General Statistics

Total Number of Observations	45	Number of Distinct Observations	10
Number of Detects	12	Number of Non-Detects	33
Number of Distinct Detects	10	Number of Distinct Non-Detects	1
Minimum Detect	5	Minimum Non-Detect	5
Maximum Detect	230	Maximum Non-Detect	5
Variance Detects	3922	Percent Non-Detects	73.33%
Mean Detects	32.5	SD Detects	62.63
Median Detects	14.5	CV Detects	1.927
Skewness Detects	3.38	Kurtosis Detects	11.58
Mean of Logged Detects	2.779	SD of Logged Detects	0.999

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.434	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.452	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.243	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	12.33	KM Standard Error of Mean	5.179
KM SD	33.27	95% KM (BCA) UCL	22.56
95% KM (t) UCL	21.04	95% KM (Percentile Bootstrap) UCL	22.2
95% KM (z) UCL	20.85	95% KM Bootstrap t UCL	58.77
90% KM Chebyshev UCL	27.87	95% KM Chebyshev UCL	34.91
97.5% KM Chebyshev UCL	44.68	99% KM Chebyshev UCL	63.87

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.553	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.762	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.334	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.254	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.84	k star (bias corrected MLE)	0.686
Theta hat (MLE)	38.68	Theta star (bias corrected MLE)	47.39
nu hat (MLE)	20.17	nu star (bias corrected)	16.46
Mean (detects)	32.5		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	8.674
Maximum	230	Median	0.01
SD	34.52	CV	3.98
k hat (MLE)	0.159	k star (bias corrected MLE)	0.163
Theta hat (MLE)	54.59	Theta star (bias corrected MLE)	53.18
nu hat (MLE)	14.3	nu star (bias corrected)	14.68

Adjusted Level of Significance (β)	0.0447		
Approximate Chi Square Value (14.68, α)	7.04	Adjusted Chi Square Value (14.68, β)	6.864
95% Gamma Approximate UCL (use when n>=50)	18.09	95% Gamma Adjusted UCL (use when n<50)	18.55

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	12.33	SD (KM)	33.27
Variance (KM)	1107	SE of Mean (KM)	5.179
k hat (KM)	0.137	k star (KM)	0.143
nu hat (KM)	12.37	nu star (KM)	12.88
theta hat (KM)	89.72	theta star (KM)	86.18
80% gamma percentile (KM)	12.9	90% gamma percentile (KM)	36.31
95% gamma percentile (KM)	68.48	99% gamma percentile (KM)	162.8

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (12.88, α)	5.812	Adjusted Chi Square Value (12.88, β)	5.655
95% Gamma Approximate KM-UCL (use when n>=50)	27.33	95% Gamma Adjusted KM-UCL (use when n<50)	28.09

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.243	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	9.359	Mean in Log Scale	0.108
SD in Original Scale	34.36	SD in Log Scale	2.137
95% t UCL (assumes normality of ROS data)	17.97	95% Percentile Bootstrap UCL	19.38
95% BCA Bootstrap UCL	25.7	95% Bootstrap t UCL	47.01
95% H-UCL (Log ROS)	38.17		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.921	KM Geo Mean	6.831
KM SD (logged)	0.715	95% Critical H Value (KM-Log)	2.087
KM Standard Error of Mean (logged)	0.111	95% H-UCL (KM -Log)	11.05
KM SD (logged)	0.715	95% Critical H Value (KM-Log)	2.087
KM Standard Error of Mean (logged)	0.111		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	10.5	Mean in Log Scale	1.413
SD in Original Scale	34.07	SD in Log Scale	0.971
95% t UCL (Assumes normality)	19.03	95% H-Stat UCL	9.279

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	11.05

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

Lead - South region post-remediation

General Statistics

Total Number of Observations	45	Number of Distinct Observations	20
Number of Detects	22	Number of Non-Detects	23
Number of Distinct Detects	19	Number of Distinct Non-Detects	1
Minimum Detect	5.5	Minimum Non-Detect	5
Maximum Detect	165	Maximum Non-Detect	5
Variance Detects	1655	Percent Non-Detects	51.11%
Mean Detects	35.84	SD Detects	40.68
Median Detects	21.5	CV Detects	1.135
Skewness Detects	2.137	Kurtosis Detects	4.555
Mean of Logged Detects	3.094	SD of Logged Detects	0.989

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.723	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.241	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.184	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	20.08	KM Standard Error of Mean	4.849
KM SD	31.78	95% KM (BCA) UCL	29.14
95% KM (t) UCL	28.23	95% KM (Percentile Bootstrap) UCL	29.07
95% KM (z) UCL	28.05	95% KM Bootstrap t UCL	33.69
90% KM Chebyshev UCL	34.63	95% KM Chebyshev UCL	41.21
97.5% KM Chebyshev UCL	50.36	99% KM Chebyshev UCL	68.33

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.626	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.767	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.156	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.19	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.169	k star (bias corrected MLE)	1.04
Theta hat (MLE)	30.66	Theta star (bias corrected MLE)	34.46
nu hat (MLE)	51.44	nu star (bias corrected)	45.76
Mean (detects)	35.84		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	17.53
Maximum	165	Median	0.01
SD	33.44	CV	1.908
k hat (MLE)	0.199	k star (bias corrected MLE)	0.2
Theta hat (MLE)	88.16	Theta star (bias corrected MLE)	87.47
nu hat (MLE)	17.89	nu star (bias corrected)	18.03

Adjusted Level of Significance (β)	0.0447		
Approximate Chi Square Value (18.03, α)	9.415	Adjusted Chi Square Value (18.03, β)	9.208
95% Gamma Approximate UCL (use when n>=50)	33.57	95% Gamma Adjusted UCL (use when n<50)	34.33

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	20.08	SD (KM)	31.78
Variance (KM)	1010	SE of Mean (KM)	4.849
k hat (KM)	0.399	k star (KM)	0.387
nu hat (KM)	35.92	nu star (KM)	34.86
theta hat (KM)	50.31	theta star (KM)	51.84
80% gamma percentile (KM)	32.28	90% gamma percentile (KM)	57.03
95% gamma percentile (KM)	84.35	99% gamma percentile (KM)	153.3

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (34.86, α)	22.35	Adjusted Chi Square Value (34.86, β)	22.02
95% Gamma Approximate KM-UCL (use when n>=50)	31.31	95% Gamma Adjusted KM-UCL (use when n<50)	31.79

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0904	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.184	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	18.51	Mean in Log Scale	1.657
SD in Original Scale	32.94	SD in Log Scale	1.728
95% t UCL (assumes normality of ROS data)	26.76	95% Percentile Bootstrap UCL	26.8
95% BCA Bootstrap UCL	30.3	95% Bootstrap t UCL	33.18
95% H-UCL (Log ROS)	55.19		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.335	KM Geo Mean	10.33
KM SD (logged)	1.004	95% Critical H Value (KM-Log)	2.376
KM Standard Error of Mean (logged)	0.153	95% H-UCL (KM -Log)	24.49
KM SD (logged)	1.004	95% Critical H Value (KM-Log)	2.376
KM Standard Error of Mean (logged)	0.153		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	18.8	Mean in Log Scale	1.981
SD in Original Scale	32.77	SD in Log Scale	1.296
95% t UCL (Assumes normality)	27.01	95% H-Stat UCL	28.58

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	31.79	95% GROS Adjusted Gamma UCL	34.33

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

Diesel range organics - North region (hypothetical with all detects)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	3
		Number of Missing Observations	0
Minimum	50	Mean	79.23
Maximum	340	Median	50
SD	82.21	Std. Error of Mean	22.8
Coefficient of Variation	1.038	Skewness	3.135

Normal GOF Test

Shapiro Wilk Test Statistic	0.424	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.485	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	119.9	95% Adjusted-CLT UCL (Chen-1995)	137.9
		95% Modified-t UCL (Johnson-1978)	123.2

Gamma GOF Test

A-D Test Statistic	3.581	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.508	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.239	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.292	k star (bias corrected MLE)	1.815
Theta hat (MLE)	34.56	Theta star (bias corrected MLE)	43.66
nu hat (MLE)	59.6	nu star (bias corrected)	47.18
MLE Mean (bias corrected)	79.23	MLE Sd (bias corrected)	58.82
		Approximate Chi Square Value (0.05)	32.42
Adjusted Level of Significance	0.0301	Adjusted Chi Square Value	30.68

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	115.3	95% Adjusted Gamma UCL (use when n<50)	121.8

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.461	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.498	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.234	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.912	Mean of logged Data	4.139
Maximum of Logged Data	5.829	SD of logged Data	0.582

Assuming Lognormal Distribution

95% H-UCL	107.8	90% Chebyshev (MVUE) UCL	109.9
95% Chebyshev (MVUE) UCL	126.5	97.5% Chebyshev (MVUE) UCL	149.6

99% Chebyshev (MVUE) UCL	194.8		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	116.7	95% Jackknife UCL	119.9
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A		
90% Chebyshev(Mean, Sd) UCL	147.6	95% Chebyshev(Mean, Sd) UCL	178.6
97.5% Chebyshev(Mean, Sd) UCL	221.6	99% Chebyshev(Mean, Sd) UCL	306.1

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	178.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Diesel range organics - South region (hypothetical with all detects)

General Statistics

Total Number of Observations	28	Number of Distinct Observations	2
		Number of Missing Observations	0
Minimum	50	Mean	59.64
Maximum	320	Median	50
SD	51.03	Std. Error of Mean	9.643
Coefficient of Variation	0.856	Skewness	5.292

Normal GOF Test

Shapiro Wilk Test Statistic	0.194	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.539	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	76.07	95% Adjusted-CLT UCL (Chen-1995)	85.81
		95% Modified-t UCL (Johnson-1978)	77.67

Gamma GOF Test

A-D Test Statistic	10.46	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.549	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.166	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.703	k star (bias corrected MLE)	4.223
Theta hat (MLE)	12.68	Theta star (bias corrected MLE)	14.12
nu hat (MLE)	263.4	nu star (bias corrected)	236.5
MLE Mean (bias corrected)	59.64	MLE Sd (bias corrected)	29.02
		Approximate Chi Square Value (0.05)	201.9
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	199.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	69.86	95% Adjusted Gamma UCL (use when n<50)	70.55

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.194	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.539	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.912	Mean of logged Data	3.978
Maximum of Logged Data	5.768	SD of logged Data	0.351

Assuming Lognormal Distribution

95% H-UCL	64.31	90% Chebyshev (MVUE) UCL	68.21
95% Chebyshev (MVUE) UCL	73.42	97.5% Chebyshev (MVUE) UCL	80.67

99% Chebyshev (MVUE) UCL	94.89

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	75.5	95% Jackknife UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A		
90% Chebyshev(Mean, Sd) UCL	88.57	95% Chebyshev(Mean, Sd) UCL	101.7
97.5% Chebyshev(Mean, Sd) UCL	119.9	99% Chebyshev(Mean, Sd) UCL	155.6

Suggested UCL to Use

95% Student's-t UCL	76.07	or 95% Modified-t UCL	77.67

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Nickel - South region post-remediation

General Statistics

Total Number of Observations	30	Number of Distinct Observations	27
Number of Detects	27	Number of Non-Detects	3
Number of Distinct Detects	26	Number of Distinct Non-Detects	1
Minimum Detect	3	Minimum Non-Detect	1.5
Maximum Detect	209	Maximum Non-Detect	1.5
Variance Detects	1442	Percent Non-Detects	10%
Mean Detects	23.98	SD Detects	37.97
Median Detects	15.7	CV Detects	1.583
Skewness Detects	4.776	Kurtosis Detects	23.95
Mean of Logged Detects	2.778	SD of Logged Detects	0.771

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.393	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.362	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.167	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	21.73	KM Standard Error of Mean	6.696
KM SD	35.99	95% KM (BCA) UCL	35.43
95% KM (t) UCL	33.11	95% KM (Percentile Bootstrap) UCL	34.96
95% KM (z) UCL	32.75	95% KM Bootstrap t UCL	58.22
90% KM Chebyshev UCL	41.82	95% KM Chebyshev UCL	50.92
97.5% KM Chebyshev UCL	63.55	99% KM Chebyshev UCL	88.36

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.928	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.765	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.258	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.172	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.395	k star (bias corrected MLE)	1.264
Theta hat (MLE)	17.19	Theta star (bias corrected MLE)	18.97
nu hat (MLE)	75.31	nu star (bias corrected)	68.28
Mean (detects)	23.98		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	21.58
Maximum	209	Median	15.2
SD	36.69	CV	1.7
k hat (MLE)	0.599	k star (bias corrected MLE)	0.561
Theta hat (MLE)	36.06	Theta star (bias corrected MLE)	38.48
nu hat (MLE)	35.92	nu star (bias corrected)	33.66

Adjusted Level of Significance (β)	0.041		
Approximate Chi Square Value (33.66, α)	21.39	Adjusted Chi Square Value (33.66, β)	20.83
95% Gamma Approximate UCL (use when n>=50)	33.96	95% Gamma Adjusted UCL (use when n<50)	34.88

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	21.73	SD (KM)	35.99
Variance (KM)	1295	SE of Mean (KM)	6.696
k hat (KM)	0.365	k star (KM)	0.35
nu hat (KM)	21.88	nu star (KM)	21.03
theta hat (KM)	59.6	theta star (KM)	62.02
80% gamma percentile (KM)	34.42	90% gamma percentile (KM)	62.75
95% gamma percentile (KM)	94.47	99% gamma percentile (KM)	175.4

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (21.03, α)	11.61	Adjusted Chi Square Value (21.03, β)	11.21
95% Gamma Approximate KM-UCL (use when n>=50)	39.36	95% Gamma Adjusted KM-UCL (use when n<50)	40.77

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.914	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.173	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.167	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	21.88	Mean in Log Scale	2.608
SD in Original Scale	36.52	SD in Log Scale	0.897
95% t UCL (assumes normality of ROS data)	33.21	95% Percentile Bootstrap UCL	34.31
95% BCA Bootstrap UCL	40.67	95% Bootstrap t UCL	58.1
95% H-UCL (Log ROS)	30.03		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.541	KM Geo Mean	12.69
KM SD (logged)	1.011	95% Critical H Value (KM-Log)	2.492
KM Standard Error of Mean (logged)	0.188	95% H-UCL (KM -Log)	33.76
KM SD (logged)	1.011	95% Critical H Value (KM-Log)	2.492
KM Standard Error of Mean (logged)	0.188		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	21.66	Mean in Log Scale	2.471
SD in Original Scale	36.65	SD in Log Scale	1.187
95% t UCL (Assumes normality)	33.03	95% H-Stat UCL	43.59

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	50.92

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

APPENDIX J

The Olympian
www.theolympian.com

AFFIDAVIT OF PUBLICATION

Account #	Ad Number	Identification	PO	Amount	Cols	Lines
705026	0004043559	#6195 Robinson Noble, Max Wills, 17625 130th A		$293.50	1	38

Attention:

WIRTH
5023-8TH AVENUE NE
SEATTLE, WA 98105

#6195
Robinson Noble, Max Wills, 17625 130th Ave NE Ste 102 Woodinville, WA 98072, is seeking coverage under the Washington State Department of Ecology's Construction Stormwater NPDES and State Waste Discharge General Permit. The proposed project, Johns Auto Wrecking, is located at 411 93rd Ave SE in Olympia in Thurston county. This project involves 0.9 acres of soil disturbance for Other (remedial excavation) construction activities. All discharges and runoff goes to ground water. Any persons desiring to present their views to the Washington State Department of Ecology regarding this Application, or interested in Ecology's action on this Application, may notify Ecology in writing no later than 30 days of the last date of publication of this notice. Ecology reviews public comments and considers whether discharges from this project would cause a measurable change in receiving water quality, and, if so, whether the project is necessary and in the overriding public interest according to Tier II antidegradation requirements under WAC 173 201A 320. Comments can be submitted to: Department of Ecology Attn: Water Quality Program, Construction Stormwater P.O. Box 47696, Olympia, WA 98504-7696
Published January 18

ELIZABETH BROWN, being duly sworn, deposes and says: That she is the Principal Clerk of The Olympian, a daily newspaper printed and published at Olympia, Thurston County, State of Washington, and having a general circulation therein, and which said newspaper has been continuously and uninterruptedly published in said County during a period of six months prior to the first publication of the notice, a copy of which is attached hereto: that said notice was published in The Olympian in accordance with RCW 65.16.020 and RCW 63.16.040, as amended, for:

2 Insertions

Published On:
January 28, 2019, February 04, 2019

Elizabeth Brown
(Principal Clerk)

Subscribed and sworn on this 5th day of February in the year of 2019 before me, a Notary Public, personally appeared before me Elizabeth Brown known or identified to me to be the person whose name subscribed to the within instrument, and being by first duly sworn, declared that the statements therein are true, and acknowledged to me that he/she executed the same.

KAREN GEBHARDT
NOTARY PUBLIC
STATE OF WASHINGTON
COMMISSION EXPIRES 06-11-2020

Karen Gebhardt
Notary Public in and for the state of Washington, residing at Olympia, Thurston County, Washington

Note: The above affidavit and fee is in compliance with RCW 63.16.030 and Sec. 3 Chapter 34, Laws of 1977

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

July 18, 2019

Max Wills
Robinson Noble
17625 130th Ave NE Ste 102
Woodinville, WA 98072

RE: Coverage under the Construction Stormwater General Permit (CSWGP)

Permit number:	**WAR306710**	
Site Name:	**Johns Auto Wrecking**	
Location:	**411 93rd Ave SE**	
	Olympia, WA	**County: Thurston**
Disturbed Acres:	**0.9**	

Dear Max Wills:

The Washington State Department of Ecology (Ecology) received your Notice of Intent for coverage under Ecology's Construction Stormwater General Permit (CSWGP). This is your permit coverage letter. Your permit coverage is effective July 18, 2019. **Please retain this permit coverage letter as the official record of permit coverage for your site.**

Ecology has approved use of electronic formats as long as they are easily produced on your construction site. A mobile friendly copy of the CSWGP permit, permit forms, and information related to your permit can be viewed and downloaded at www.ecology.wa.gov/eCoverage-packet. Please contact your Permit Administrator, listed below, if you would like to receive a hard copy of the CSWGP.

Please take time to read the entire permit and contact Ecology if you have any questions.

Electronic Discharge Monitoring Reports (WQWebDMR)
This permit requires that Permittees submit monthly discharge monitoring reports (DMRs) for the full duration of permit coverage (from issuance date to termination). DMRs must be submitted electronically using Ecology's secure online system, WQWebDMR. To sign up for WQWebDMR go to www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html. If you have questions, contact the portal staff at (360) 407-7097 (Olympia area), or (800) 633-6193/option 3, or email WQWebPortal@ecy.wa.gov.

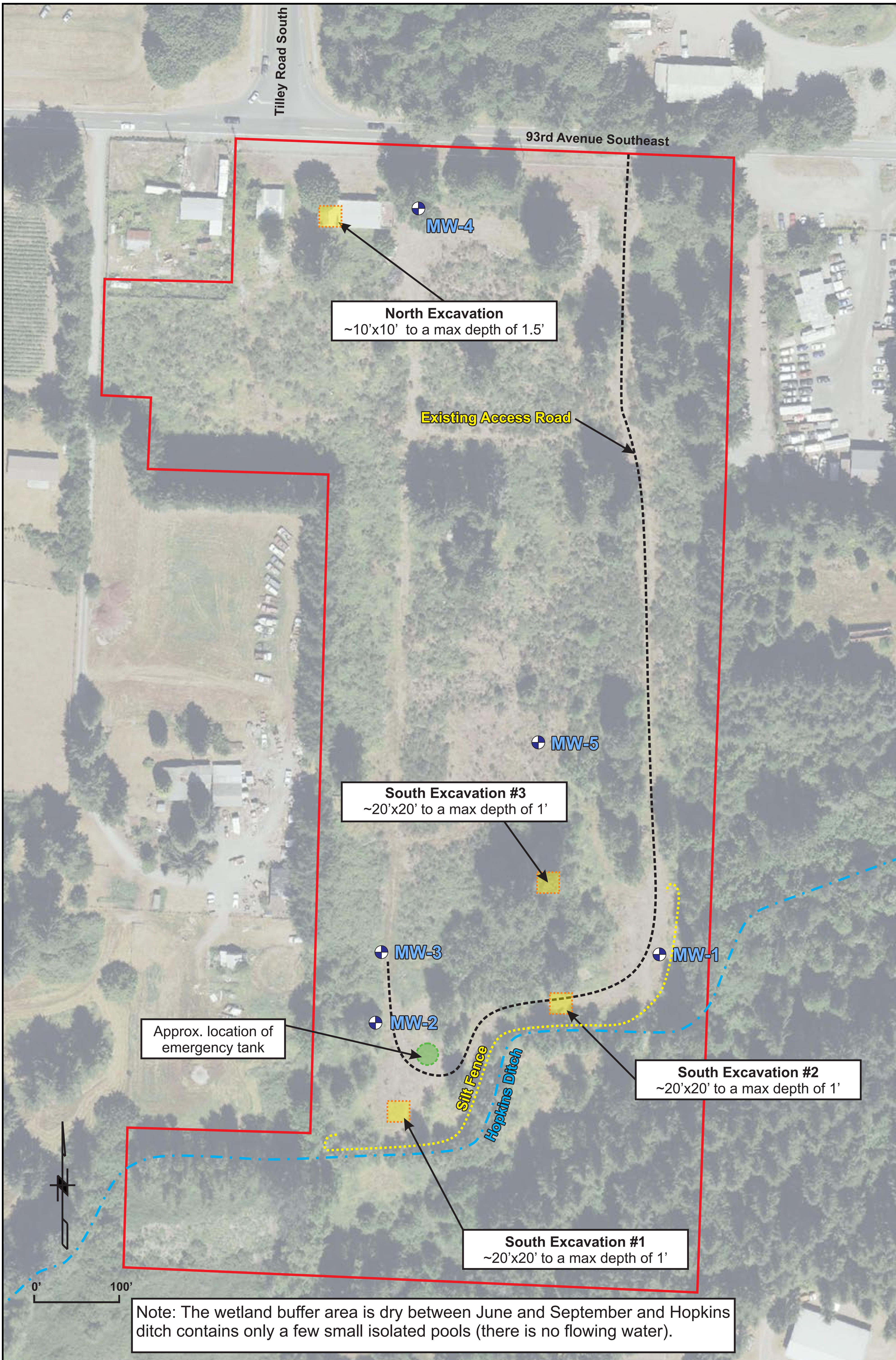
Appeal Process
You have a right to appeal coverage under the general permit to the Pollution Control Hearing Board (PCHB). Appeals must be filed within 30 days of the date of receipt of this letter. Any appeal is limited to the general permit's applicability or non-applicability to a specific discharger. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2). For more information regarding your right to appeal, go to https://fortress.wa.gov/ecy/publications/SummaryPages/1710007.html to view Ecology's Focus Sheet: *Appeal of General Permit Coverage*.

Ecology Field Inspector Assistance
If you have questions regarding stormwater management at your construction site, please contact Carol Serdar of Ecology's Southwest Regional Office in Lacey at carol.serdar@ecy.wa.gov or (360) 407-6269.

Questions or Additional Information
Ecology is committed to providing assistance. Please review our web page at www.ecology.wa.gov/constructionstormwaterpermit. If you have questions about the Construction Stormwater General Permit, please contact your Permit Administrator, Josh Klimek at josh.klimek@ecy.wa.gov or (360) 407-7451.

Sincerely,

Vincent McGowan, P.E., Manager
Program Development Services Section
Water Quality Program



ROBINSON NOBLE	Note: Image from Thurston County Geodata 2015 Aerials	PM: MTW October 2018 2491-001G	Thurston County T 17 N/R 02 W - 23 Scale 1" = 100'	Figure 1 Excavation Location Map John's Auto Wrecking: Remedial Investigation

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

November 4, 2019

Max Willis
Robinson Noble
17625 130th Ave NE Ste 102
Woodinville, WA 98072-8706

RE: Notice of Termination of Coverage under the Construction Stormwater General Permit

Permit Number:	WAR306710
Site Name:	Johns Auto Wrecking
Location:	411 93rd Ave SE Olympia, WA (Thurston County)
Disturbed Acres:	.9

Dear Max Willis:

The Washington State Department of Ecology (Ecology) has reviewed your Notice of Termination (NOT) of coverage under the Construction Stormwater General Permit for the construction site shown above. Based on the NOT, Ecology is terminating your coverage under the permit as of October 23, 2019, finding the site has met the termination criteria outlined in the Permit under Special Condition S10.

Please ensure that you retain the Stormwater Pollution Prevention Plan (SWPPP) and copies of all of the application, inspection reports, and all other reports required by this permit for at least three years after the date of final stabilization of the construction site. These documents need to be available to Ecology and to the local government agencies with jurisdiction, upon request.

Appeal of this Action

You have a right to appeal this action. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal, you must do the following within 30 days of the date of receipt of this letter:

- File your appeal and a copy of the permit cover page with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.

- Serve a copy of your appeal and the permit cover page on Ecology in paper form - by mail or in person (see addresses below). Email is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Address and Location Information:

Street Addresses:	**Mailing Addresses:**
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	Department of Ecology Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board (PCHB) 1111 Israel Road SW, Suite 301 Tumwater, WA 98501	Pollution Control Hearings Board PO Box 40903 Olympia, WA 98504-0903

As required by State law (RCW 90.48.465), Ecology charges a fee for its discharge permits. Although your permit is terminated, you will receive an invoice for entire fiscal year if payment has not been received. Ecology ***does not prorate fees*** for permits terminated during the fiscal year.

If you would like more information on the fee process, please contact Charles Gilman at (360) 407-6425 or send email to charles.gilman@ecy.wa.gov.

If you have any questions regarding the termination process, please contact Josh Klimek at (360) 407-7451 or send email to JOKL461@ecy.wa.gov.

Sincerely,

Vince McGowan, P.E., Manager
Program Development Services Section
Water Quality Program

cc: Charles Gilman, Ecology/Water Quality Program/Fees

CASE NO.: 2019101224
SEPA SEQUENCE NO.: 19 103357 XA
CASE SEQUENCE NO.: 19 103356 XD

DETERMINATION OF NONSIGNIFICANCE

Proponent:	Max Willis Robinson Noble, Inc. 17625 130th Avenue NE, Suite 102 Woodinville WA 98071-8706
Applicant:	Judith Wirth Havens Estate Investments, LLC 5023 8th Avenue NE Seattle WA 98105-3602
Description of Proposal:	The site is a former auto wrecking yard that has four small areas of ground contamination—the contaminant is lead. The proposal is to excavate all four areas, each approximately 10'x10' and one-foot deep, removing excavated materials to a designated landfill. The excavated areas will then be backfilled with clean material.
Location of Proposal: Section/Township/Range: Tax Parcel Numbers:	411 93rd Avenue SE, Olympia 23/17N/2W 12723210100, 12723220200, 12723210400, 12723210101, 12723210700, 12723210000,
Threshold Determination:	The lead agency for this proposal has determined that it does not have a probable significant adverse impact upon the environment. An Environmental Impact Statement is not required under RCW 43.21C.030(2)(C). This decision was made after review by the Lead Agency of a completed Environmental Checklist and other information on file with the Lead Agency. This information is available to the public on request.

Conditions/Mitigating Measures:

1. **SEE ATTACHED**

Jurisdiction: Lead Agency: Responsible Official:	Thurston County Community Planning and Economic Development Bret Bures, Planning Manager

Date of Issue: June 4, 2019
Comment Period ends: June 24, 2019
Appeal Period ends: July 1, 2019

Leah Davis
Leah Davis, Associate Planner

This Determination of Nonsignificance (DNS) is issued under 197-11-340(2); the lead agency will not act on this proposal for 14-days from the date of issue. No permits may be issued, and the applicant shall not begin work until after the comment and any appeal periods have expired and any other necessary permits are issued. If conditions are added, deleted, or modified during the 14-day review period, a modified MDNS will be issued. Otherwise, this MDNS will become final after the expiration of the comment deadline and appeal period, if applicable.

APPEALS: Threshold determinations may be appealed pursuant to TCC 17.09.160 if: (1) a written notice of appeal, meeting the requirements of TCC 17.09.160(D), and the appropriate appeal fee is received by the Thurston County Development Services Department within fourteen calendar days of the date of issuance of the threshold determination or, if there is a comment period under WAC 197-11-340, within seven calendar days of the last day of the comment period; and (2) the person filing the appeal meets the requirements of TCC 17.09.160(B).

NOTE: The issuance of this Determination of Nonsignificance does not constitute project approval. The applicant must comply with all applicable requirements of Thurston County and Washington State.

Thurston County CPED, Leah Davis
Building #1, Administration
2000 Lakeridge Drive SW
Olympia, WA 98502
(360) 786-5582
leah.davis@co.thurston.wa.us

cc: Department of Ecology
Adjacent Property Owners
WA Dept. of Fish and Wildlife
Squaxin Indian Tribe
Nisqually Tribe

ATTACHED CONDITIONS

CASE NO.: 2019101224
SEQUENCE NUMBERS: 19 103357 XA and 19 103356 XD

Background

This Determination of Non-Significance is based on the project as proposed and the impacts and mitigation reflected in the following materials:

- Environmental Checklist, received March 21, 2019
- Critical Areas Review Permit application, received March 21, 2019
- Site plan, received March 21, 2019
- ORCAA comments, received February 6, 2019
- Site visit, conducted May 13, 2019
- Washington State Department of Ecology letters, dated April 5, 2019 and April 22, 2019
- Washington State Dept. of Health comment, dated April 1, 2019
- Nisqually Tribe comment letter, dated April 1, 2019
- Squaxin Island Tribe comments, dated March 25, 2019

Conditions:

1. Erosion control measure must be in place prior to any clearing, grading, or construction. The discharge of sediment-laden runoff or other pollutants to waters of the state is in violation of Chapter 90.48, Water Pollution Control, and WAC 173-201A, Water Quality Standards for Surface Waters of the State of Washington, and is subject to enforcement action. Erosion control measures must be in place prior to any clearing, grading or construction. These control measures must be effective to prevent soil from being carried into surface water by stormwater runoff. Sand, silt, clay particles, and soil will damage aquatic habitat and are considered pollutants when discharged to waters of the state.

2. The issuance of a DNS does not constitute project approval. No work shall occur on site during the SEPA review process and the resolution of any appeals.

3. The applicant must comply with all applicable requirements of Thurston County Codes prior to receiving permit approval.

4. All grading and filling of land must utilize only clean fill. All other materials may be considered solid waste and permit approval may be required from your local jurisdictional health department prior to filling. All removed debris resulting from this project must be disposed of at an approved site. Contact the local jurisdictional health department for proper management of these materials.

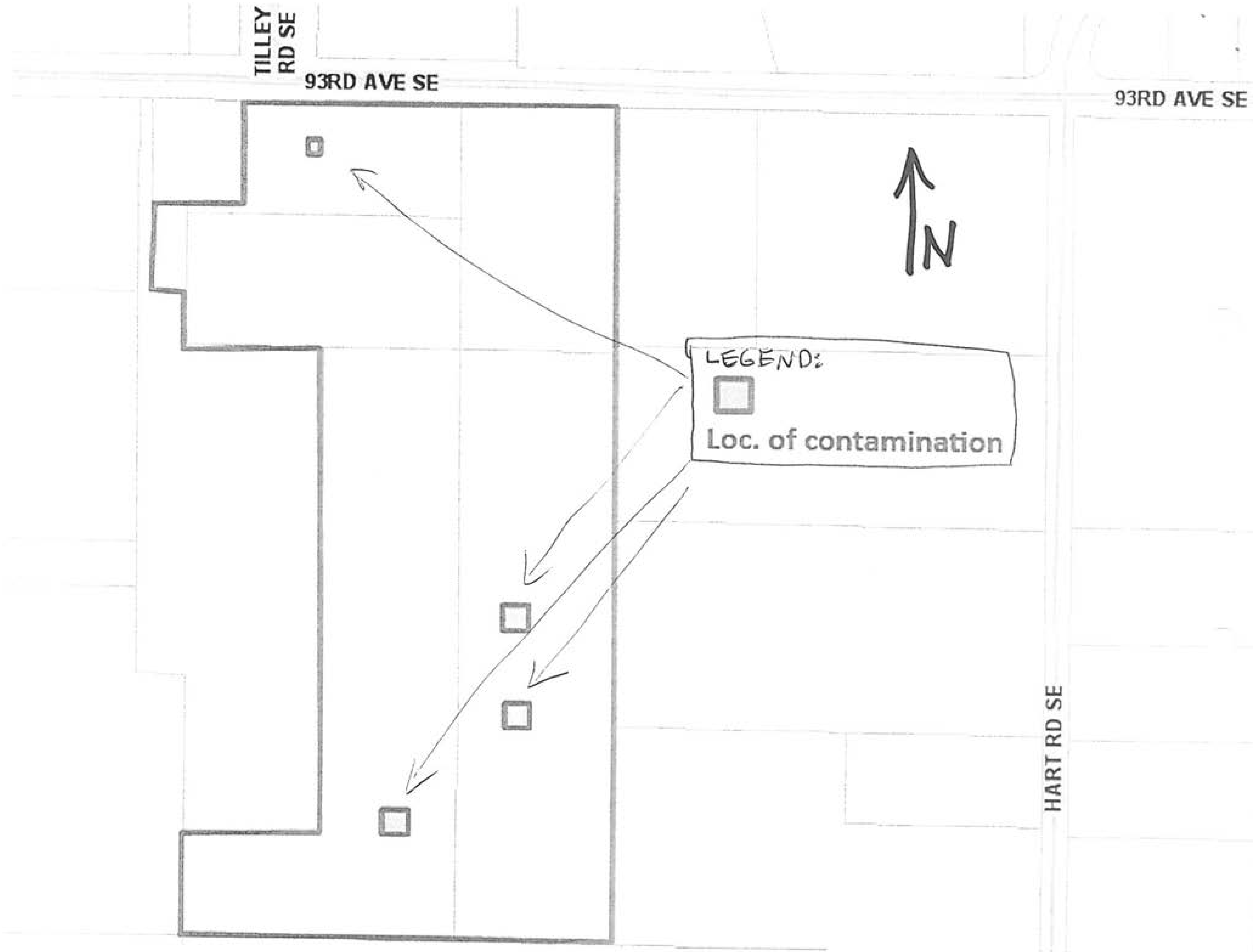
5. A Construction Stormwater Permit from the Washington State Department of Ecology may be required.

6. If contamination is currently known or suspected during construction, testing of potentially contaminated media must be conducted. If contamination of soil or groundwater is readily visible, or is revealed by testing, the Washington State Department of Ecology must be notified. Contact the Environmental Report Tracking system Coordinator at the Southwest Regional Office at (360) 407-6300.

7. All areas that are disturbed or newly created by construction activities shall be seeded, vegetated, or given some other equivalent type of protection against erosion.

8. In the event of inadvertent discovery of human remains or artifacts, the applicant shall contact and Department of Archaeology and Historic Preservation (360) 586-3534.

9. All other applicable state, federal, and local permits must be obtained prior to the start of project work.


TILLEY
RD SE
93RD AVE SE
93RD AVE SE
N
LEGEND:
Loc. of contamination
HART RD SE

THURSTON COUNTY
WASHINGTON
SINCE 1852

COUNTY COMMISSIONERS

John Hutchings
District One
Gary Edwards
District Two
Tye Menser
District Three

DEPARTMENT OF COMMUNITY PLANNING AND ECONOMIC DEVELOPMENT

Creating Solutions for Our Future

Joshua Cummings, Director

July 2, 2019

Max Wills
Robinson Noble, Inc.
17625 130th Avenue NE, Suite 102
Woodinville WA 98072-8706
mwills@robinson-noble.com

**SUBJECT: Critical Area Review Permit – John's Auto Wrecking Remediation
Project No. 2019101224, Folder Sequence No. 19 103356 XD
Location: 411 93rd Avenue SE, Olympia
Parcels: 12723210100, 12723220200, 12723210400, 12723210401, 12723210700, 12723210000**

Dear Mr. Wills:

Thurston County has completed a critical area review for toxics remediation on the subject parcels. The replacement work will include excavating four small contaminated areas, approximately 20 feet square and one foot deep. All contaminated material will be taken to an approved disposal site. Clean fill will then be placed in the excavated areas. The critical areas on site include, potential gopher habitat, areas of high ground water, and a stream with associated wetlands. All Critical Areas are regulated by the Thurston County Critical Area Ordinance (TCC 24). Remediation work in critical areas is allowed with approval of a Critical Area Review Permit (TCC 24.25.080).

The Critical Area Review permit is **approved** with the following conditions:

1. The two southern-most remediation areas, near Hopkins Ditch, shall have silt fencing installed between the excavation area and the stream to prevent any soils from being carried into surface water.

2. All conditions of the Mitigated Determination of Non-Significance shall be met before, during, and after construction.

If you wish to appeal this determination, please do so in writing on the enclosed administrative appeal form, accompanied by a nonrefundable fee of $1,960.00. Any appeal must be *received* in the Permit Assistance Center on the second floor of Building #1 in the Thurston County

Courthouse complex no later than 4 p.m. on **July 16, 2019.** Postmarks are not acceptable. If your fee and completed appeal form are not filed by this time, you will be unable to appeal this determination. This deadline may not be extended.

If you should you have questions I can be reached at (360) 786-5582 or by email at leah.davis@co.thurston.wa.us.

Sincerely,

Leah K Davis

Leah Davis
Associate Planner

Cc: Judith Wirth, via email (judithworth206@gmail.com)

Enclosures: Appeal form
Approved Plan
DNS with conditions

Q:\Planning\Amanda Save File\Critical Area Review Permit\2019101224JohnsAutocleanup.LD.docx

THURSTON COUNTY
WASHINGTON
SINCE 1852

Project No. ______________________
Appeal Sequence No. ______________________

APPEAL OF AN ADMINISTRATIVE DECISION

TO THE THURSTON COUNTY HEARING EXAMINER COMES NOW ______________________
on this _____ day of ____________ 20__, as an APPELLANT in the matter of an administrative decision rendered on ______________________ 20__, by ____, relating to
____
____
____

THE APPELLANT, after review and consideration of the reasons given by the administrative official for his/her decision, does now, give written notice of APPEAL to the Hearing Examiner of said decision under the provision(s) of the ordinances marked below.

☐ 17.09.160 *SEPA*
☐ 17.15.410 *AG ACTIVITIES, CRITICAL AREAS*
☐ 20.60.060 *ZONING*
☐ 22.62.050 *TUMWATER UGA ZONING*
☐ 24.05.050 *CRITICAL AREAS*
☐ 18.10.070 *PLATTING & SUBDIVISION*
☐ 19.12.010 *SHORELINE PROGRAM*
☐ 21.81.070 *LACEY UGA ZONING*
☐ 23.72.190 *OLYMPIA UGA ZONING*
☐ 14.22.501 *ABATEMENT OF DANGEROUS BUILDINGS*

STATE THE BASIS OF THE APPEAL AS OUTLINED IN SECTION "A" ON REVERSE SIDE OF THIS FORM.

(If more space is required, please attach additional sheet.)

AND REQUESTS that the Hearing Examiner, having responsibility for review of such decisions will upon review of the record of the matters and the allegations contained in this appeal, find in favor of the appellant and reverse the administrative decision.

____
APPELLANT NAME PRINTED

____
SIGNATURE OF APPELLANT

Address______________________________________

Phone: ______________________________________

Email: ______________________________________

Please do not write below - for Staff Use Only:

Filed with Community Planning & Economic Development this ________ day of ____________ 20__,
by ______________________________, Filing fee of $1960.00*, receipt no. ______________ by ______.

*The filing fee will cover staff time (for Planning, Environmental Health & Development Review), and Hearing Examiner time to hear the appeal and issue a decision. Additional fees will be billed if warranted.

THURSTON COUNTY
PROCEDURE FOR APPEAL OF ADMINISTRATIVE DECISION TO HEARING EXAMINER

NOTE: THERE MAY BE NO EX PARTE (ONE-SIDED) CONTACT OUTSIDE A PUBLIC HEARING WITH EITHER THE HEARING EXAMINER OR WITH THE BOARD OF THURSTON COUNTY COMMISSIONERS ON APPEALS (Thurston County Code, Section 2.06.030).

The following is a description of the rules of procedure for appeals before the Hearing Examiner.

A. A FILED APPEAL MUST BE IN WRITING AND CONTAIN THE FOLLOWING

1. A brief statement as to how the appellant is significantly affected by or interested in the matter appealed;
2. A brief statement of the appellant's issues on appeal, noting appellant's specific exceptions and objections to the decision or action being appealed;
3. The relief requested, such as reversal or modification.

B. PRE-HEARING CONFERENCE

1. All parties to an appeal hearing shall be prepared for a pre-hearing conference with the Thurston County Hearing Examiner. The pre-hearing conference is held to structure the scope of the hearing.
2. Pre-hearing conferences may be held by telephone conference call.
3. The Hearing Examiner shall give reasonable notice to parties of any pre-hearing conference. Notice may be written or oral.
4. All parties shall be represented at a pre-hearing conference unless they waive the right to be present or represented.
5. Following the pre-hearing conference, the Hearing Examiner may issue an order reciting the actions taken or ruling on motions made at the conference.

C. PARTIES REPRESENTATIVE REQUIRED

When a party consists of more than one individual, or is a group, organization, corporation, or other entity, the appellant shall designate an individual to be its representative, and inform the Hearing Examiner's office of the name, address and telephone number of the designated representative. The rights of such an appellant shall be exercised by the person designated as the party representative. Notice or other communication to the party representative is considered to be notice or communication to party.

D. PARTIES' RIGHTS AND RESPONSIBILITIES

1. Although Appellants and Applicants have the right to be represented by an attorney, representation by an attorney is not required. Attorney representation is not discouraged.
2. Where a party has designated a representative, the representative shall exercise the rights of the party.
3. All parties and others participating in and observing hearings shall conduct themselves with civility and deal courteously with all persons involved in the proceedings.

E. HEARING FORMAT

1. Appeal hearings, although generally informal in nature, shall have a structured format and shall be conducted in a manner deemed by the Hearing Examiner to make the relevant evidence most readily and efficiently available to the Examiner and to provide the parties a fair opportunity for hearing.
2. The order of an appeal hearing will generally be as follows:
   a. Examiner's introductory statement;
   b. Background presentation by Department;
   c. Appellant's argument;
   d. Department's presentation;
   e. Applicant's presentation;
   f. Rebuttal;
   g. Closing argument of parties.

F. Hearing Examiner Decision will be issued within **ten (10) working days** of the hearing unless additional time is agreed to by the parties.

ROBINSON NOBLE	Note: Image from Thurston County Geodata 2015 Aerials	PM: MTW October 2018 2491-001G	Thurston County T 17 N/R 02 W - 23 Scale 1" = 100'	Figure 1 Excavation Location Map John's Auto Wrecking: Remedial Investigation

CASE NO.: 2019101224
SEPA SEQUENCE NO.: 19 103357 XA
CASE SEQUENCE NO.: 19 103356 XD

DETERMINATION OF NONSIGNIFICANCE

Proponent:	Max Willis Robinson Noble, Inc. 17625 130th Avenue NE, Suite 102 Woodinville WA 98071-8706
Applicant:	Judith Wirth Havens Estate Investments, LLC 5023 8th Avenue NE Seattle WA 98105-3602
Description of Proposal:	The site is a former auto wrecking yard that has four small areas of ground contamination—the contaminant is lead. The proposal is to excavate all four areas, each approximately 10'x10' and one-foot deep, removing excavated materials to a designated landfill. The excavated areas will then be backfilled with clean material.
Location of Proposal:	411 93rd Avenue SE, Olympia
Section/Township/Range:	23/17N/2W
Tax Parcel Numbers:	12723210100, 12723220200, 12723210400, 12723210101, 12723210700, 12723210000,
Threshold Determination:	The lead agency for this proposal has determined that it does not have a probable significant adverse impact upon the environment. An Environmental Impact Statement is not required under RCW 43.21C.030(2)(C). This decision was made after review by the Lead Agency of a completed Environmental Checklist and other information on file with the Lead Agency. This information is available to the public on request.

Conditions/Mitigating Measures:

1. **SEE ATTACHED**

Jurisdiction:	Thurston County
Lead Agency:	Community Planning and Economic Development
Responsible Official:	Bret Bures, Planning Manager

Date of Issue: June 4, 2019
Comment Period ends: June 24, 2019
Appeal Period ends: July 1, 2019

Leah Davis, Associate Planner

This Determination of Nonsignificance (DNS) is issued under 197-11-340(2); the lead agency will not act on this proposal for 14-days from the date of issue. No permits may be issued, and the applicant shall not begin work until after the comment and any appeal periods have expired and any other necessary permits are issued. If conditions are added, deleted, or modified during the 14-day review period, a modified MDNS will be issued. Otherwise, this MDNS will become final after the expiration of the comment deadline and appeal period, if applicable.

APPEALS: Threshold determinations may be appealed pursuant to TCC 17.09.160 if: (1) a written notice of appeal, meeting the requirements of TCC 17.09.160(D), and the appropriate appeal fee is received by the Thurston County Development Services Department within fourteen calendar days of the date of issuance of the threshold determination or, if there is a comment period under WAC 197-11-340, within seven calendar days of the last day of the comment period; and (2) the person filing the appeal meets the requirements of TCC 17.09.160(B).

NOTE: The issuance of this Determination of Nonsignificance does not constitute project approval. The applicant must comply with all applicable requirements of Thurston County and Washington State.

Thurston County CPED, Leah Davis
Building #1, Administration
2000 Lakeridge Drive SW
Olympia, WA 98502
(360) 786-5582
leah.davis@co.thurston.wa.us

cc: Department of Ecology
Adjacent Property Owners
WA Dept. of Fish and Wildlife
Squaxin Indian Tribe
Nisqually Tribe

PS 6/4

ATTACHED CONDITIONS

CASE NO.: 2019101224
SEQUENCE NUMBERS: 19 103357 XA and 19 103356 XD

Background

This Determination of Non-Significance is based on the project as proposed and the impacts and mitigation reflected in the following materials:

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Conditions:

1. Erosion control measure must be in place prior to any clearing, grading, or construction. The discharge of sediment-laden runoff or other pollutants to waters of the state is in violation of Chapter 90.48, Water Pollution Control, and WAC 173-201A, Water Quality Standards for Surface Waters of the State of Washington, and is subject to enforcement action. Erosion control measures must be in place prior to any clearing, grading or construction. These control measures must be effective to prevent soil from being carried into surface water by stormwater runoff. Sand, silt, clay particles, and soil will damage aquatic habitat and are considered pollutants when discharged to waters of the state.

2. The issuance of a DNS does not constitute project approval. No work shall occur on site during the SEPA review process and the resolution of any appeals.

3. The applicant must comply with all applicable requirements of Thurston County Codes prior to receiving permit approval.

4. All grading and filling of land must utilize only clean fill. All other materials may be considered solid waste and permit approval may be required from your local jurisdictional health department prior to filling. All removed debris resulting from this project must be disposed of at an approved site. Contact the local jurisdictional health department for proper management of these materials.

5. A Construction Stormwater Permit from the Washington State Department of Ecology may be required.

6. If contamination is currently known or suspected during construction, testing of potentially contaminated media must be conducted. If contamination of soil or groundwater is readily visible, or is revealed by testing, the Washington State Department of Ecology must be notified. Contact the Environmental Report Tracking system Coordinator at the Southwest Regional Office at (360) 407-6300.

7. All areas that are disturbed or newly created by construction activities shall be seeded, vegetated, or given some other equivalent type of protection against erosion.

8. In the event of inadvertent discovery of human remains or artifacts, the applicant shall contact and Department of Archaeology and Historic Preservation (360) 586-3534.

9. All other applicable state, federal, and local permits must be obtained prior to the start of project work.

THURSTON COUNTY
WASHINGTON
SINCE 1852

Building Development Center
2000 Lakeridge Dr. SW, Olympia, WA 98502
(360)786-5490 / (360)754-2939 (Fax)
TDD Line (360) 754-2933
Email: permit@co.thurston.wa.us
www.thurstoncountybdc.com
Creating Solutions for Our Future

MASTER APPLICATION

This application must accompany a project specific supplemental application.

STAFF USE ONLY	DATE STAMP
LABEL NOTE: ALL APPLICATIONS AND SITE PLANS MUST BE COMPLETED IN BLACK OR BLUE INK ONLY	
Gopher Soils ☐ YES ☐ NO **Prairie Soils** ☐ YES ☐ NO	Intake By: ______

PROJECT DESCRIPTION John's Auto Wrecking - Environmental Remediation

PROPERTY INFORMATION

1. **Tax Parcel Number(s)** 12723210100; 12723220200 ; 12723210400; 12723210401 ; 12723210700; 12723210000
2. **Subdivision Name** N/A **Lot #** N/A
3. **Property Address** 411 93rd Avenue Southeast **City** Olympia **Zip Code** 98501
4. **Directions to Property** (from nearest major road)
Take exit 99 from I-5, drive east on 93rd Avenue SE approximately 1.75 miles. Property is located on the south side of 93rd Avenue SE between Tiley Road SW and Hart Road SE. The property is fenced and locked - access is via a gate on the NE corner of the property.

PROPERTY ACCESS

5. **Property Access** ☑ Existing ☐ Proposed
6. **Access Type** ☐ Private Driveway ☐ Shared Driveway ☑ Private Road ☐ Public Road
7. **Property Access Issues** (locked gate, gate code, dogs or other animals) ☐ No ☑ Yes The property is fenced and locked - key required.
Property owner is responsible for providing gate code and securing animals prior to site visit.

WATER/SEPTIC

8. **Water Supply** ☐ Existing ☐ Proposed
9. **Water Supply Type** ☐ Single Family ☐ Two Party Well ☐ Group A ☐ Group B
WATER SYSTEM NAME N/A - There is no existing water supply on the site.
10. **Waste Water Sewage Disposal** ☐ Existing ☐ Proposed
11. **Sewage Disposal System Type** ☐ Individual Septic System ☐ Community System ☐ Sewer
NAME OF PUBLIC SYSTEM N/A - There is no existing sewage disposal system on the site.

BILLING OF INVOICES

The fee charged at the time of application covers base hours listed on the fee schedule. When base hours by a Department are used, a monthly billing invoice is generated at the hourly rate listed on the fee schedule. Should review of the project exceed the base hours allotted, billing invoices shall be mailed to: ☑ **Owner** ☑ **Applicant** ☐ **Point of Contact**

PROPERTY OWNER (additional property owner sheet can be obtained online at www.thurstoncountybdc.com)

Property Owner Name Havens Estate Investments, LLC (Judith Wirth)

Mailing Address 5023 8th Avenue NE City Seattle State WA Zip Code 98105-3602

Phone (206) 632-1924 Cell ( ) Fax (206) 632-1924

EMAIL judithworth206@gmail.com

Communication from staff provided by Email? ☑ YES ☐ NO

Property Owner Signature* ________________ **Date** 3/21/2019

APPLICANT

Applicant Name Havens Estate Investments, LLC (Judith Wirth)

Mailing Address 5023 8th Avenue NE City Seattle State WA Zip Code 98105-3602

Phone (206) 632-1924 Cell ( ) Fax (206) 632-1924

EMAIL judithworth206@gmail.com

Communication from staff provided by Email? ☑ YES ☐ NO

Signature* ________________ **Date** 3/21/2019

POINT OF CONTACT (Person receiving all County correspondence)

Name Max Wills (Robinson Noble, Inc.)

Mailing Address 17625 130th Avenue NE, Suite 102 City Woodinville State WA Zip Code 98072-8706

Phone (425) 488-0599 Cell (206) 550-7215 Fax (425) 488-2330

EMAIL mwills@robinson-noble.com

Communication from staff provided by Email? ☑ YES ☐ NO

Signature* ________________ **Date** 3/21/2019

*DISCLAIMER

Application is hereby made for a permit(s) to authorize the activities described herein. I certify that I am familiar with the information contained in the application package and that to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities. I hereby grant to the agencies to which this application is made or forwarded, the right to enter the above-described location to inspect the proposed, in-progress or completed work. I agree to start work only after all necessary permits/approvals have been received.

APPENDIX K

Libby Environmental, Inc.
4139 Libby Road NE • Olympia, WA 98506-2518

July 21, 2016

Max Wills
Robinson Noble
17625 130th Avenue NE, Suite 102
Woodinville, WA 98072

Dear Mr. Wills:

Please find enclosed the analytical data report for the Havens Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@aol.com
www.LibbyEnvironmental.com

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L160715-5
Client Project # 2491-001F

Analyses of Total Lead in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)
Method Blank	7/20/16	nd
WS 10	7/20/16	165
WS 11	7/20/16	67
WS 12	7/20/16	21
WS 13	7/20/16	47
WS 14	7/20/16	17
WS 15	7/20/16	9.0
WS 16	7/20/16	7.5
WS 17	7/20/16	7.6
WS 18	7/20/16	386
WS 19	7/20/16	11
WS 19 Dup	7/20/16	11
WS 20	7/20/16	41
WS 21	7/20/16	123
WS 22	7/20/16	15
WS 23	7/20/16	13
WS 24	7/20/16	85
WS 24 Dup	7/20/16	90
Practical Quantitation Limit		5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@aol.com

HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L160715-5
Client Project # 2491-001F

QA/QC for Lead in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)
LCS	7/20/16	115%
WS 24 MS	7/20/16	84%
WS 24 MSD	7/20/16	85%
RPD	7/20/16	1%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Jamie Deyman

Libby Environmental, Inc.

Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Client: ROBINSON NOBLE
Address: 17625 130th AVE NE SUITE 102
City: WOODINVILLE State: WA Zip: 98072
Phone: (206) 550 7215 Fax:
Client Project # 2491-001F

Date: 7/15/16 Page: 1 of 1
Project Manager: MAX WILLS
Project Name: HAVENS
Location: OLYMPIA City, State:
Collector: MTW ACY Date of Collection: 7/15/16
Email: MWILLS@ROBINSON-NOBLE.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-Gx	BTEX 8021	NWTPH-HCID	NWTPH-Dx	NWTPH-Dx/Dx	c PAH 8270	PAH 8270	Semi Vol 8270	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	LEAD		Field Notes
1	WS10	0-1	1130	SOIL	4 oz JAR												X			
2	WS 11		1145														X			
3	WS 12		1155														X			
4	WS 13		1210														X			
5	WS 14		1220														X			
6	WS 15		1230														X			
7	WS16		1235														X			
8	WS17		1245														X			
9	WS18		1300														X			
10	WS 17.		1310														X			
11	WS20		1320														X			
12	WS 21	0-1½	1330														X			
13	WS 22	0-1	1340														X			
14	WS 23		1350														X			
15	WS 24		1400														X			
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
MTW	7/15/16 1430	[illegible signature]	7/15/16 1430

Sample Receipt
Good Condition? Y N
Temp. °C
Seals Intact? Y N N/A
Total Number of Containers

Remarks: STD TURN
EIM

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

July 17, 2019

Max Wills
Robinson Noble
2105 South C Street
Tacoma, WA 98402

Dear Mr. Wills:

Please find enclosed the analytical data report for the Haven Estate Invest Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Libby Environmental, Inc. — Chain of Custody Record

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154
www.LibbyEnvironmental.com

Date: 7/9/19 Page: 1 of 1

Client: RN
Address: 2105 S C St
City: Tacoma State: WA Zip: 98402
Phone: 253-475-7711 Fax:
Client Project # 2491-0016

Project Manager: Max Wills
Project Name: Haven Estate Invest
Location: John's Auto Wrecking City, State: Olympia, WA
Collector: Matthew G Lutz Date of Collection: 7/9/19
Email: mwills@robinson-noble.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-Gx	BTEX 8021	NWTPH-HCID	NWTPH-Dx	NWTPH-Dx/Dx	cPAH 8270	PAH 8270	Semi Vol 8270	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	TCLP - Lead			Field Notes
1	WS8-A	6"	14:20	soil	4oz jar													X			
2	WS6-A	8"	14:45	↓	↓													X			
3	WS21-A	8"	15:00	↓	↓													X			
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					
16																					
17																					

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	7/10/19 1418	[signature]	7/10/19 1418

Sample Receipt

Good Condition?	Y N
Temp.	°C
Seals Intact?	Y N N/A
Total Number of Containers	

Remarks: STD
EIM

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a cout of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

HAVEN ESTATE INVEST PROJECT
Robinson Noble
Libby Project # L190710-7
Date Received 7/10/2019
Time Received 2:18 PM

Received By KD

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody is complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☐ Hand Delivered	☑ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	1.8 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	15.6 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☐ Yes	☐ No	☑ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies?	☐ Yes	☐ No	☑ N/A

Person Notified: ______ Date: ______

By Whom: ______ Via: ______

Regarding: ______

19. Comments.

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

07/16/2019

Libby Environmental, Inc.
3322 South Bay Road NE
Olympia, WA 98506

Project: Haven Estate Invest
Date Received: 07/11/2019
Spectra Project: 2019070330

Client ID	Spectra #	Analyte	Result	Units	Method	Matrix	Date Sampled
WS8-A	1	TCLP Lead	< 0.025	mg/L	EPA 1311/6010D	Soil	07/09/2019
WS6-A	2	TCLP Lead	< 0.025	mg/L	EPA 1311/6010D	Soil	07/09/2019
WS21-A	3	TCLP Lead	< 0.025	mg/L	EPA 1311/6010D	Soil	07/09/2019

SPECTRA LABORATORIES

Jeffrey Cooper, Laboratory Manager

a8/scj

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

7/16/2019

Libby Environmental, Inc
3322 South Bay Rd, NE
Olympia, WA 98506

Units:	mg/L
Spectra Project:	2019070330
Applies to Spectra #'s	1-3
Analyst:	SCJ

QUALITY CONTROL RESULTS

ICP Metals SW846 6010C - TCLP Extract

Method Blank

Date Digested: 7/16/2019 Date Analyzed: 7/16/2019

Element	Result
Lead	< 0.025

Laboratory Control Sample (LCS)

Date Digested: 7/16/2019 Date Analyzed: 7/16/2019

Element	Spike Added	LCS Conc.	LCS %Rec
Lead	1.0	1.041	104.1

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 7/16/2019 Date Analyzed: 7/16/2019
Sample Spiked: 2019070301-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Lead	0.000	1.0	0.957	95.7	0.938	93.8	2.0

Recovery Limits 75-125%
RPD Limit 20
Comment:

Spectra Laboratories

Jeffrey Cooper
Laboratory Manager

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

3322 South Bay Road NE
Olympia, WA 98506

Ph: 360-352-2110
Fax: 360-352-4154

2019070330

Client: Libby Environmental, Inc.	Date: 7/11/19 Page: 1 of 1
Address: (see above)	Project Manager: Sherry Chilcutt
City: State: Zip:	Project Name: Haven Estate invest
Phone: Fax:	Location: Johns Auto City, State: WA
Client Project # L190710-7	Collector: MGL Date of Collection: 7/9/19
	Email: LibbyEnv@Gmail.com

#	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-Gx	BTEX 8021	NWTPH-HCID	NWTPH-Dx	NWTPH-Dx/Dx	cPAH 8270	PAH 8270	Semi Vol 8270	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	TCLP Pb			Field Notes
1	WS8-A	6"	1420	Soil	4 oz													X			
2	WS6-A	8"	1445	|	|													X			
3	WS21-A KD 7/11	6"	1500	|	|													X			
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					
16																					
17																					

Relinquished by:	Date / Time	Received by:	Date / Time	Sample Receipt		Remarks:
[signature]	7/11/19 1417	[signature]	7-11-19 1417	Good Condition?	Y N	
Relinquished by:	Date / Time	Received by:	Date / Time	Cooler Temp.	1.9 °C	
				Sample Temp.	6.8 °C	
Relinquished by:	Date / Time	Received by:	Date / Time	Total Number of Containers	3	TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

August 21, 2019

Max Wills
Robinson Noble
2105 South C Street
Tacoma, WA 98402

Dear Mr. Wills:

Please find enclosed the analytical data report for the Havens Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.   Chain of Custody Record

www.LibbyEnvironmental.com

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 8-19-19   Page: 1 of 1

Client: Robinson Noble, Inc		Project Manager: Max Wills	
Address:		Project Name: Havens	
City: Tacoma	State: WA Zip: 9	Location: 411 93rd, SE	City, State: Olympia, WA
Phone: 253-475-7711	Fax:	Collector: Max Wills	Date of Collection: 8-19-19
Client Project # 2491-001G		Email:	

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-Gx	BTEX 8021	NWTPH-HCID	NWTPH-Dx	NWTPH-Dx/Dx	cPAH 8270	PAH 8270	Semi Vol 8270	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	LEAD			Field Notes
1	NEX1-2	2	930	S	4oz													X			
2	NEX2-2	2	935															X			
3	NEX3-2	2	940															X			
4	S-EX#1-1-2	2	1030															X			
5	S-EX#1-2-2	2	1035															X			
6	PS-2-1	1	1100									X									
7	PS-3-1	1	1105									X									
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					
16																					
17																					

Relinquished by:	Date / Time	Received by:	Date / Time
MW	8/19/19 1138	[signature]	8-19-19 1138
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt		
Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks:
RUSH LEAD
48 hr PAH

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a cout of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L190819-1
Client Project # 2491-001G

Analyses of Total Lead in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)
Method Blank	8/19/19	nd
NEX1-2	8/19/19	nd
NEX1-2 Dup	8/19/19	nd
NEX2-2	8/19/19	nd
NEX3-2	8/19/19	nd
S-EX#1-1-2	8/19/19	nd
S-EX#1-2-2	8/19/19	nd
Practical Quantitation Limit		5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L190819-1
Client Project # 2491-001G

QA/QC for Total Lead in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)
LCS	8/19/19	100%
NEX1-2 MS	8/19/19	103%
NEX1-2 MSD	8/19/19	109%
RPD	8/19/19	6%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

HAVENS PROJECT
Robinson Noble
Libby Project # L190819-1
Date Received 8/19/2019
Time Received 11:38 AM

Received By SC

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☐ Hand Delivered	☑ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	-1.5 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	15.0 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☐ Yes	☐ No	☑ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies?	☐ Yes	☐ No	☑ N/A

Person Notified: ______ Date: ______
By Whom: ______ Via: ______
Regarding: ______

19. Comments.

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Sherry Chilcutt
3322 South Bay Road NE
Olympia, WA 98506

RE: Havens
Work Order Number: 1908271

August 21, 2019

Attention Sherry Chilcutt:

Fremont Analytical, Inc. received 2 sample(s) on 8/20/2019 for the analyses presented in the following report.

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)
Sample Moisture (Percent Moisture)

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

CLIENT:	Libby Environmental
Project:	Havens
Work Order:	1908271

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1908271-001	PS-2-1	08/19/2019 11:00 AM	08/20/2019 9:15 AM
1908271-002	PS-3-1	08/19/2019 11:05 AM	08/20/2019 9:15 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1908271**

Date: **8/21/2019**

CLIENT: Libby Environmental
Project: Havens

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **1908271**
Date Reported: **8/21/2019**

Client: Libby Environmental
Collection Date: 8/19/2019 11:00:00 AM
Project: Havens
Lab ID: 1908271-001
Matrix: Soil
Client Sample ID: PS-2-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 25563		Analyst: SB
Benz(a)anthracene	ND	42.8		µg/Kg-dry	1	8/20/2019 8:11:14 PM
Chrysene	ND	42.8		µg/Kg-dry	1	8/20/2019 8:11:14 PM
Benzo(b)fluoranthene	ND	42.8		µg/Kg-dry	1	8/20/2019 8:11:14 PM
Benzo(k)fluoranthene	ND	42.8		µg/Kg-dry	1	8/20/2019 8:11:14 PM
Benzo(a)pyrene	ND	42.8		µg/Kg-dry	1	8/20/2019 8:11:14 PM
Indeno(1,2,3-cd)pyrene	ND	42.8		µg/Kg-dry	1	8/20/2019 8:11:14 PM
Dibenz(a,h)anthracene	ND	42.8		µg/Kg-dry	1	8/20/2019 8:11:14 PM
Surr: 2-Fluorobiphenyl	60.2	19.4 - 157		%Rec	1	8/20/2019 8:11:14 PM
Surr: Terphenyl-d14 (surr)	77.8	31.5 - 173		%Rec	1	8/20/2019 8:11:14 PM
Sample Moisture (Percent Moisture)				Batch ID: R53376		Analyst: SBM
Percent Moisture	17.8	0.500		wt%	1	8/21/2019 8:15:06 AM

Analytical Report

Work Order: **1908271**
Date Reported: **8/21/2019**

Client: Libby Environmental
Collection Date: 8/19/2019 11:05:00 AM
Project: Havens
Lab ID: 1908271-002
Matrix: Soil
Client Sample ID: **PS-3-1**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 25563		Analyst: SB
Benz(a)anthracene	ND	46.9		µg/Kg-dry	1	8/20/2019 8:31:55 PM
Chrysene	ND	46.9		µg/Kg-dry	1	8/20/2019 8:31:55 PM
Benzo(b)fluoranthene	ND	46.9		µg/Kg-dry	1	8/20/2019 8:31:55 PM
Benzo(k)fluoranthene	ND	46.9		µg/Kg-dry	1	8/20/2019 8:31:55 PM
Benzo(a)pyrene	ND	46.9		µg/Kg-dry	1	8/20/2019 8:31:55 PM
Indeno(1,2,3-cd)pyrene	ND	46.9		µg/Kg-dry	1	8/20/2019 8:31:55 PM
Dibenz(a,h)anthracene	ND	46.9		µg/Kg-dry	1	8/20/2019 8:31:55 PM
Surr: 2-Fluorobiphenyl	46.8	19.4 - 157		%Rec	1	8/20/2019 8:31:55 PM
Surr: Terphenyl-d14 (surr)	71.7	31.5 - 173		%Rec	1	8/20/2019 8:31:55 PM
Sample Moisture (Percent Moisture)				Batch ID: R53376		Analyst: SBM
Percent Moisture	22.1	0.500		wt%	1	8/21/2019 8:15:06 AM

Fremont Analytical

Work Order: 1908271
CLIENT: Libby Environmental
Project: Havens

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **MB-25563** SampType: **MBLK** Units: **µg/Kg** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **MBLKS** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056084**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	ND	40.0									
Chrysene	ND	40.0									
Benzo(b)fluoranthene	ND	40.0									
Benzo(k)fluoranthene	ND	40.0									
Benzo(a)pyrene	ND	40.0									
Indeno(1,2,3-cd)pyrene	ND	40.0									
Dibenz(a,h)anthracene	ND	40.0									
Surr: 2-Fluorobiphenyl	521		500.0		104	19.4	157				
Surr: Terphenyl-d14 (surr)	534		500.0		107	31.5	173				

Sample ID: **LCS-25563** SampType: **LCS** Units: **µg/Kg** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **LCSS** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056085**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	1,220	40.0	1,000	0	122	36.6	142				
Chrysene	987	40.0	1,000	0	98.7	43	165				
Benzo(b)fluoranthene	1,040	40.0	1,000	0	104	41	155				
Benzo(k)fluoranthene	961	40.0	1,000	0	96.1	30.6	164				
Benzo(a)pyrene	1,120	40.0	1,000	0	112	30.2	171				
Indeno(1,2,3-cd)pyrene	857	40.0	1,000	0	85.7	31.3	159				
Dibenz(a,h)anthracene	837	40.0	1,000	0	83.7	28	158				
Surr: 2-Fluorobiphenyl	472		500.0		94.4	19.4	157				
Surr: Terphenyl-d14 (surr)	567		500.0		113	31.5	173				

Sample ID: **1908270-002ADUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **BATCH** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056087**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	ND	43.8						0		30	
Chrysene	ND	43.8						0		30	

Work Order: 1908271
CLIENT: Libby Environmental
Project: Havens

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **1908270-002ADUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **BATCH** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056087**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo(b)fluoranthene	ND	43.8						0		30	
Benzo(k)fluoranthene	ND	43.8						0		30	
Benzo(a)pyrene	ND	43.8						0		30	
Indeno(1,2,3-cd)pyrene	ND	43.8						0		30	
Dibenz(a,h)anthracene	ND	43.8						0		30	
Surr: 2-Fluorobiphenyl	392		547.0		71.6	19.4	157		0		
Surr: Terphenyl-d14 (surr)	433		547.0		79.2	31.5	173		0		

Sample ID: **1908270-002AMS** SampType: **MS** Units: **µg/Kg-dry** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **BATCH** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056088**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	805	40.7	1,017	6.699	78.5	34.9	139				
Chrysene	739	40.7	1,017	0	72.6	45.2	146				
Benzo(b)fluoranthene	721	40.7	1,017	0	70.8	42.2	168				
Benzo(k)fluoranthene	738	40.7	1,017	0	72.5	20.5	150				
Benzo(a)pyrene	780	40.7	1,017	0	76.7	34.4	179				
Indeno(1,2,3-cd)pyrene	641	40.7	1,017	0	63.0	11.8	140				
Dibenz(a,h)anthracene	633	40.7	1,017	0	62.2	17.3	156				
Surr: 2-Fluorobiphenyl	350		508.7		68.9	19.4	157				
Surr: Terphenyl-d14 (surr)	366		508.7		71.9	31.5	173				

Sample ID: **1908270-002AMSD** SampType: **MSD** Units: **µg/Kg-dry** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **BATCH** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056089**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	784	40.1	1,002	6.699	77.6	34.9	139	805.1	2.64	30	
Chrysene	725	40.1	1,002	0	72.4	45.2	146	738.8	1.84	30	
Benzo(b)fluoranthene	758	40.1	1,002	0	75.6	42.2	168	720.7	5.02	30	
Benzo(k)fluoranthene	594	40.1	1,002	0	59.3	20.5	150	737.5	21.5	30	

Date: *8/21/2019*

Work Order: 1908271
CLIENT: Libby Environmental
Project: Havens

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **1908270-002AMSD** SampType: **MSD** Units: **µg/Kg-dry** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **BATCH** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056089**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo(a)pyrene	730	40.1	1,002	0	72.9	34.4	179	780.3	6.68	30	
Indeno(1,2,3-cd)pyrene	658	40.1	1,002	0	65.7	11.8	140	641.0	2.59	30	
Dibenz(a,h)anthracene	648	40.1	1,002	0	64.7	17.3	156	632.9	2.43	30	
Surr: 2-Fluorobiphenyl	310		500.9		61.9	19.4	157		0		
Surr: Terphenyl-d14 (surr)	332		500.9		66.3	31.5	173		0		

Date: *8/21/2019*

Work Order: 1908271
CLIENT: Libby Environmental
Project: Havens

QC SUMMARY REPORT

Sample Moisture (Percent Moisture)

Sample ID: **1908279-005ADUP**	SampType: **DUP**			Units: **wt%**		Prep Date: **8/21/2019**			RunNo: **53376**		
Client ID: **BATCH**	Batch ID: **R53376**					Analysis Date: **8/21/2019**			SeqNo: **1055948**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	11.0	0.500						11.05	0.919	20	

Sample ID: **1908271-001ADUP**	SampType: **DUP**			Units: **wt%**		Prep Date: **8/21/2019**			RunNo: **53376**		
Client ID: **PS-2-1**	Batch ID: **R53376**					Analysis Date: **8/21/2019**			SeqNo: **1055960**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	17.6	0.500						17.82	1.44	20	

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**1908271**
Logged by:	**Clare Griggs**	Date Received:	**8/20/2019 9:15:00 AM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	UPS		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Required ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >0°C to 10.0°C *	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

19. Additional remarks:

Item Information

Item #	Temp ºC
Cooler	4.9
Sample	8.1

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

1908271

www.LibbyEnvironmental.com

Client: Libby Environmental, Inc
Address: See above
City: State: Zip:
Phone: Fax:
Client Project # L190819-1

Date: 8/19/19 Page: 1 of 1
Project Manager: Sherry Chilcutt
Project Name: Havens
Location: City, State: Olympia, WA
Collector: MW Date of Collection: 8-19-19
Email: Libbyenv@Gmail.com

Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-Gx	BTEX 8021	NWTPH-HCID	NWTPH-Dx	NWTPH-Dx/Dx	c PAH 8270	PAH 8270	Semi Vol 8270	PCB 8082	MTCA 5 Metals	RCRA 8 Metals			Field Notes
1 PS-2-1	1	1100	Soil	4 oz							X								
2 PS-3-1	1	1105	⊥	⊥							X								
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
KJD	8/19/19 1250	UPS	
UPS		Zoë Rowland	8/20/19 9:15

Sample Receipt

Good Condition?	Y N
Cooler Temp.	°C
Sample Temp.	°C
Total Number of Containers	

Remarks:

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

August 21, 2019

Max Wills
Robinson Noble
17625 130th Avenue NE, Suite 102
Woodinville, WA 98072

Dear Mr. Wills:

Please find enclosed the analytical data report for the Havens Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

3322 South Bay Road NE
Olympia, WA 98506

Ph: 360-352-2110
Fax: 360-352-4154

Date: 8/19/19 Page: 1 of 1

Client: RN

Project Manager: MAX WILLS

Address: 17625 130th AVE NE, SUITE 102

Project Name: HAVENS

City: WOODINVILLE State: WA Zip: 98072

Location: OLYMPIA City, State: WA

Phone: 206 550-7215 Fax:

Collector: MTW Date of Collection: 8/19/19

Client Project # 2491-001 G

Email: mwillsQ robinson-noble. com

Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-Gx	BTEX 8021	NWTPH-HCID	NWTPH-Dx	NWTPH-Dx/Dx	c PAH 8270	PAH 8270	Semi Vol 8270	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	LEAD			Field Notes
1 S-EX#2-1-2	2	1300	Soil	4oz							X						X			
2 S-EX#2-2-2	2	1305	Soil	4oz							X						X			
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	8/19/19 1423	[signature]	8/19/19 14:26
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y N
Cooler Temp.	°C
Sample Temp.	°C
Total Number of Containers	

Remarks:
LEAD RUSH
PAH 48 hr

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a cout of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L190819-2
Client Project # 2491-001G

Analyses of Total Lead in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (mg/kg)
Method Blank	8/19/19	nd
S-EX#2-1-2	8/19/19	nd
S-EX#2-2-2	8/19/19	nd
Practical Quantitation Limit		5.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

HAVENS PROJECT
Robinson Noble
Olympia, Washington
Libby Project # L190819-2
Client Project # 2491-001G

QA/QC for Total Lead in Soil by EPA Method 7010 Series

Sample Number	Date Analyzed	Lead (% Recovery)
LCS	8/19/19	100%
L190819-1 MS	8/19/19	103%
L190819-1 MSD	8/19/19	109%
RPD	8/19/19	6%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Dirk Peterson

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

HAVENS PROJECT
Robinson Noble
Libby Project # L190819-2
Date Received 8/19/2019
Time Received 2:26 PM

Received By EN

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☑ Hand Delivered	☐ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☐ Yes	☑ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☐ Yes	☐ No	☑ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☐ No	☑ N/A
6. Was an attempt made to cool the samples?	☐ Yes	☑ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	N/A °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	15.7 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☐ Yes	☐ No	☑ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies?	☐ Yes	☐ No	☑ N/A

Person Notified: ______ Date: ______

By Whom: ______ Via: ______

Regarding: ______

19. Comments.

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Sherry Chilcutt
3322 South Bay Road NE
Olympia, WA 98506

RE: Havens
Work Order Number: 1908270

August 21, 2019

Attention Sherry Chilcutt:

Fremont Analytical, Inc. received 2 sample(s) on 8/20/2019 for the analyses presented in the following report.

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)
Sample Moisture (Percent Moisture)

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

CLIENT:	Libby Environmental
Project:	Havens
Work Order:	1908270

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1908270-001	S-EX #2-1-2	08/19/2019 1:00 PM	08/20/2019 9:15 AM
1908270-002	S-EX #2-2-2	08/19/2019 1:05 PM	08/20/2019 9:15 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1908270**

Date: **8/21/2019**

CLIENT: Libby Environmental
Project: Havens

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **1908270**
Date Reported: **8/21/2019**

Client: Libby Environmental
Collection Date: 8/19/2019 1:00:00 PM
Project: Havens
Lab ID: 1908270-001
Matrix: Soil
Client Sample ID: **S-EX #2-1-2**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 25563		Analyst: SB
Benz(a)anthracene	ND	42.6		µg/Kg-dry	1	8/20/2019 7:50:32 PM
Chrysene	ND	42.6		µg/Kg-dry	1	8/20/2019 7:50:32 PM
Benzo(b)fluoranthene	ND	42.6		µg/Kg-dry	1	8/20/2019 7:50:32 PM
Benzo(k)fluoranthene	ND	42.6		µg/Kg-dry	1	8/20/2019 7:50:32 PM
Benzo(a)pyrene	ND	42.6		µg/Kg-dry	1	8/20/2019 7:50:32 PM
Indeno(1,2,3-cd)pyrene	ND	42.6		µg/Kg-dry	1	8/20/2019 7:50:32 PM
Dibenz(a,h)anthracene	ND	42.6		µg/Kg-dry	1	8/20/2019 7:50:32 PM
Surr: 2-Fluorobiphenyl	61.8	19.4 - 157		%Rec	1	8/20/2019 7:50:32 PM
Surr: Terphenyl-d14 (surr)	85.5	31.5 - 173		%Rec	1	8/20/2019 7:50:32 PM
Sample Moisture (Percent Moisture)				Batch ID: R53376		Analyst: SBM
Percent Moisture	15.8	0.500		wt%	1	8/21/2019 8:15:06 AM

Analytical Report

Work Order: **1908270**
Date Reported: **8/21/2019**

Client: Libby Environmental
Collection Date: 8/19/2019 1:05:00 PM
Project: Havens
Lab ID: 1908270-002
Matrix: Soil
Client Sample ID: S-EX #2-2-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 25563		Analyst: SB
Benz(a)anthracene	ND	41.5		µg/Kg-dry	1	8/20/2019 6:27:36 PM
Chrysene	ND	41.5		µg/Kg-dry	1	8/20/2019 6:27:36 PM
Benzo(b)fluoranthene	ND	41.5		µg/Kg-dry	1	8/20/2019 6:27:36 PM
Benzo(k)fluoranthene	ND	41.5		µg/Kg-dry	1	8/20/2019 6:27:36 PM
Benzo(a)pyrene	ND	41.5		µg/Kg-dry	1	8/20/2019 6:27:36 PM
Indeno(1,2,3-cd)pyrene	ND	41.5		µg/Kg-dry	1	8/20/2019 6:27:36 PM
Dibenz(a,h)anthracene	ND	41.5		µg/Kg-dry	1	8/20/2019 6:27:36 PM
Surr: 2-Fluorobiphenyl	68.9	19.4 - 157		%Rec	1	8/20/2019 6:27:36 PM
Surr: Terphenyl-d14 (surr)	87.3	31.5 - 173		%Rec	1	8/20/2019 6:27:36 PM
Sample Moisture (Percent Moisture)				Batch ID: R53376		Analyst: SBM
Percent Moisture	10.6	0.500		wt%	1	8/21/2019 8:15:06 AM

Work Order: 1908270
CLIENT: Libby Environmental
Project: Havens

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **MB-25563** SampType: **MBLK** Units: **µg/Kg** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **MBLKS** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056084**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	ND	40.0									
Chrysene	ND	40.0									
Benzo(b)fluoranthene	ND	40.0									
Benzo(k)fluoranthene	ND	40.0									
Benzo(a)pyrene	ND	40.0									
Indeno(1,2,3-cd)pyrene	ND	40.0									
Dibenz(a,h)anthracene	ND	40.0									
Surr: 2-Fluorobiphenyl	521		500.0		104	19.4	157				
Surr: Terphenyl-d14 (surr)	534		500.0		107	31.5	173				

Sample ID: **LCS-25563** SampType: **LCS** Units: **µg/Kg** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **LCSS** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056085**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	1,220	40.0	1,000	0	122	36.6	142				
Chrysene	987	40.0	1,000	0	98.7	43	165				
Benzo(b)fluoranthene	1,040	40.0	1,000	0	104	41	155				
Benzo(k)fluoranthene	961	40.0	1,000	0	96.1	30.6	164				
Benzo(a)pyrene	1,120	40.0	1,000	0	112	30.2	171				
Indeno(1,2,3-cd)pyrene	857	40.0	1,000	0	85.7	31.3	159				
Dibenz(a,h)anthracene	837	40.0	1,000	0	83.7	28	158				
Surr: 2-Fluorobiphenyl	472		500.0		94.4	19.4	157				
Surr: Terphenyl-d14 (surr)	567		500.0		113	31.5	173				

Sample ID: **1908270-002ADUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **S-EX #2-2-2** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056087**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	ND	43.8						0		30	
Chrysene	ND	43.8						0		30	

Date: *8/21/2019*

Work Order: 1908270
CLIENT: Libby Environmental
Project: Havens

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **1908270-002ADUP** SampType: **DUP** Units: **µg/Kg-dry** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **S-EX #2-2-2** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056087**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo(b)fluoranthene	ND	43.8						0		30	
Benzo(k)fluoranthene	ND	43.8						0		30	
Benzo(a)pyrene	ND	43.8						0		30	
Indeno(1,2,3-cd)pyrene	ND	43.8						0		30	
Dibenz(a,h)anthracene	ND	43.8						0		30	
Surr: 2-Fluorobiphenyl	392		547.0		71.6	19.4	157		0		
Surr: Terphenyl-d14 (surr)	433		547.0		79.2	31.5	173		0		

Sample ID: **1908270-002AMS** SampType: **MS** Units: **µg/Kg-dry** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **S-EX #2-2-2** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056088**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	805	40.7	1,017	6.699	78.5	34.9	139				
Chrysene	739	40.7	1,017	0	72.6	45.2	146				
Benzo(b)fluoranthene	721	40.7	1,017	0	70.8	42.2	168				
Benzo(k)fluoranthene	738	40.7	1,017	0	72.5	20.5	150				
Benzo(a)pyrene	780	40.7	1,017	0	76.7	34.4	179				
Indeno(1,2,3-cd)pyrene	641	40.7	1,017	0	63.0	11.8	140				
Dibenz(a,h)anthracene	633	40.7	1,017	0	62.2	17.3	156				
Surr: 2-Fluorobiphenyl	350		508.7		68.9	19.4	157				
Surr: Terphenyl-d14 (surr)	366		508.7		71.9	31.5	173				

Sample ID: **1908270-002AMSD** SampType: **MSD** Units: **µg/Kg-dry** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **S-EX #2-2-2** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056089**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	784	40.1	1,002	6.699	77.6	34.9	139	805.1	2.64	30	
Chrysene	725	40.1	1,002	0	72.4	45.2	146	738.8	1.84	30	
Benzo(b)fluoranthene	758	40.1	1,002	0	75.6	42.2	168	720.7	5.02	30	
Benzo(k)fluoranthene	594	40.1	1,002	0	59.3	20.5	150	737.5	21.5	30	

Fremont Analytical

Date: *8/21/2019*

Work Order: 1908270
CLIENT: Libby Environmental
Project: Havens

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **1908270-002AMSD** SampType: **MSD** Units: **µg/Kg-dry** Prep Date: **8/20/2019** RunNo: **53380**
Client ID: **S-EX #2-2-2** Batch ID: **25563** Analysis Date: **8/20/2019** SeqNo: **1056089**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo(a)pyrene	730	40.1	1,002	0	72.9	34.4	179	780.3	6.68	30	
Indeno(1,2,3-cd)pyrene	658	40.1	1,002	0	65.7	11.8	140	641.0	2.59	30	
Dibenz(a,h)anthracene	648	40.1	1,002	0	64.7	17.3	156	632.9	2.43	30	
Surr: 2-Fluorobiphenyl	310		500.9		61.9	19.4	157		0		
Surr: Terphenyl-d14 (surr)	332		500.9		66.3	31.5	173		0		

Fremont Analytical

Date: 8/21/2019

Work Order: 1908270
CLIENT: Libby Environmental
Project: Havens

QC SUMMARY REPORT

Sample Moisture (Percent Moisture)

Sample ID: **1908279-005ADUP** SampType: **DUP** Units: **wt%** Prep Date: **8/21/2019** RunNo: **53376**
Client ID: **BATCH** Batch ID: **R53376** Analysis Date: **8/21/2019** SeqNo: **1055948**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	11.0	0.500						11.05	0.919	20	

Sample ID: **1908271-001ADUP** SampType: **DUP** Units: **wt%** Prep Date: **8/21/2019** RunNo: **53376**
Client ID: **BATCH** Batch ID: **R53376** Analysis Date: **8/21/2019** SeqNo: **1055960**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	17.6	0.500						17.82	1.44	20	

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**1908270**
Logged by:	**Clare Griggs**	Date Received:	**8/20/2019 9:15:00 AM**

Chain of Custody

#	Question	Yes	No	Other
1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	UPS		

Log In

#	Question	Yes	No	Other
3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Required ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >0°C to 10.0°C *	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

#	Question	Yes	No	Other
18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: ____ Date: ____

By Whom: ____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: ____

Client Instructions: ____

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	4.9
Sample	8.1

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Libby Environmental, Inc.

Chain of Custody Record 1908270

www.LibbyEnvironmental.com

3322 South Bay Road NE Ph: 360-352-2110
Olympia, WA 98506 Fax: 360-352-4154

Client: Libby Environmental, Inc.	Date: 8/19/19 Page: 1 of 1
Address: (see above)	Project Manager: Sherry Chilcutt
City: State: Zip:	Project Name: Havens
Phone: Fax:	Location: City, State: Olympia, WA
Client Project # L190819-2	Collector: M.W. Date of Collection: 8/19/19
	Email: libbyenv@gmail.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-Gx	BTEX 8021	NWTPH-HCID	NWTPH-Dx	NWTPH-Dx/Dx	c PAH 8270	PAH 8270	Semi Vol 8270	PCB 8082	MTCA 5 Metals	RCRA 8 Metals				Field Notes
1	S-EX#2-1-2	2	1300	soil	4oz jar							X									
2	S-EX#2-2-2	2	1305	⊥	⊥							X									
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					
16																					
17																					

Relinquished by:	Date / Time	Received by:	Date / Time
Melissa Taft	8/19/19 1500	UPS	
UPS		Zoë Rowland	8/20/19 9:15

Sample Receipt		
Good Condition?	Y	N
Cooler Temp.	°C	
Sample Temp.	°C	
Total Number of Containers		

Remarks:

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.

Distribution: White - Lab, Yellow - File, Pink - Originator